YOUR COMMENT ON THE WHITEROCK QUARRY AND MANAGED FILL

Please include all the contact details listed below with your comments and indicate whether you can receive further communications from us by email.

1. Contact Details			
Please ensure that you have authority to comment on the application on behalf of those named on this form.			
Organisation name (if relevant)	Canterbury Regional Council (Environment Canterbury)		
First name	Henry		
Last name	Winchester		
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2.			
☒	I can receive emails and my email address is correct	☐	I cannot receive emails and my postal address is correct

Thank you for your comments

10 of September 2026

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

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Stephanie Frame
Manager – Fast-track Operations
Fast-track Applications
Environmental Protection Authority
info@fasttrack.govt.nz

Kia ora Stephanie,

Thank you for your letter received 20 of August 2026 regarding the Whiterock Quarry and Managed Fill project from Whiterock Lime Limited.

Please find attached the response from Canterbury Regional Council (CRC) to the specific questions raised in the above letter. Also included within the response are general comments on the proposal which may assist the Minister in making their determination under section 21 of the Fast Track Approvals Act 2024 (FTAA).

Overall, CRC has not identified any matters that would trigger declining the referral under section 21, however the absence of such matters should not, in itself, be taken as demonstrating that the proposal meets the criteria for acceptance under section 22. In particular, following review by economic and waste management experts, CRC considers that the evidence does not support the applicant's statements that the proposal would provide significant regional or national benefits, as required by section 22(1)(a). The tables attached below provide more detailed consideration.

Should the Minister be of the mind to grant this referral, CRC would anticipate significant assessments supporting the substantive application when lodged. These assessments should include, evidence supporting the proposed waste management, economic and infrastructure benefits. CRC continues to be willing to work with the applicant in reviewing these assessments as part of our pre-application processes. CRC also considers that, if referral under the FTAA is considered more appropriate than continuing under the RMA, the submitters to the existing RMA application should be identified as parties who may be invited to comment on the substantive application under section 27(3)(b)(iii), allowing matters raised through the RMA process to be considered by the Expert Panel.

CRC trusts that these comments will assist the Minister in determining whether to accept the referral application and proceed with referring the project. Should any further information be required, please do not hesitate to contact us.

Ngā mihi

Henry Winchester

Manager Consents Planning

CANTERBURY REGIONAL COUNCIL COMMENTS UNDER S17 FTAA – WHITEROCK QUARRY AND MANAGED FILL

Specific questions from the EPA

Any applications that have been lodged with the Council that would be a competing application or applications if a substantive application for the project were lodged. If no such applications exist, please also confirm this in writing.

RMA applications CRC243699-CRC243706 lodged by Protranz International Limited are currently suspended, pending the outcome of this FTAA referral approval.

Protranz International Limited is owned by the same owners of Whiterock Lime Limited and the applicant has confirmed that the RMA applications in process are substantially the same as the Project seeking FTAA referral approval. The details of the RMA applications have been provided by the applicant in Attachment 10 of their referral application.

In relation to projects seeking approval of a resource consent under section 42(4)(a) of the FTAA, whether there any existing resource consents issued where sections 124C(1)(c) or 165ZI of the Resource Management Act 1991 (RMA) could apply, if the project were to be applied for as a resource consent under the RMA. If no such consents exist, please also confirm this in writing.

In accordance with section 30(3)(b) of FTAA, CRC can confirm that there are no existing resource consents of that kind.

Whether you consider the project may involve an ineligible activity, and if so, why (as defined in section 5 of the Act).

In accordance with section 5 of FTAA, CRC does not consider that the project may involve any ineligible activities.

Whether you consider any of the reasons to decline a referral application may be applicable to this application, and if so why (under section 21(5) of Act).

CRC has assessed the application against the circumstances in which the Minister must or may decline a referral application under section 21(3) to (5) of the Act, and the criteria for accepting a referral under section 22, as set out in the tables below. In summary, CRC does not identify any matters that would require, or support declining the referral under section 21(3) to (5).

However, CRC does not consider that the application demonstrates that the section 22 criteria are met. In particular, CRC considers that the evidence does not demonstrate that the proposal would provide significant regional or national benefits, including in relation to the claimed waste management, economic and infrastructure benefits.

GENERAL COMMENTS FROM CRC TO ASSIST WITH CONSIDERATION AGAINST S21 AND S22 FTAA

Criteria under Section 21	CRC Comment
3) The Minister must decline a referral application if— (a) the application may not be accepted under subsection (1)[1]; or	
(b) the Minister is satisfied that the project involves an ineligible activity; or	The application states that the project does not involve any ineligible activities. CRC agree and are not aware of the activity involving any ineligible activities as defined in Section 5 of the Act.
(c) the Minister considers that they do not have adequate information to inform the decision under this section.	While further information would be required to support a substantive decision, CRC considers that sufficient information has been provided to inform the Minister's decision on referral.
(4) The Minister may decline a referral application for any other reason, whether or not the project meets the criteria in section 22.	This is a matter for the Minister to determine.
(5) Reasons to decline a referral application under subsection (4) include, without limitation, the following: (a) the project would be inconsistent with any of the following: (i) a Treaty settlement: (ii) the Ngā Rohe Moana o Ngā Hapū o Ngāti Porou Act 2019: (iii) the Marine and Coastal Area (Takutai Moana) Act 2011: (iv) a Mana Whakahono ā Rohe: (v) a joint management agreement:	CRC considers other parties invited to comment on the referral application are the appropriate parties to advise the minister on these matters.
(b) it would be more appropriate to deal with the matters that would be authorised by the proposed approvals under another Act or Acts:	The RMA application for the project is suspended from processing, pending a decision on the referral application under the Fast-track Approvals Act 2024 (FTAA). Prior to its suspension, the RMA application had been publicly notified, with expert conferencing, directed by the Hearing Commissioner scheduled. CRC considers that the matters raised by submitters and other parties through the RMA process are important for consideration by decision makers (be it RMA or FTAA).

1

	While none of the activities sought are prohibited activities, regulation 45B(6) of the Resource Management (National Environmental Standards for Freshwater) Regulations 2020 set strict criteria which must be met for a consent to be granted. This strict test in an incentive for pursuing referral where the FTAA lessens the weighting given to these Regulations. Section 27(3)(b)(iii) FTAA provides for the Minister to invite any other parties to comment on a substantive application when making a decision on a referral. Should the Minister consider it is more appropriate to accept this referral application than to continue under the RMA; identifying the submitters on RMA application as other parties to comment on a substantive application could provide natural justice and ensure the expert panel are presented with all information as the RMA Hearing Commissioners may have had in front of them.
(c) the project may have significant adverse effects on the environment:	CRC considered the RMA application has the potential for significant adverse effects on the environment. This has been previously detailed in comments on the applicant's previous referral application (page 189 of Appendix 3 to this response). CRC notes that this referral application includes changes from both the RMA application and previously sought referral. The technical updates to the proposal appear to address some of the concerns previously identified regarding significant adverse effects however CRC's technical experts would need to undertake a detailed review of the updated proposal before it could be determined whether the amendments reduce the significance of the effects. Should the project be referred and a substantive application subsequently lodged, CRC considers that the updated technical reports identified in the referral application, particularly the terrestrial and aquatic ecology assessments, would need to be provided to enable CRC's technical experts to assess the updated proposal and determine whether the changes have addressed the potential adverse effects previously identified. Any further matters arising from that review could then be considered with the Applicant through the Fast-track process.
(d) the applicant (or, if the referral application is lodged by more than 1 person, any of those persons) has a poor compliance history under a specified Act that relates to any of the proposed approvals:	CRC notes that Whiterock Lime Limited, the applicant for the referral application, has no known compliance history under the RMA. The RMA application relating to the same activity was made by Protranz International Limited, which has a compliance history under the RMA. The compliance history of Protranz International Ltd is included within CRC comments on the previously referred proposal (page 25 of Appendix 3). CRC acknowledges that Whiterock Lime Limited and Protranz International Limited are separate legal entities and so connection cannot be made regarding compliance history for the two entities.
(e) the project area includes land that the Minister for Treaty of Waitangi Negotiations considers necessary for Treaty settlement purposes:	To CRC's knowledge, this criterion does not apply to the project area.
(f) the project includes an activity that is a prohibited	The Applicant is not seeking approval for a prohibited activity under the RMA.

activity under the Resource Management Act 1991[2]:	
(g) a substantive application for the project would have 1 or more competing applications:	RMA applications CRC243699-CRC243706 lodged by Protranz International Limited are suspended from processing, pending the outcome of this FTAA referral approval. Protranz International Limited is owned by the same owners of Whiterock Lime Limited and the applicant has confirmed that the RMA applications in process are substantially the same as the Project seeking FTAA referral approval. The details of the RMA applications have been provided by the applicant in Attachment 10 to their referral application.
(h) in relation to any proposed approval of the kind described in section 42(4)(a) (resource consent), there are 1 or more existing resource consents of the kind referred to in section 30(3)(a).	In accordance with section 42(4)(a) of FTAA, the CRC can confirm that there are no existing resource consents issued where sections 124C(1)(c) or 165ZI of the Resource Management Act 1991 (RMA) could apply.

CRITERIA FOR ASSESSING REFERRAL APPLICATION – SECTION 22(1-2)

Criteria under Section 22	CRC Comment
(1) The criteria for accepting a referral application are that— (a) the project is an infrastructure or development project that would have significant regional or national benefits; and	Attachment 4 of the application states that the proposal would provide regionally significant infrastructure through the provision of additional Class 3 managed fill capacity in Canterbury, while supporting development industries by reducing a key constraint in the development process. With the information provided to date, CRC is concerned that the project would not provide significant regional or national benefits. In relation to the claimed benefit of providing additional Class 3 managed fill capacity, the waste demand advice received by CRC acknowledges that the proposal would expand disposal options and increase competition in Canterbury, but considers that the proposal does not demonstrate a critical demand or regional significance given the other disposal options and increasing recovery outlets available in the Canterbury market. On this basis, CRC does not consider that the proposal would address a significant regional need for waste disposal capacity to support the development industry. CRC acknowledges that the quarrying operation also supports the primary sector through the supply of AgLime. However, AgLime is supplied by a number of other sites in the vicinity and across the region, and CRC does not consider that this establishes a significant regional or national benefit. Further detail regarding the economic and waste demand advice is provided in Appendices 1 and 2.
(b) referring the project to the fast-track approvals process— (i) would facilitate the project, including by enabling it to be processed in a more timely	CRC notes that an RMA application for the project is currently suspended pending a decision on this referral application. The RMA application was publicly notified, and CRC considers that the matters raised by submitters and other parties through that process are important for the consideration of the proposal.

[2]S21(7) states that a prohibited activity does not necessarily prevent referral Fast-track Approvals Act 2024 | New Zealand Legislation

and cost-effective way than under normal processes; and (ii) is unlikely to materially affect the efficient operation of the fast-track approvals process	The referral application seeks resource consents under the RMA only, as a Wildlife Act authority has already been obtained. Given approvals sought are under only one Act, consideration should be given to whether progressing the project under the FTAA would provide a more timely and cost-effective pathway than continuing with the existing RMA process. CRC notes, however, that the Applicant may be seeking referral under the FTAA in part due to the requirements of the National Environmental Standards for Freshwater Regulations 2020, particularly regulation 45B, which may present constraints to progressing the project under the RMA (as discussed in table above). CRC agrees with the Applicant that the project is unlikely to materially affect the efficient operation of the Fast-track approvals process.
(1A) For the purposes of subsection (1)(a), the Minister must consider a relevant Government policy statement.	No Government Policy Statement is applicable to this application.
(2) For the purposes of subsection (1)(a), the Minister may consider— (a) whether the project— (i) has been identified as a priority project in a central government, local government, or sector plan or strategy (for example, in a general policy statement or spatial strategy), or a central government infrastructure priority list:	The Applicant states that the project is not identified as a priority project but considers that it aligns with national and regional waste management policy settings. In particular, the Applicant considers that the provision of additional Class 3 managed fill capacity would support greater efficiency in the management of waste by enabling waste to be directed to the appropriate class of fill and preserving capacity for other waste streams. CRC notes that the waste demand expert engaged to assess the proposal has not identified a critical demand for additional Class 3 disposal capacity and questions the importance of a regional need for the proposed facility. Accordingly, CRC considers that the Applicant's claimed efficiency gains from directing waste to the appropriate class of fill, and thereby preserving capacity for other waste streams, are not currently supported by the available evidence. In particular, the current evidence does not indicate that there is a shortage of waste disposal capacity for Class 3 fill in Canterbury, with established disposal facilities identified as having long-term capacity to meet Canterbury's disposal needs. The waste demand advice also identifies increasing opportunities for the reuse, blending and recycling of Class 2 and 3 materials, which may further reduce the demand for landfilling.
(ii) will deliver new regionally or nationally significant infrastructure or enable the continued functioning of existing regionally or nationally significant infrastructure:	The Applicant considers that the proposal will deliver new regionally significant waste management infrastructure and enable regionally and/or nationally significant infrastructure developments. CRC questions the extent to which the proposal would provide regionally significant infrastructure or enable regionally or nationally significant infrastructure developments through the provision of additional waste management capacity. CRC acknowledges that the quarrying operation supports primary industries through the supply of AgLime; however, AgLime is also supplied by a number of other sites in the vicinity of the site and across the region. CRC's economic technical expert has reviewed the benefits and impacts claimed by the Applicant and considers that these are immaterial even at the Canterbury regional level, and therefore would be even less significant at a national level. The economic review also identifies that, when potential

	unmitigated cultural adverse impacts are taken into account, the costs associated with these impacts could be sufficient to offset any claimed benefits of the project. Further detail regarding the economic advice is provided in Appendix 2. The waste demand technical expert providing advice to CRC and WDC, considers that the proposal would expand disposal options and increase competition in Canterbury, but questions the critical demand or regional significance given the other disposal options and increasing recovery outlets available in the Canterbury market. Accordingly, CRC does not consider that the evidence demonstrates that the proposal would provide regionally significant waste management infrastructure or enable other regionally or nationally significant infrastructure developments. Further detail regarding the waste demand advice is provided in Appendix 1.
(iii) will increase the supply of housing, address housing needs, or contribute to a well-functioning urban environment (within the meaning of policy 1 of the National Policy Statement on Urban Development 2020):	The project is not a housing development project. The Applicant notes that the project may facilitate the development of housing projects by providing additional capacity for waste generated from demolition activities. CRC questions if there is a critical demand or regional shortage of waste disposal capacity in Canterbury. Accordingly, CRC does not consider that the proposal would provide a significant benefit in facilitating housing development through the provision of additional waste disposal capacity.
(iv) will deliver significant economic benefits:	The Applicant has provided an economic assessment to quantify the economic benefits associated with the project as Attachment 6 of the referral application. This assessment includes an updated memo responding to the economic report commissioned by CRC. Noting that the previous referral application for this activity was declined due to insufficient evidence of the economic and employment outcomes and how the project would deliver significant regional benefits; CRC commissioned an economic review of the assessment provided to CRC under s11 FTAA (included as Appendix 2 to this advice). CRC's economic expert has questioned both the economic benefits presented by the Applicant and the model used to quantify those benefits. While there remains a difference of view regarding the appropriate economic modelling methodology, CRC's economic technical expert considers that, even based on the Applicant's approach to quantifying the benefits, the project's assessed benefits and impacts are immaterial at the Canterbury regional level and therefore would be even less significant at a national level. The economic review also notes that, when potential unmitigated cultural adverse impacts are taken into account, the costs associated with these impacts could be sufficient to offset any claimed benefits of the project. CRC questions the economic benefits of this project at a regional level and certainly at a national level. Should the Minister grant this application for referral, CRC anticipates a more comprehensive economic assessment should support the substantive application.
(v) will support primary industries, including aquaculture:	The Applicant notes that the project would provide benefits to primary industries, including agriculture, through improved freight logistics. CRC does not contest that the project may provide some benefits to primary industries. However, CRC considers that any such benefits are unlikely to

	be of regional or national significance. Accordingly, CRC considers that this criterion has limited relevance to the proposal.
(vi) will support development of natural resources, including minerals and petroleum:	CRC notes that the Applicant has quantified the benefits associated with the quarrying activity. While the quarrying activity forms part of the proposal, CRC considers that the scale of the benefits identified is unlikely to be of regional or national significance. This is consistent with the economic advice received by CRC (Appendix 2), which considers that the assessed benefits and impacts of the project are immaterial even at the Canterbury regional level.
(vii) will support climate change mitigation, including the reduction or removal of greenhouse gas emissions:	The Applicant states that climate mitigation is not the primary purpose of the application. CRC agrees with the Applicant that this is not the primary purpose of the proposal and, accordingly, considers that this criterion has limited relevance to the proposal.
(viii) will support climate change adaptation, reduce risks arising from natural hazards, or support recovery from events caused by natural hazards:	The Applicant states that there is no direct relationship between the project and climate change adaptation or hazard recovery. CRC agrees with the Applicant and, accordingly, considers that this criterion has limited relevance to the proposal.
(ix) will address significant environmental issues:	The Applicant notes that the project would address environmental issues by providing additional capacity for waste disposal within the appropriate class of facility. CRC's waste demand technical expert considers a more detailed consideration is needed. Accordingly, CRC considers that the Applicant's claims regarding the environmental benefits of the proposal are not supported by the available evidence. On this basis, CRC considers that this criterion has limited relevance to the proposal.
(ixa) will promote competition in the grocery industry:	Not applicable.
(x) is consistent with local or regional planning documents, including spatial strategies:	The Applicant considers that the proposal is broadly aligned with the strategic direction of the relevant planning documents but acknowledges some tension with cultural matters. A detailed assessment of the proposal against the relevant Canterbury Regional Policy Statement (CRPS) objectives and policies is provided in Appendix 3 to this advice (commencing at page 154). There are significant areas of inconsistency with the objectives and policies of the Canterbury Regional Policy Statement (CRPS), particularly those relating to freshwater management, ecosystems and biodiversity, and public and Ngāi Tahu access to riverbeds. CRC also considers that the proposal is inconsistent with the CRPS provisions relating to waste management, as the proposed activities would result in a discharge to the environment and it is uncertain whether the resulting adverse effects can be avoided, remedied, or adequately mitigated. CRC considers that, through further consideration of the proposal's design and mitigation measures, there may be opportunities to address some of the identified inconsistencies with the CRPS.
(b) any other matters the Minister considers relevant.	Not applicable.

Whiterock Landfill Fast Track Referral Application Benefits Report – Peer review

I have been asked by Waimakariri District Council to peer review the WSP report Whiterock Quarry and Managed Fill Analysis of the Significant Benefits to the Region, in particular waste demand aspect, which is in support of the Whiterock Class 3 Managed Fill application under the Fast-track Approvals Act 2024 at the Whiterock Lime Quarry near Loburn in Canterbury.

I hold a Bachelor of Science with First Class Honours in Geology and a Master of Civil Engineering, with research that focused on risk assessment for closed landfills in North Canterbury. I have more than 10 years' senior management experience in the waste industry in Canterbury and across New Zealand.

The proposed Whiterock Landfill has approximately 500,000 m³ of usable airspace and is anticipated to operate for approximately 20 years, implying an average intake of approximately 800,000 tonnes, averaged at 40,000 tonnes per year. The same 40,000 tonnes per year is subsequently used to calculate transport and emissions benefits. It is challenging to conclusively determine how many tonnes of actual waste will likely be generated over this period.

The report claims that the proposed facility is well located and would expand disposal options available in Canterbury. Given the proximity of Whiterock to Christchurch, this statement in the report seems generally correct. Furthermore, Whiterock going ahead would increase competition in the landfill market.

The report refers to national waste data, including an estimate that between 4.5 and 7.5 million tonnes of soil is disposed of nationally in 2022-23. This claim supports the proposition that soil disposal is a significant national waste management issue. The report does not establish the volume of waste generated in Canterbury or the proportion of material that would realistically be available to Whiterock. These national figures are useful context, but do not accurately establish a regional need.

The report relies on forecast population growth, infrastructure investment and proposed development projects as important drivers of future waste demand. These factors do reasonably support an expectation that C&D waste and surplus soil will continue to be generated. It is noted that the report does not address increasing efforts for reuse and recycling of this material. For example, major residential development may generate significant earthworks material, but this does not necessarily mean that material will require off-site disposal. Companies such as Frews (at Marshs Road) and South Demolition (at Owaka Road) have also recently invested in material recovery and blending operations in Christchurch, avoiding landfill disposal for many materials previously considered waste.

The report identifies recent projects which generated approximately 14,500 tonnes of material that could be diverted from Class 1 or Class 2 landfill facilities to Whiterock. This is useful evidence that relevant waste streams are currently generated in Canterbury. The 14,500 tonnes identified are equivalent to approximately 35% of the 40,000-tonne annual throughput assumed in the report. Whiterock location would have been convenient for many of these projects.

The report could be enhanced if further information were to be provided regarding:

- current annual throughput at competing facilities;
- remaining consented capacity at these facilities;
- expected operating lives; and
- overlap between the competing facilities' WACs and the Whiterock WAC.

Without this information, it is difficult to determine whether Canterbury faces an actual capacity deficit, as opposed to a situation where additional capacity would principally increase competition and choice.

The report does not identify that Kate Valley currently accepts Class 2 and Class 3 (“high density”) material. The author understands Kate Valley has significant airspace and capacity for many decades, enough to take all the addressable market for Class 2 and 3 waste in Canterbury. It is recommended that the report reconsiders Kate Valley’s current disposal options and gate rates for these classes of materials.

Other Observation

Section 3.1 of the report states that contaminated soil and sorted C&D are inert. In reality, both contaminated soil and C&D have the potential to generate leachate, and the anerobic decomposition of organic material in C&D waste (without gas collection and destruction) will generate methane. For this reason, the term “inert” used in section 3.1 of the report could be reconsidered.

Conclusion

It is considered that the proposed facility is convenient and would expand disposal options available in Canterbury. Competition would increase, which would be commercially beneficial to those wishing to dispose of waste to land. The report uses national, rather than regional data to justify its benefit and does not identify that established landfills, including Kate Valley Landfill, likely have long-term capacity for Canterbury’s disposal needs for the foreseeable future.

The report does not discuss the increasing trend in industry for reuse, blending and recycling of Class 2 and 3 materials (e.g. at Frews and South Demolition facilities), avoiding the need for some current landfilling activities.

On balance, the report correctly identifies that the proposal has the potential to increase commercial landfilling options and competition in Canterbury. In my view the report does not demonstrate a critical demand or regional significance in its current form, given other disposal options and increasing recovery outlets available in the Canterbury market.

Greg Slaughter

IN THE MATTER **AND** **IN THE MATTER**	of the Fast-track Approvals Act 2024 (**FTAA**) of an application for approvals under the FTAA for the Whiterock Class 3 Managed Fill development **FTAA-2502-1062**

STATEMENT OF EVIDENCE OF DR RICHARD BRENT MEADE

27 June 2026

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1. Introduction

1.1 Scope of this Evidence

1. I have been asked by Environment Canterbury to assess the economic analysis (**the Analysis**) provided by Sapere on behalf of Whiterock Lime Limited (**the Applicant**) in support of the Whiterock Class 3 Managed Fill application (**the Application**) under the Fast-track Approvals Act 2024 (**FTAA**) for the development of a Class 3 managed fill facility at the Whiterock Lime Quarry near Loburn in Canterbury (**the Project**).

2. In particular, I have been asked whether, in my opinion as an expert economist, the Analysis credibly and robustly demonstrates the extent of the Project's regional or national benefits, and whether there are material adverse impacts arising from the Project either not addressed or inadequately accounted for in the Analysis. I have also been asked to provide my opinion on the significance of the Project's regional or national benefits.

1.2 Background, Experience and Code of Conduct

3. I am a professional economic consultant and researcher with 34 years' experience in providing economic and financial analysis and advice. My primary professional role is as Principal Economist at Cognitus Economic Insight, an economic consulting and research practice I founded in 2002. Since 2023, I have been an Adjunct Associate Professor at Griffith University, and was appointed a Lay Member of the High Court for Commerce Act matters in 2024. In June 2025, I retired after being on the organising committee of the Law & Economics Association of New Zealand for 10 years, having been president for three years, and Auckland vice president for six years.

4. Prior to founding Cognitus, I was an investment banker with Credit Suisse First Boston (1992-1998), through which I was a valuation and corporate finance specialist. I have also taught undergraduate and MBA finance and/or corporate finance for Victoria University of Wellington in New Zealand and Hong Kong multiple times, and completed a graduate-level course in finance as part of my PhD (further details below).

5. I have also been a Research Principal at the New Zealand Institute for the Study of Competition and Regulation (2001-2011), and a Senior Research Fellow at Auckland University of Technology (2015-2025). In addition to teaching finance or corporate finance, I have also lectured in industrial organisation and/or environmental economics at Auckland University of Technology and University of Auckland multiple times.

6. Since 1992, I have provided independent advice to 10 iwi/tribes, or groups of iwi, in negotiations with the Crown for settlements of historical claims arising from Crown breaches of the Treaty of Waitangi, including the landmark Ngāi Tahu settlement. I have also provided independent expert advice for multiple other Māori organisations, and government agencies in relation to Māori matters, on a range of policy and commercial matters.

7. I hold the following qualifications: a PhD (awarded with Distinction) in industrial organisation and regulation, as well as an MPhil and MSc in economic theory and econometrics, all from Toulouse School of Economics. I also hold a BSc (Hons, First Class) in statistics and operations research (including papers in economics and finance), a BSc in statistics and operations research, and a BCA in economics and finance, all from Victoria University of Wellington.

8. I belong to multiple professional and academic associations, including the Law & Economics Association of New Zealand (Member), Competition Law & Policy Institute of New Zealand (Member), Asia-Pacific Industrial Organisation Society (Member), New Zealand Association of Economists (Member), the New Zealand Institute of Forestry (Ordinary Member), and the Australian Centre for International Commercial Arbitration (Associate Member).

9. Relevant examples of my work for this exercise include:

    9.1. Assessing economic evidence provided in support of other applications under the FTAA, including for the Waihi North and Bendigo-Ophir gold-mining applications, the Te Ākau Bream Bay sand-mining application, the Delmore and Sunfield housing applications, and the Stella Passage port expansion application;

    9.2. Undertaking numerous and often-times complex financial evaluations;

    9.3. Applying the total economic value (**TEV**) framework for describing and categorising the full range of economic values that attach to a given activity or resource, and also non-market valuation (**NMV**) techniques for ascribing monetary values to product or service attributes that are not traded in markets and hence which lack identifiable market prices;

    9.4. Co-authoring a study commissioned by Te Puni Kōkiri on the economic value of recognising and protecting Māori taonga, sole-authoring a study on the economic value of access to kapa haka festivals, and providing expert evidence before the Waitangi Tribunal assessing the welfare costs to whānau of inequitable access to Māori language immersion schooling;

9.5. Providing expert evidence or commercial advice regarding fair sharing – e.g. of net social benefits or commercial returns;

9.6. Co-authoring a study commissioned by Kāhui Wai Māori on translating traditional Māori concepts regarding customary rights (over freshwater and geothermal resources) into contemporary economic terms;

9.7. Undertaking research on how land use is affected when land provides cultural services as well as commercial value, as well as research more broadly on the role of cooperative ownership in affecting business viability and behaviour; and

9.8. Providing expert economic evidence (including for multiple landmark cases) in the High Court, Waitangi Tribunal, and Environment Court.

10. I confirm that I have read the Environment Court Practice Note 2023 – Code of Conduct for Expert Witnesses (**the Code**), and have complied with it in the preparation of this evidence. I also agree to follow the Code when participating in any subsequent processes, such as expert conferencing, directed by the Panel. I confirm that the opinions I have expressed are within my area of expertise and are my own, except where I have stated that I am relying on the work or evidence of others, which I have specified.

1.3 Documents Reviewed

11. In preparing this evidence, I have reviewed the following documents:

11.1. A report prepared by Sapere for Whiterock dated April 2026, *Whiterock Class 3 Managed Fill: A Review of Economic Benefits* (**Sapere Report**);

11.2. An undated report prepared by WSP, *Attachment 8: Anticipated and Known Adverse Effects* (**WSP Report**);

11.3. An undated document prepared by or on behalf of the Applicant entitled *Whiterock Quarry and Managed Fill – Consultation Material* (**Consultation Material**);

11.4. An undated document prepared by WSP on behalf of the Applicant, *Appendix R: Containment Risk Assessment* (**Containment Risk Report**); and

11.5. Other documents and materials as referenced throughout this statement of evidence.

1.4 Summary of Main Conclusions

12. In the following sections I set out my detailed assessment of the Analysis. By way of summary, it is my opinion that:

12.1. The FTAA requires a clear assessment of whether the Project delivers net benefits to New Zealand's social welfare once all costs, disbenefits, and adverse impacts are accounted for. In economic terms, this necessitates a cost-benefit analysis (**CBA**), rather than an economic impact assessment (**EIA**).

12.2. The Sapere Report provides both an EIA (for full-time equivalent (**FTE**) employment impacts, and regional GDP impacts) and a partial CBA (for certain non-market benefits, ignoring non-market costs) – it is therefore not, or only partially, fit for purpose under the FTAA framework. Its EIA measures economic activity rather than benefits, includes costs as benefits, and overstates impacts due to use of input-output (**I-O**) multipliers which are known to over-state project impacts. Its CBA assesses non-market benefits but omits significant non-market adverse impacts. In either case, the results materially overstate the project's economic contribution. Accordingly, the Project's claimed impacts, let alone benefits, are not robustly established.

12.3. Critically, the Project's assessed benefits/impacts are immaterial at even the Canterbury regional level (hence only even more immaterial at the national level), even before allowing for potentially substantial unmitigated cultural adverse impacts, which costs are likely to be sufficient to offset any claimed Project impacts/benefits.

12.4. On the available evidence, it is implausible that the project delivers significant net regional or national benefits as required under the FTAA.

2. Comprehensive Cost-Benefit Analysis Required, Not Economic Impact Analysis or Only Partial Cost-Benefit Analysis

2.1 Overview

13. In this section I:

13.1. Explain why I understand the FTAA to require a comprehensive (not selective or partial) CBA of the Project's net benefits, accounting for both market and non-market benefits and costs; and

13.2. Explain why EIA of the sort used in the Analysis, which assesses the Project's "impacts" rather than its "benefits", is inappropriate, and how reliance on project "impacts" can result in projects being approved that lessen social welfare/wellbeing – i.e. result in disbenefits at a regional or national level.

2.2 Cost-Benefit Analysis Framework

14. I understand the framing of the FTAA to require a CBA, since the focus of s.3 is on projects that deliver significant regional or national "benefits":

14.1. By any interpretation, a regional or national "benefit" is something that makes a region or the nation "better off" in some sense – which is what "social welfare" in the CBA framework captures:

14.1.1. By contrast, impacts identified using EIA may or may not make a region or the nation better off, and do not do so comprehensively (since EIA's focus is on "market economy" impacts only – it ignores non-market considerations altogether, as discussed further in Section 3.2 below).

15. It follows that s. 3 must be focusing on projects that deliver positive net benefits (since if a project's net benefits are negative, then by definition the project is not beneficial):

15.1. By construction, EIA does not weigh benefits against costs, and can even conflate them by counting costs as relevant impacts (making it impossible in that case to determine net benefits).

16. These features alone point to the FTAA requiring some form of CBA (and not EIA, except as below) – it requires a comparison of project (gross) benefits (things that make a region or the nation better off) with project costs (things that make a region or the nation worse off), with the difference between the two measuring the extent to which the project generates "benefits":

16.1. I understand s. 85(3) of the FTAA to support this interpretation, requiring a consideration of a project's adverse impacts, which under the standard CBA framework – if applied comprehensively – would naturally be incorporated

(including non-market impacts), either quantitatively if possible or qualitatively otherwise;

16.2. Either way a Panel, as for any CBA, is able to weight relevant costs and benefits as it considers appropriate, and a formal CBA systematically transparently sets out all relevant costs and benefits, which helps to avoid omissions or double-counting.

17. Notably, the s. 3 focus is on "benefits" – if Parliament had intended that s. 3 should instead focus on "impacts", "GDP impacts", "GDP", "economic impacts", or "economic activity", I would have expected it and the FTAA to have said so:

17.1. <u>These other measures are only pertinent if and to the extent they measure "benefits"</u> – i.e. things that improve social welfare;

17.2. Impacts or activity are not necessarily beneficial – e.g. socially-harmful activities like illegal drug supply – this implies a need to establish how impacts or activity improve social welfare (whereas by definition "benefits" in a CBA are necessarily things that improve welfare).

18. From an economic perspective, that naturally favours CBA, and not EIA, especially if "impacts" include costs, which favours inefficient projects over comparable but efficient ones.

19. Note that the legislation does not specifically require or mandate CBA, but I understand that it does so in effect due to its framing (as above), with CBA in any case an economically coherent and systematic framework that directly aligns with the s. 3 focus on "benefits", and also informing s. 85(3) assessments (without precluding panel weighting, and helping to avoid omissions or double counting):

19.1. By contrast, in my opinion EIA is <u>inconsistent with</u> FTAA requirements <u>unless</u> it speaks directly to assessing net benefits – since it is not complying with the s. 3 focus on "benefits" otherwise.

19.2. EIA is remote from s. 3 "benefits" focus, and therefore needs to demonstrate how impacts are benefits, and properly distinguish costs from benefits, whereas CBA directly aligns with that focus.

20. In summary, the FTAA's focus on project "benefits" (net of monetary project costs and other monetary disbenefits), suitably weighed against project adverse impacts (including, among

other things, non-monetary costs), necessarily requires an assessment of how that project enhances New Zealand's social welfare/wellbeing (at a regional or national level), since if a project does not increase social welfare/wellbeing, then in economic terms it is not beneficial at an aggregated (i.e. regional or national) level:

20.1. I note that my conclusion, that the FTAA requires a CBA and not an EIA to assess a project's (net) benefits, has been echoed in a recent article by two other prominent New Zealand economists, Dr Timme Denne of Resource Economics, and Dr Adolf Stroombergen of Infometrics;[1]

20.2. I further note that the Sapere Report plainly acknowledges that it has assessed the Project's impacts on economic activity, and not its contribution to social welfare.[2]

2.3 Focus on Benefits – Not Impacts – Essential for Assessing Whether Projects Improve Social Welfare/Wellbeing

21. Elaborating on the above discussion, following Treasury guidance, and based on my own assessment – for the purposes of sound economic decision-making – any assessment of whether the Project gives rise to significant regional or national benefits as required under the FTAA necessarily requires a CBA, and not an EIA (and partial CBA) as provided in the Analysis (discussed further below):

21.1. Such a CBA measures the net benefits of an undertaking like the Project, being the total incremental benefits of the Project, less its total incremental costs (including opportunity costs, and both indirect market and non-market costs and benefits as well as direct ones), appropriately adjusted for time and risk, and allowing for any salient distributional impacts;

21.2. By contrast, EIA purports to measure the economic impact of the Project, not its benefits (and hence not its contribution to social wellbeing) *per se* – including by treating Project costs as benefits, even if national wellbeing could be improved by allocating fewer resources elsewhere:[3]

[1] https://www.rmla.org.nz/rmla-insights/benefits-analysis-under-the-ftaa.

[2] Sapere Report, at p. 16.

[3] Treasury, 2015, *Guide to Social Cost Benefit Analysis*, July, at p. 54.

21.2.1. The classic example of EIA indicating a benefit, when society is not in fact made better off by the relevant activity, is paying a person to dig a hole and then pay them to fill it in again.

21.2.2. This is counted as a gain under EIA – two payments of wages – but not under CBA – wage costs are incurred for a socially pointless activity, when the relevant labour resources could have been used for socially beneficial activities elsewhere in the economy at the same wage cost.

22. Indeed, Treasury argues for the use of CBA as follows:[4]

22.1. "[A]ll advice that is aimed at helping decision-makers make a decision, should adopt a CBA framework as an organising principle"; and

22.2. Investment in systematic CBA is justified whenever decisions impact on large numbers of people.

23. By contrast, Treasury notes the following additional shortcomings of EIA (which measures components of GDP):[5]

23.1. It does not measure social welfare *per se*;

23.2. It makes no inherent distinction between economic impact accruing to local parties and economic impact accruing to overseas parties – i.e. it fails to identify whether project impacts accrue to New Zealand (as is required by "significant regional or national benefits") or to overseas parities (about whose welfare the FTAA appears to be unconcerned);

23.3. It ignores non-market effects, which can be socially important; and

23.4. It offers no insight as to any distributional concerns – i.e. whether resources are allocated to groups deemed in need of greater access than others.[6]

[4] Treasury, 2015, *Guide to Social Cost Benefit Analysis*, July, at p. 39.

[5] Treasury, 2015, *Guide to Social Cost Benefit Analysis*, July, at p. 47.

[6] This latter issue can be partially addressed through an alternative approach involving a social accounting matrix (**SAM**), which the Analysis does not apply.

24. Treasury concludes that "EIA can provide useful contextual information for decision-makers, but it is not suitable as a tool for measuring the balance of costs and benefits of a decision to society"[7] [emphasis added]:

    24.1. This appears highly pertinent to assessing FTAA applications.

25. To Treasury's list I would also point out that EIA typically focuses on only gross Project "market" (versus "non-market") economic impacts – see Section 3.2 below for further discussion – and as such does not account for adverse Project economic impacts (whether market or non-market) or non-market Project benefits for that matter. Hence EIA is inherently partial in its coverage, whereas CBA, if applied properly, captures all relevant positive or negative project effects:

    25.1. Furthermore, as above, EIA can even treat adverse project impacts as benefits – e.g. by treating expenditures to remediate adverse impacts as desirable Project impacts – such as due to requiring expenditures on capital, labour or other inputs (whereas in CBA terms such expenditures would be counted as costs incurred to mitigate the social costs of the relevant adverse impacts, with any such mitigation counting as a social benefit).

26. By way of illustration, if an oil spill creates $10m in non-market social costs (e.g. environmental harms not directly affecting market economic activity), but those social costs are halved by spending $1m on cleanup, then CBA counts the cleanup costs as a cost, while recording a reduction in the oil spill social costs of $5m (still counting the remaining unremedied $5m of the spill's social costs as an outstanding social cost):

    26.1. EIA by contrast ignores the social costs of the spill (whether pre- or post-cleanup), but counts the expenditure on cleanup as a positive economic impact – as if a social welfare gain has been enjoyed due to the oil spill, when in net terms society bears $5m in unmitigated social costs, and spent $1m of resources that could have been used elsewhere for social benefit (e.g. spending on health, education, infrastructure, etc).

27. As such, failing to assess the Project in terms of its net social benefits under a CBA framework risks misallocating national resources, with purported regional or national benefits potentially being lower – and distributed more inequitably – than what could be

[7] Treasury, 2015, *Guide to Social Cost Benefit Analysis*, July, at p. 39.

achieved through more efficient and equitable use of resources (as might be identified using CBA).

28. I consider a full CBA of the Project to be feasible, and warranted given its identified adverse impacts (discussed further in Section 3.4 below).

29. A hypothetical example further illustrates how relying on project impacts rather than project benefits can lead to a reduction in social welfare/wellbeing – i.e. negative project benefits, or net project disbenefits (either way, failing to achieve the FTAA's purpose). Specifically, if two projects deliver exactly the same non-employment benefits, but one of them involves twice the employment level of the other:

    29.1. EIA would suggest that the project with the higher employment level is to be preferred due to having larger employment impacts – yet the other project is by assumption twice as labour-efficient, since it can deliver the same non-employment benefits with only half the required employees (also meaning that the extra employees required to deliver the less efficient project could be deployed elsewhere in the economy, and thereby generate even further benefits for the region or nation);

    29.2. A CBA would prefer the project that delivers the given level of non-employment benefits with the lower required workforce, and lead to better overall economic outcomes – i.e. would deliver greater economic "benefits" as required for FTAA purposes, if not higher economic "impacts" (as measured by EIA).

3. Assessment of Sapere's Economic Analysis

3.1 Overview

30. In this section I explain how the Analysis:

    30.1. Applies EIA to assess the Project's employment (i.e. full-time equivalent, **FTE**) and GDP impacts (as opposed to benefits), and a one-sided and partial CBA of certain Project non-market benefits (ignoring offsetting Project non-market costs);

    30.2. Overstates the Project's impacts due to its use of I-O multipliers which are known to produce biased (i.e. overstated) impacts because they rest on certain restrictive assumptions that are typically not valid in practice;

30.3. Further overstates the Project's impacts/benefits by not accounting for all relevant project costs, disbenefits, or adverse impacts – notably, unmitigated cultural costs, which I conservatively show to be of an order of magnitude sufficient to either fully or largely offset the Project's claimed impacts/benefits;

30.4. Implicitly assumes, without providing justification, that existing waste levels are socially desirable, and that it is desirable to accommodate those waste levels, albeit more efficiently, via the Project;

30.5. Claims that the Project provides important enabling benefits (i.e. benefits to other sectors such as construction), but explicitly assumes that the Canterbury region's waste requirements will be met without the Project (just at very slightly higher costs);

30.6. Incorporates certain technical errors – both material and immaterial;

30.7. Fails to provide sensitivity analyses, and is insufficiently transparent to fully test and validate its key assumptions and modelling choices;

30.8. Provides assessed Project impacts/benefits differing by an entire order of magnitude across scenarios, making it difficult to understand what the true level of claimed Project impacts/benefits really are; and

30.9. Results in claimed Project impacts/benefits which, even if taken at face value, are immaterial at a regional level (and hence only even more immaterial at a national level), so cannot plausibly constitute significant regional or national benefits as required under the FTAA.

3.2 Sapere Report Does Not Provide a Comprehensive Assessment of Project Benefits

31. The Sapere Report provides a hybrid form of analysis, comprising:

31.1. An EIA of the Project's employment (i.e. FTE) and GDP impacts; and

31.2. A partial but one-sided assessment of the Project's non-market benefits – specifically, the value of travel time savings, reduced greenhouse gas emissions, and avoided crash costs are assessed, but offsetting non-market Project costs (i.e. cultural costs) are not assessed.

32. As explained in Section 2, impacts assessed using EIA are not the same as benefits as required under the FTAA, so by definition EIA fails to provide an accurate assessment of even the Project's "market" benefits:

    32.1. On the other hand, while the Analysis legitimately assesses non-market Project benefits, its omission of relevant non-market costs means it further fails to fully assess the Project's (net) benefits.

33. To better understand the distinction between "market" and "non-market" benefits and costs, market-based values relate to things (like commodities, or labour) that are traded in markets and which can be valued by reference to market prices. Conversely, non-market goods or services are not traded in markets:

    33.1. This does not mean non-market goods or services are unimportant (publicly-provided health or education services are a prominent example), but rather that their value is often overlooked or incompletely assessed because it is not possible to use market prices to estimate their value – when they are not treated commensurately with market goods or services, their values tend to be under-acknowledged;[8]

    33.2. Such non-market costs/benefits are typically not immaterial just because they lack market prices – according to a prominent study assessing non-market values of New Zealand's land-based ecosystems, those non-market values can be at least as great as their market values.[9]

34. A framework commonly used by economists to characterise the full range of both market and non-market values is the so-called Total Economic Value (**TEV**) framework:[10]

    34.1. For example, the TEV framework can be used to characterise the full range of values that can be attached to things like natural resources;[11]

[8] Eppink et al., 2016, *Non-Market Values in a Cost-Benefit World: Evidence from a Choice Experiment*, https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0165365.

[9] Patterson and Cole, 2013, *'Total Economic Value' of New Zealand's Land-Based Ecosystems and their Services.*

[10] A survey of the TEV literature is provided in NZIER, 2018, *What's the Use of Non-Use Values?*

[11] It is also increasingly being used to assess cultural value. For a survey, see Allan et al., 2013, Value and Culture, Motu Working Paper 13-09.

34.2. Relatedly, over many decades economists from multiple specialisations (e.g. environmental, transport, labour, health, education and cultural economics) have developed an extensive and well-established range of sophisticated non-market valuation (**NMV**) techniques to objectively estimate people's subjective non-market values.

35. A 2018 Treasury discussion paper applies the TEV framework to the valuation of natural capital (i.e. minerals, energy resources, land, soil, water, trees, plants and wildlife),[12] stating that the "general framework has been recognised for the past 30 years".[13]

36. In short, the TEV framework recognises that the value attaching to any given resource (e.g. minerals) is not confined to the value that can be realised in a market exchange of that resource or the commercial produce it can sustain, but can either:

36.1. Sustain a range of co-existing and additive other values (e.g. social, environmental or cultural values), even if market prices do not exist to directly quantify those other values; or

36.2. Conflict with those other values – e.g. creating non-market opportunity costs.

37. While there are numerous variants of the TEV framework applied in practice,[14] Figure 1 illustrates one such variant, based on a prominent study assessing TEV for New Zealand's land-based ecosystems.[15] Importantly, the Analysis:

37.1. Considers via its EIA only impacts (vs benefits) relating to what Figure 1 characterises as just a subset of "use value" relating to the Project, namely provisioning services value;

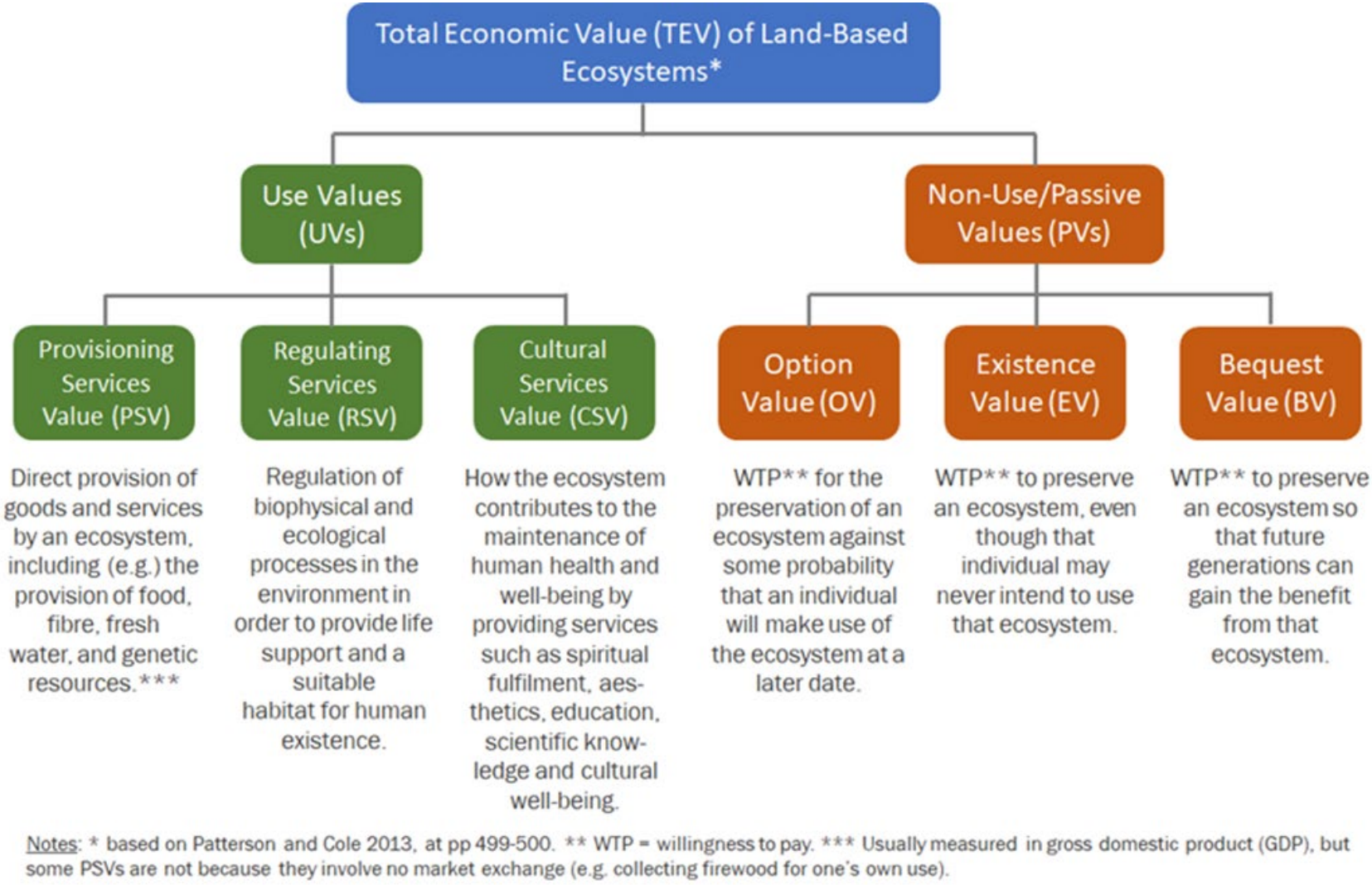
[12] van Zyl and Au, 2018, *The Start of a Conversation on the Value of New Zealand's Natural Capital*, Treasury Discussion Paper 18/03.

[13] van Zyl and Au, 2018, *The Start of a Conversation on the Value of New Zealand's Natural Capital*, Treasury Discussion Paper 18/03, at p. 7.

[14] For multiple examples, see van Zyl and Au, 2018, *The Start of a Conversation on the Value of New Zealand's Natural Capital*, Treasury Discussion Paper 18/03, Appendix 1, at pp 36-39.

[15] Patterson and Cole, 2013, *'Total Economic Value' of New Zealand's Land-Based Ecosystems and their Services*.

Figure 1 – Total Economic Value (TEV) Framework as Applied to New Zealand's Land-Based Ecosystems by Patterson and Cole 2013



Source: Author's adaptation of Patterson and Cole 2013.

37.2. Considers benefits – or in this case, avoided costs – relating to other use values (regulating services value), but not foregone cultural services value (i.e. cultural costs); and

37.3. Ignores other likely important values relating to the Karetu River, such as "passive values" relating to option, bequest and existence values, all of which are likely to be important components of cultural values attaching to the river.

38. Notable in relation to the latter, the WSP Report acknowledges that the Project has more than minor adverse effects, or potentially significant adverse effects, on the cultural landscape because Ngāi Tūāhuriri, as local mana whenua and cultural experts:[16]

38.1. Oppose the Project; and

38.2. Consider themselves adversely affected by the Project due to its proximity to the Karetu River, including (among other things) because it diminishes the river's mauri.

39. Clearly it is open to the Panel to weigh any adverse impacts of the Project against claimed Project benefits (whether measured as impacts or benefits) with or without any or all of those adverse impacts being monetised. However:

39.1. This would seem incongruous if any adverse effects are inherently monetisable and benefits/impacts have been presented in monetary terms;

39.2. Good modelling practice would be to systematically and transparently include all credibly monetisable costs and benefits in the model itself, since omitting relevant and material costs or benefits clearly risks misleading modelling conclusions being reached;

39.3. If relevant and material adverse effects are not monetised in some objective way, they can only be weighed in purely subjective terms against monetised (net) project benefits, which calls the very purpose of economic modelling into question (if it is not necessary for adverse effects, then is it necessary for benefits/impacts, and if not, then what would be the basis for assessing regional or national benefits?);

39.4. Hence, monetising impacts – where this can be done credibly – should assist Panels in their assessment of how project benefits compare with project adverse impacts.

[16] WSP Report, at p. 27.

40. In practice, many non-market benefits can only be monetised approximately. However, it is a false dichotomy to suggest that any or all market impacts/benefits can be monetised more accurately. This is because the Project's market impacts/benefits arise over a future 20 year period, and it is impossible to accurately assess Project impacts/benefits arising in even five let alone 20 years' time, given the relevant market prices and production technologies are inherently uncertain and impossible to predict with accuracy:

    40.1. This is not to suggest that modelling should be abandoned – rather that it be applied as systematically, transparently and robustly as it can be, highlighting the implications of key areas of uncertainty for modelled results – e.g. performing sensitivity analyses on key input assumptions, as discussed further in Section 3.8 below;

    40.2. That would then better support any remaining subjective trade-offs that need to be made, while avoiding the need for subjective trade-offs wherever possible.

41. In any case, I agree in general terms with the approach taken in the Sapere Report to apply widely-used metrics of relevant non-market values to assess the Project's non-market benefits – Sapere has not taken the position that only market impacts/benefits can or should be monetised:

    41.1. My main point of departure with Sapere's approach to assessing non-market impacts/benefits is that only non-market benefits have been monetised, and no attempt has been made to asses even the relevant order of magnitude of any corresponding non-market (e.g. cultural) costs;

    41.2. As a consequence, the Sapere Report presents an upwards-biased assessment of the Project net non-market impacts/benefits.

3.3 Multiplier-Based Economic Impact Analysis Has Known Limitations Leading to Overstated Benefits, Which Alternative Methods Avoid

42. Even if an EIA were deemed appropriate for establishing significant regional or national benefits, this requires use of an approach that more properly assesses the flow-on economic impacts of the Project than the I-O multiplier method used in the Sapere Report. That method

has widely-acknowledged limitations due to the restrictive and unrealistic assumptions it is based upon, and systematically overstates economic benefits due to those limitations.[17]

43. For example, the Australian Bureau of Statistics (**ABS**) ceased publishing I-O multipliers almost 25 years ago due to the method's unrealistic assumptions and inherent bias, stating:[18]

> "Production of multipliers was discontinued with the 2001–02 issue for several reasons. There was considerable debate in the user community as to their suitability for the purposes to which they were most commonly applied, that is, to produce measures of the size and impact of a particular project to support bids for industry assistance of various forms. …
>
> "I–O multipliers are most commonly used to quantify the economic impacts (both direct and indirect) relating to policies and projects. While their ease of use makes I–O multipliers a popular tool for economic impact analysis, they are based on limiting assumptions that results in multipliers being a biased estimator of the benefits or costs of a project." [emphasis added]

44. The ABS summarises the "inherent shortcomings and limitations of multipliers for economic impact analysis" as follows:[19]

    44.1. **Lack of supply–side constraints:** The most significant limitation of economic impact analysis using multipliers is the implicit assumption that the economy has no supply–side constraints. That is, it is assumed that extra output can be produced in one area without taking resources away from other activities, thus overstating economic impacts. The actual impact is likely to be dependent on the extent to which the economy is operating at or near capacity.

    44.2. **Fixed prices:** Constraints on the availability of inputs, such as skilled labour [or housing], require prices to act as a rationing device. In assessments using multipliers, where factors of production are assumed to be limitless, this rationing response is

[17] For example, see Counsell, K., 2024, "Improving economic analysis in environmental decision-making: a tale of two coal mines", *Resource Management Journal*, August. A more comprehensive discussion of I-O multipliers and their alternatives for economic impact analysis is given in Dwyer, L., Forsyth, P. and W. Dwyer, 2020, chapter 9, "The Economic Impacts of Tourism", *Tourism Economics and Policy*, Channel View Publications.

[18] https://www.abs.gov.au/ausstats/abs@.nsf/Previousproducts/5209.0.55.001Main%20Features42009-10.

[19] https://www.abs.gov.au/ausstats/abs@.nsf/Previousproducts/5209.0.55.001Main%20Features42009-10.

assumed not to occur. Prices are assumed to be unaffected by policy and any crowding out effects are not captured.

44.3. **Fixed ratios for intermediate inputs and production:** Economic impact analysis using multipliers implicitly assumes that there is a fixed input structure in each industry and fixed ratios for production. As such, impact analysis using multipliers can be seen to describe average effects, not marginal effects. For example, increased demand for a product is assumed to imply an equal increase in production for that product. In reality, however, it may be more efficient to increase imports or divert some exports to local consumption rather than increasing local production by the full amount;

44.4. **No allowance for purchasers' marginal responses to change:** Economic impact analysis using multipliers assumes that households consume goods and services in exact proportions to their initial budget shares. For example, the household budget share of some goods might increase as household income increases. This equally applies to industrial consumption of intermediate inputs and factors of production.

44.5. **Absence of budget constraints:** Assessments of economic impacts using multipliers that consider consumption induced effects (type two multipliers) implicitly assume that household and government [e.g. local government] consumption is not subject to budget constraints.

44.6. **Not applicable for small regions:** Multipliers that have been calculated from the national I–O table are not appropriate for use in economic impact analysis of projects in small regions. For small regions multipliers tend to be smaller than national multipliers since their inter–industry linkages are normally relatively shallow. Inter–industry linkages tend to be shallow in small regions since they usually don't have the capacity to produce the wide range of goods used for inputs and consumption, instead importing a large proportion of these goods from other regions.

45. Notably, for the Project, the Analysis' methodology not allowing for supply–side constraints means that competition for things like (skilled) labour, materials, or accommodation for construction and other workers – if there is not significant excess capacity for those things – might simply displace economic activity elsewhere.

46. Likewise, due to implicitly assuming fixed input prices, the Project's purported impact may turn out to be much less beneficial than as assessed if competition for things like (skilled)

labour or temporary accommodation for development and other workers bids up prices such as wages and rents.

47. Given these limitations, Treasury guidance when assessing project proposals is that I-O multipliers of the sort used in the Analysis of the Project should be ignored unless there is significant unemployment (I would add, or other significant spare capacity – e.g. in accommodation for construction workers, etc) in the economy:[20]

    47.1. This means, at best, the Project's assessed impact (let alone benefit) is at most that assessed in the Analysis;

    47.2. In reality, since the Analysis ultimately measures gross economic impact, and does so using I-O multipliers, its assessment of the Project's economic impact will *overstate* the Project's actual benefits.

48. A technique better suited to assessing the economic impact of the Project is computable general equilibrium (**CGE**) analysis. Unlike I-O multipliers-based EIA, CGE more comprehensively and realistically accounts for how an economic stimulus ripples through other parts of the economy (either by sector or region), including by allowing for constraints in the supply of labour, housing (etc), and also allowing for prices to adjust in response to the proposed stimulus:

    48.1. In my opinion, where an EIA is used, it is preferable to undertake a full CGE analysis of the Project's regional and national impacts – though, as above, only if and to the extent that such impacts constitute regional or national benefits;

    48.2. By better accounting for regional and economy-wide feedback loops than I-O multipliers-based EIA, CGE analysis would better identify whether the Project gives rise to net regional benefits, and also net national benefits.

3.4 Unmitigated Cultural Costs are Likely to Fully or Largely Offset Claimed Project Impacts/Benefits

49. As noted above, the WSP report acknowledges that the Project has more than minor adverse effects, or potentially significant adverse effects, on the cultural landscape. While I defer to Ngāi Tahu rūnanga, Ngāi Tūāhuriri – as mana whenua – to represent the scale of such adverse effects, here I show, by reference to published willingness-to-pay (**WTP**) metrics that

[20] Treasury, 2015, *Guide to Social Cost Benefit Analysis*, July, at p. 16.

are likely to very conservatively understate the Project's cultural costs, that those costs are plausibly sufficient to offset the Project's claimed impacts/benefits.

50. As to the latter, the Analysis claims the following impacts/benefits:

    50.1. Minimum GDP impacts of $1.39m/year, and maximum GDP impacts of $1.76m/year;[21]

    50.2. Minimum "efficiency gains" (i.e. avoided travel time, emissions, and crash costs) of $34,747/year to $185,448/year (Kate Valley counterfactual), and maximum efficiency gains of $306,711/year to $1,764,395/year (Taiko Road counterfactual).[22]

51. This implies:

    51.1. Minimum claimed annual Project impacts/benefits of $1.39m + $0.035m = c. $1.4m/year; and

    51.2. Maximum claimed annual Project impacts/benefits of $1.76m + $1.764m = c. $3.5m/year.

52. Published research on New Zealand (i.e. not necessarily Māori – let alone Ngāi Tūāhuriri or Ngāi Tahu) individuals' WTP to achieve moderate (respectively, good) lowland freshwater outcomes, instead of poor outcomes, is $89/person/year (respectively, $100/person/year; midpoint $94.50) in 2026$, even when those individuals do not directly engage with those lowland freshwater habitats:

    52.1. When those individuals do directly engage with those lowland freshwater habitats, the corresponding figures are $95-107/person/year (midpoint $101).[23]

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[21] Sapere Report, at p. 16.

[22] Underlying figures taken from Sapere Report at Tables 7-9 ("Base case" without resource consenting constraints), and from p. 25 ("Consent constraints" case).

[23] All figures taken from Table 3.5 of Tait et al., 2017, *Assessing New Zealand public preferences for native biodiversity outcomes across habitat types: A choice experiment approach incorporating habitat engagement*, Lincoln University AERU Research Report No. 345. CPI adjustments from 2015 to 2026 were made using the Reserve Bank's inflation calculator: https://www.rbnz.govt.nz/monetary-policy/about-monetary-policy/inflation-calculator.

53. I do not suggest that these figures represent the WTP of Ngāi Tūāhuriri member's for improved freshwater outcomes, which only those members can advise:

    53.1. Rather, I reference these published WTP metrics as conservative lower bounds on what that WTP might be, to illustratively identify how even such conservatively assessed costs affect whether the Project's claimed impacts/benefits are more or less than those costs – i.e. whether the Project's claimed impacts/benefits are net positive or net negative even allowing for only conservatively-assessed cultural costs.

54. To make this illustrative assessment, it is necessary to make assumptions as to the relevant affected populations, which in this case might include:

    54.1. Ngāi Tūāhuriri (adult) members;

    54.2. Ngāi Tahu (adult) members based in Canterbury; or

    54.3. Ngāi Tahu (adult) members.

55. Due to data limitations, for illustrative purposes I conservatively assume either 17,265 adult Canterbury Ngāi Tahu members, or 60,158 Ngāi Tahu adult members, in each case using 2023 Census data:[24]

    55.1. Assuming the former population, the illustrative conservative total WTP to avoid the Project's cultural impacts would be in the order of 17,265 x $94.50 = $1.63m/year, which is almost half of the maximum claimed Project impacts/benefits of $3.5m/year, and greater than the minimum claimed Project impacts/benefits of $1.4m/year;

    55.2. Assuming the latter population, the illustrative conservative total WTP to avoid the Project's cultural impacts would be in the order of 60,158 x $94.50 = $5.7m/year, which clearly exceeds even the maximum claimed Project impacts/benefits of $3.5m/year.

56. Once again, I stress I am not purporting to represent the position of Ngāi Tūāhuriri as to the actual level of cultural costs arising due to the Project (or whether those costs can or should be monetised):

[24] https://tewhata.io/ngai-tahu-kai-tahu/.

56.1. Instead, I demonstrate, using conservative publicly-available WTP metrics, that those cultural costs alone could easily far exceed the Project's claimed impacts/benefits.

3.5 Sapere Report Implicitly Assumes that Current Waste Levels are Socially Desirable

57. The Sapere Report assesses the Project's claimed efficiency benefits in terms of enabling existing waste levels to be accommodated more cheaply than can be achieved through alternative means. It stresses that the Project does so by reducing travel time, emissions, and crash costs for handling those waste levels.

58. However, this presumes that the current level of waste is in some sense socially desirable, and hence we should only care about handling that waste as efficiently as possible. The implicit assumption is that absent the Project the costs (i.e. transport-related costs and gate fees) of handling waste will be in some sense "too high":

58.1. No evidence is presented to justify this assumption, and in reality it is possible that the total costs of handling the region's existing waste reflect only private costs, and do not fully internalise the total costs, including social costs, of such waste;

58.2. As such, it could in fact be socially desirable to <u>increase</u> the costs of handling such waste, to achieve a reduction in such waste, which the Project – if its efficiency benefits are real – might frustrate.

3.6 Sapere Report Does Not Assume Regional Waste Needs Will Not Be Met Absent the Project

59. The Sapere Report stresses that the Project will:

59.1. "[E]nable the continued functioning of existing regionally significant infrastructure";[25] and

59.2. "[A]lign with both national and regional direction by enabling more cost-effective diversion of inert materials, reducing pressure on Class 1 facilities, and supporting more efficient and sustainable waste system performance across the region."[26]

[25] Sapere Report, at p. 6.

[26] Sapere Report, at p. 9.

60. However, the Project's assessed efficiency benefits are predicated on the region's existing waste management needs being accommodated even without the Project, just at slightly higher travel time, emissions, and crash costs:

    60.1. As such, and because those efficiency benefits are so modest, there is nothing in the Analysis that suggests the region's waste management needs cannot be effectively accommodated even without the Project proceeding;

    60.2. Indeed, for the reasons discussed above, the Project could in fact result in perpetuating a socially-excessive level of regional waste.

3.7 Sapere Report Contains Material and Immaterial Technical Errors

61. The formula provided in the Sapere Report for converting 20 years of annual GDP impacts into a present value of $17.3m is incorrect, and impossible to interpret given the provided variable definitions:[27]

    61.1. That said, the $17.3m figure provided is correct, so this error is immaterial in practice.

62. More materially, travel time savings are presented as social benefits, and private transport cost savings (i.e. of waste transporters) due to the Project are argued to be transfers that re not relevant for CBA purposes:[28]

    62.1. In this case, however, any travel time savings are likely to be private in nature – i.e. accruing to users of waste transport services in the form of lower waste transport costs;

    62.2. Such private benefits are very much relevant for transport CBA purposes, and are not treated as transfers that can be ignored in such CBAs.[29]

[27] Sapere Report, at p. 17. The correct formula is $PV = (A / r) \times [1 - (1 + r)^{-n}]$.

[28] Sapere Report, at p. 23.

[29] For example, see De Rus et al., 2022, "Cost-benefit analysis of transport projects: Theoretical framework and practical rules", *Transport Policy*, 123, at pp 25-26, 29-30, and 36.

63. Critically, the assumed travel time, emissions cost, and crash cost savings attributed to the Project are based on social savings metrics that accrue to all New Zealand, not specifically to Canterbury:

    63.1. As such, the claimed Project impacts/benefits cannot be understood to be just regional impacts/benefits, which is relevant to assessing their regional or national significance (as discussed further in Section 3.10 below).

3.8 Sapere Report Fails to Provide Sensitivity Analyses, and is Insufficiently Transparent

64. While the Sapere Report does consider various scenarios (e.g. comparing the Project's travel time, emissions, and crash costs with those relative to both Taiko Road and Kate Valley), it does not follow standard modelling practice of showing how modelled efficiency results change in response to plausible changes in input assumptions, particularly where those input assumptions are material, and their values are not certain (including over time):[30]

    64.1. Indeed, FTE and GDP impacts are presented as point estimates only, with not even scenario modelling provided.

65. This means the results presented for each modelled scenario hinge on the assumed input values, and the sensitivity of scenario results to changes in those assumptions cannot be determined:

    65.1. As such, the Panel has not been presented with sufficient information to assess the robustness of the modelled results to changes in input assumptions.

66. Relatedly, the Analysis is insufficiently transparent and replicable to either test its assumptions and approach, or to translate the claimed Project impacts into annual figures over time (particularly in relation to efficiency benefits, which are stated to grow in line with district-level population growth,[31] for which no data are provided):

[30] For example, waste generation assumptions are set out in Table 5 of the Sapere Report, and key efficiency assumptions are set out elsewhere on pp 23-25, but results are not reported for plausible different values of such assumptions.

[31] Sapere Report, at p. 26.

66.1. Such transparency is a matter of good modelling practice, since it clearly identifies both key assumptions, and how those assumptions affect key modelling outputs – both of which are essential for establishing the veracity of the Analysis.

3.9 Assessed Project Efficiency Benefits Differ by Orders of Magnitude, Complicating Interpretation

67. While the Project's claimed FTE and GDP impacts are essentially point estimates, with no variation, its claimed efficiency benefits differ by orders of magnitude, i.e. referring to the annual impacts/benefits summarised in Section 3.4 above:

67.1. For the Taiko Road counterfactual, annual efficiency benefits range from $1.76m/year in the "Base case" (with no resource consent constraints) down to $0.31m/year in the "Consent constraints" case – some 82% lower;

67.2. For the Kate Valley counterfactual, the corresponding figures are $0.19m/year down to $0.035m/year – also some 82% lower;

67.3. For the "Base case", benefits are assessed to be as high as $1.76m/year for the Taiko Road counterfactual, and as low as $0.185m/year for the Kate Valley counterfactual – some 89% lower; and

67.4. For the "Consent constraints" case, benefits are assessed to be as high as $0.307m/year for the Taiko Road counterfactual, and as low as $0.035m/year for the Kate Valley counterfactual – also some 89% lower.

68. While it is legitimate and desirable to allow for key Project uncertainties, as captured in these modelled scenarios, the utility of the modelled results is reduced when those results are so highly-sensitive to the scenario descriptions:

68.1. When the variability of results is this high, then absent further information to understand which scenario is the most reliable, it is hard to meaningfully interpret those results;

68.2. All that can be said otherwise is that the results might be at a certain level, or a vastly different level – this makes it hard for decision-makers (e.g. the Panel) to understand what the true level of claimed impacts/benefits really are.

3.10 Even Claimed Impacts/Benefits are Immaterial, So Not Significant at Either a Regional or National Level

69. When Project impacts/benefits are measured in FTE or GDP terms, it is natural to consider their regional or national significance by reference to their regional or national FTE and GDP counterparts:[32]

    69.1. For reference purposes, Canterbury employment and GDP in 2025 were 365,376 filled jobs (not FTEs per se) and $53,919m respectively.[33]

70. Taking the Project's claimed maximum FTE impact of 8.7 jobs as stated, this amounts to just 0.0024% (i.e. 24 millionths) of Canterbury's filled jobs – in other words, Canterbury's number of filled jobs is more than 40,000 times the Project's maximum claimed FTE impact.

71. Taking the Project's claimed maximum annual GDP impact of $1.76m/year as stated, this amounts to just 0.0033% (i.e. 33 millionths) of Canterbury's annual GDP – in other words, Canterbury's annual GDP is more than 30,000 times the Project's maximum claimed GDP impact:

    71.1. While the Project's maximum claimed efficiency benefits of $1.76m/year (coincidentally the same figure as the maximum claimed GDP impacts) is not directly comparable to regional GDP, the same conclusion applies – annual regional GDP is more than 30,000 times those claimed maximum annual efficiencies;

    71.2. For the Project's minimum claimed efficiency benefits of $0.035m/year, the comparison is even more stark – Canterbury's annual GDP is more than 1.5 million times those claimed benefits.

72. At these levels, the Project's claimed maximum FTE and GDP impacts are not even statistical noise:

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[32] While practice in this regard differs across FTAA applications, I note that the economist for the applicant in the Bendigo-Ophir gold-mining FTAA application chose to assess the significance of claimed Project FTE and GDP impacts by reference to regional FTE and GDP levels.

[33] Using regional economic data published by Infometrics: https://regions.infometrics.co.nz/canterbury-region/.

72.1. The average annual change in Canterbury's filled jobs is 5,175 jobs, so the Project's claimed maximum FTE impact of 8.7 jobs is an immaterial share (0.17%) of even the average annual change in the region's employment;

72.2. The average annual change in Canterbury's GDP is $1,068m, so the Project's claimed maximum GDP impact of $1.76m is also an immaterial share (0.16%) of even the average annual change in the region's employment.

73. As such, if the Project did not proceed, that would not affect Canterbury's employment or GDP in any discernible way:

73.1. Since Canterbury's waste management needs are assumed in the Sapere Report to be fulfilled even without the Project, just at very modestly greater cost, this too points to the Project not having discernible regional effects more generally.

74. Notably, all of these conclusions apply before:

74.1. Allowing for the fact that not all EIA-based impacts are benefits;

74.2. Deducting the non-market value of cultural costs – which I showed above to conservatively be possibly as great as the claimed Project impacts/benefits, i.e. essentially causing those impacts/benefits to be zero or possibly even negative in net terms; and

74.3. Allowing for the fact that the claimed efficiency benefits are based on social cost metrics that apply at a national level, so cannot be assumed to be attributable to just the Canterbury region.

75. This means that the claimed Project impacts/benefits – whether in terms of FTE, GDP, or waste management service provision – are immaterial, and in net terms are even zero or negative, at a regional level:

75.1. As such, they are even more immaterial at a national level.

76. In my opinion, it is implausible to conclude that even the Project's claimed impacts/benefits – let alone its actual net benefits – are significant at a regional or national level, as required under the FTAA.

4. Conclusions

77. In conclusion, it is my opinion that:

77.1. The FTAA requires a clear assessment of whether the Project delivers net benefits to New Zealand's social welfare once all costs, disbenefits, and adverse impacts are accounted for. In economic terms, this necessitates a CBA, rather than an EIA.

77.2. The Sapere Report provides both an EIA (for FTE employment impacts, and regional GDP impacts) and a partial CBA (for certain non-market benefits, ignoring non-market costs) – it is therefore not, or only partially, fit for purpose under the FTAA framework. Its EIA measures economic activity rather than benefits, includes costs as benefits, and overstates impacts due to use of input-output (I-O) multipliers which are known to over-state project impacts. Its CBA assesses non-market benefits but omits significant non-market adverse impacts. In either case, the results materially overstate the project's economic contribution. Accordingly, the Project's claimed impacts, let alone benefits, are not robustly established.

77.3. Critically, the Project's assessed benefits/impacts are immaterial at even the Canterbury regional level (hence only even more immaterial at the national level), even before allowing for potentially substantial unmitigated cultural adverse impacts, which costs are likely to be sufficient to offset any claimed Project impacts/benefits.

77.4. On the available evidence, it is implausible that the project delivers significant net regional or national benefits as required under the FTAA.

Richard Meade (PhD, Toulouse School of Economics)
Principal Economist, Cognitus Economic Insight

Your written comments on a project under the Fast Track Approvals Act 2024

Project name	**Whiterock Lime Limited**

Before the due date, for assistance on how to respond or about this template or with using the portal, please email contact@fasttrack.govt.nz or phone 0800 FASTRK (0800 327 875).

All sections of this form with an asterisk (*) must be completed.

1. Contact Details

Please ensure that you have authority to comment on the application on behalf of those named on this form.

Organisation name (if relevant)	Canterbury Regional Council (Environment Canterbury)		
***First name**	Tim		
***Last name**	Davie		
Postal address	PO Box 345 Christchurch 8140		
***Contact phone number**	s 9(2)(a)	**Alternative**	
***Email**	fasttrack@ecan.govt.nz		

2. Please provide your comments on this application

Please find the response to the specific questions raised in the above letter from Canterbury Regional Council (**CRC**).

1. Any applications that have been lodged with the Council that would be a competing application or applications if a substantive application for the project were lodged. If no such applications exist, please also confirm this in writing.

RMA applications CRC243699-CRC243706 lodged by *Protranz International Limited* are currently suspended, pending the outcome of this FTAA referral approval. Protranz International Limited is owned by the same owners of *Whiterock Lime Limited* and the applicant has confirmed that the RMA applications in process are substantially the same as the Project seeking FTAA referral approval. The details of the RMA applications have been provided by the applicant in Attachment 10.

2. In relation to projects seeking approval of a resource consent under section 42(4)(a) of the Act, whether there any existing resource consents issued where sections 124C(1)(c) or 165ZI of the Resource Management Act 1991 (RMA) could apply, if the project were to be applied for as a resource consent under the RMA. If no such consents exist, please also confirm this in writing.

In accordance with section 42(4)(a) of FTAA, the CRC can confirm that there are no existing resource consents issued where sections 124C(1)(c) or 165ZI of the Resource Management Act 1991 (RMA) could apply.

3. Whether you consider this project provides significant regional benefits related to overall landfill activity.

The application has been assessed against the criteria set out in section 22(2)(a) of the FTAA.

The applicant has stated that the proposed managed fill site will provide:

- Significant regional strategic benefit
- Significant regional economic benefit
- Significant regional social benefit and
- Significant environmental benefit.

The continuation of the lime quarry is proposed to provide:

- Significant regional benefit to the primary industries.

The above has been supported by two documents: Attachment 5 (Analysis of the Significant Benefits to the Region) and Attachment 6 (Economic Benefits).

Summary:

The Whiterock fast-track proposal is essentially the same as suspended RMA applications, with the applicant claiming significant strategic, economic, social, and environmental benefits. The concerns raised by the CRC regarding effects are relevant to the application from Whiterock, being:

- Significant residual environmental risks.
- While the landfill design resembles Class 1 standards, uncertainties remain around long-term containment, leachate management, stormwater controls, and ecological impacts.
- Persistent contaminants could pose enduring risks to groundwater, surface water, and wetlands, particularly once engineered mitigation fails.
- The proposal may also create long-term public liabilities, with inadequate certainty about post-closure management.
- Ngāi Tūāhuriri Rūnanga has expressed opposition to the proposal.
- Social and economic benefits, such as reduced disposal costs and housing affordability, lack robust evidence.
- The Canterbury Regional Policy Statement (CRPS) emphasises waste minimisation, reuse, and integrated management, discouraging proliferation of new local landfills. The Whiterock proposal is inconsistent with this direction and may undermine regional and national initiatives on soil reuse and waste reduction.

Overall, CRC considers the proposal does not demonstrate significant regional benefits sufficient to justify referral under the FTAA; specifically, that the environmental risks associated with the Whiterock proposal outweigh the proposed benefits put forward by the applicant. It is the position of the CRC that integrated regional planning and the existing capacity of the regions landfills already meet Canterbury's needs.

Comments – Canterbury context:
The CRC has reviewed the Canterbury Regional Policy Statement (**CRPS**) to determine whether the proposed continued quarry and new managed landfill development aligns with the intent of section 22(a)(ii) of the FTAA. Although the CPRS defined what constitutes a *regionally significant infrastructure*, it does not provide specific direction or criteria for treating landfill developments as regionally significant, and landfills are not included in that definition. The definition provided in the CRPS notes that '*some infrastructure may be critical to communities being able to recover promptly from damage from natural hazard events'*. Landfilling could therefore be loosely grouped into the definition of infrastructure for the purpose of a supporting function.

Chapter 19 of the CRPS focuses on waste minimisation and management and specifically addresses a desired direction towards the 5Rs of waste management, being reduction, reuse, recycling and recovery before dealing with residual waste within the region. The explanation given is that a product that enters the waste stream will often need to be replaced, which is also true of construction and demolition waste.
19.1.2 '*Inappropriate Management of Waste'* further addresses the need for appropriate waste disposal and management to reduce inefficiencies, duplication of resource input into infrastructure and avoid the proliferation of disposal sites such as landfills across the region. It is further stated that an increase in disposal sites will increase the likelihood of adverse effects occurring on the environment and the social, economic and cultural well-being of people and communities. The following objectives are thus relevant to this project:
19.2.1 – Minimise the generation of waste: The most effective way of avoiding adverse effects of waste is to minimise the amount of waste generated.
19.2.2 – Minimise adverse effects of waste: Adverse effects on the environment caused by residual waste and its management are avoided, remedied or mitigated.

The following policies support the above objectives:
19.3.1 – Waste management hierarchy: to apply the principles of the 5Rs to the management of all waste streams
19.3.2 – Reduce waste at the source
19.3.3 – Integrated management of waste: promote and integrated approach to waste management in the region. The explanation given for integrated management mentions that long-term planning to waste treatment can be done more effectively with the coordination and cooperation between local authorities within Canterbury and neighbouring regions. This way, the disposal sites can be located in the most appropriate areas where adverse effects can be minimised and cost-effectiveness for the service areas can be met. This also avoid duplication of adverse effects within each district.

The proliferation of individual local landfills within the region, which are not planned in the manner noted above, do not promote the implementation of the 5R direction as it aims to provide a further option for residual waste disposal within the region and therefore the proposal would directly contradict policies 19.3.1 and 19.3.3. According to the CRPS, the majority of the waste reduction work in Canterbury is focused on recycling but more effort needs to be applied in 'reduction'.

As of last year, industry and MfE/WasteMINZ are actively working on the reuse component of soil management, for example[1]. WasteMINZ also has a sector group – the Territorial Authority Officers' Forum, with a strong focus on construction and demolition waste (**C&D waste**), acknowledging that C&D waste is NZ's largest waste stream, and focus on reduction and reuse and recycling of this waste stream. MfE released the first baseline report on construction and demolition waste in June 2025[2], stating that of the construction and demolition waste, 70% of wate is being disposed of at Class 1-4 facilities. Nearly 80% of that waste is soil or rubble. The remaining waste is mainly made up of timber, plastics, plasterboard and textiles (e.g. carpet). In essence, with active work promoting soil reuse, and sorting of waste, and the proposed acceptance criteria of this project (namely excluding timber, plasterboard and textiles), the remaining waste streams are sufficiently accounted for within Canterbury.

Canterbury has a Class 1 regional landfill at Kate Valley, with a remaining capacity to service the region until 2040. For context, the regional landfill reached its halfway point approx. in late 2024[3], after 19 years of operation, and has another 15 years until consent expiry. Kate Valley was specifically set up as a public/ private partnership between Christchurch City Council, and the District Councils of Ashburton, Hurunui, Selwyn and Waimakariri, and the private sector to manage Canterbury's waste streams and provide assurance to the community that no further small-scale localised landfills will be developed across the region. This approach also had the support of Canterbury's Papatipu Runanga.

Waste disposal is further serviced within the Canterbury region via a Class 1 landfill in Timaru (Redruth), a recently authorised Class 2 fill site in Cave, South Canterbury (Taiko) until 2053, and a Class 3 fill site in Hororata (until 2042). Burwood in Christchurch (Class 4 site) has been extended to operate until 2026; further extensions are not guaranteed.

There is sufficient capacity within Canterbury to deal with a variety of waste streams in various locations. Therefore, the key question is whether Canterbury requires another landfill, and whether a new landfill will provide a significant regional strategic/economic/social and environmental benefit. While it will provide some localised benefits to specific industry, not all statements provided in the application can be corroborated. Further detail is provided below.

A complete assessment of the project against the objectives and policies of the CRPS and the Canterbury Land and Water Regional Plan (**CLWRP**) can be reviewed in **Appendix 1** which contains the CRC's s42A report prepared for the RMA application. The applicant has confirmed that the proposal presented for FTAA referral is in large part, identical to the RMA application and hence conclusions reached are presented for review.

Overall, the applicant makes the following comments to support a referral under the FTAA:

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[1] Soil surplus project | Our Work | WasteMINZ

[2] New-Zealand-Construction-and-Demolition-Waste-Baseline-and-Tracking-Methodology-Report.pdf

[3] Capacity milestone reached at Kate Valley Landfill - Transwaste

Strategic and economic benefit: provision of a dedicated facility for the safe management of inert waste streams; reducing transport distances and ensuring optimisation of filling across landfill disposal types in the region.

The argument is made that the ability to provide for an appropriate class landfill (without external levies that apply for Class 1 and 2), matched with appropriate operational and engineering controls (lower than Class 1 or 2), can lower the gate fee charged to the consumer. It is proposed that the gate fee will sit around $110 per tonne at Whiterock, compared to Kate Valley (15 km further distance from Christchurch CBD, Class 1 landfill), with a gate fee of $198 per tonne.

Comments:
There has been debate during the RMA consents process whether this site can truly be classified as a Class 3 managed fill proposal. Class 3 managed fills, in accordance with WasteMINZ (2023) only accept Clean Fill Material, Controlled Fill Material and Managed Fill Material. Class 2 Landfills are able to accept C&D waste, incl. the biodegradable and putrescible aspects of C&D waste not included in the Whiterock Waste Acceptance Criteria.
The RMA application also included acceptance of soil contamination more aligned with Class 1 fill limits. The application includes engineering design with standards meeting a Class 1 landfill and monitoring requirements (which have been subject to debate for the RMA applications).

It is unclear if the applicant's assumption that lower gate fees can be justified due to lower operational costs and monitoring requirements. The site is located in a sensitive environment, and no consideration has been given to the additional monitoring and mitigation that will likely be required and has been identified as a gap to be addressed as part of the RMA applications.

For comparison, as presented by the applicant, Whiterock proposes to charge $110 per tonne, when e.g. Taiko (Class 2 but lesser sensitive environment) charges $150 per tonne, and Hororata Managed Fill (Class 3, lesser sensitive environment) charges $155 per tonne.

There is no guarantee that Whiterock will retain the proposed gate fee at $110 per tonne, and the conclusions reached regarding cost savings to the wider region and the industry, and therefore regional economic benefit are uncertain. The CRC is concerned, given the more sensitive environment in which Whiterock is to be located, how these cost savings would manifest in practice, alongside appropriate and acceptable management of effects.

The remaining assessment places emphasis on the cost savings made by having a more accessible (15 km closer than Kate Valley) and more affordable options for the disposal of sorted C&D waste.
A landfill facility located 15km closer to Christchurch may result in some transport savings associated with the closer distance.

The CRC recognises that increased competition in the disposal to land sector in the Canterbury Region, could have benefits, however, some of the statements made by Whiterock around this potential benefit are considered to be slightly contradictory. For example, it is claimed that Whiterock will enable a more efficient waste sorting behaviour across the industry with the

availability of a cheaper disposal site. With the high disposal cost to Kate Valley landfill (Class 1) one would assume that the industry already maximises waste sorting and recovery of material to ensure that residual waste streams are disposed of at the smallest cost possible. No evidence is provided to support the claim that increased waste sorting and recovery behaviour is a direct function of the availability of a C&D waste fill site.

One of the benefits is listed as providing an immediate solution for the disposal of inert C&D waste and contaminated soils. The provision of an easy and cheaper disposal site may directly counter the efforts to promote the reuse of soils on site (where appropriate). With the work on reusing soils (WasteMINZ), existing void spaces may manifest within the regional Class 1 landfill, even without the availability of a C&D landfill.

Some of the benefits addressed in the application are further discussed in the Economic Benefits report (Attachment 6), including the claim that authorisations to proceed with this proposal will delay the need to consent and develop new sites for landfills in Canterbury, which are located further from Greater Christchurch compared to Whiterock. This statement is not backed by evidence; to the contrary, succession planning is well underway as intended, and potential sites are being investigated[4]. Additionally, Kate Valley has confirmed that capacity can be managed until consent expiry. Even if capacity remained after consent expiry, Kate Valley will need to apply for new consents, as has always been envisaged for KV2 (the next potential site).

Equally, more evidence needs to be provided to support the claim that Whiterock will be able to benefit the delivery of strategic initiatives, such as the remediation of historic landfills. It is stated that the proposal could support the remediation of a series of landfill projects, such as the Onuku Bay, Okains Bay and Allandale landfill. I note that the Onuku Bay remediation does not consist of material being removal but rather "*clearing of site vegetation, recontouring of slopes and slumping and reinstatement of capping*".[5] Okains Bay remediation consists of "*improving structural integrity of the sea wall to prevent erosion and loss of refuse into the environment*"[6], and there aren't sufficient details listed for the Allandale Landfill remediation to draw conclusions of the types of works involved and whether material removal will be part of the project[7].
Given that it is generally unknown what has been deposited into these landfills historically, it is more likely that the material recovered, if indeed scheduled for removal, will need to go to a Class 1 landfill site. No evidence has been provided to support the assumption that Whiterock will provide a benefit to these works, what this benefit would amount to in terms of cost savings to Council, and

[4] Capacity milestone reached at Kate Valley Landfill - Transwaste

[5] Onuku Bay Landfill Remediation | Refuse & Recycling | Transport & Waste | CCC Capital Programme - Projects | Christchurch City Council

[6] Okains Bay Closed Landfill Remediation | Refuse & Recycling | Transport & Waste | CCC Capital Programme - Projects | Christchurch City Council

[7] Allandale Closed Landfill Remediation | Refuse & Recycling | Transport & Waste | CCC Capital Programme - Projects | Christchurch City Council

the proposed Waste Acceptance Criteria (**WAC**) would likely preclude most of the material recovered from historic landfills to be deposited at the proposed Whiterock site.

Social Benefits

Comment:

It is stated that the project will provide significant social benefit through assisting with construction required to increase the supply of housing through reduced development costs. This has not been further addressed or supported by evidence, but it may only be valid for redevelopment of sites, not so much for greenfield development (unless contaminated soil removal is necessary) which is the largest contributor to increase in housing in the Greater Christchurch area. Further evidence should be presented.

Environmental Benefit

The applicant proposed that significant environmental benefits will arise from: climate change mitigation (lower transport emissions, enabling further biogas production at Kate Valley, recovery from natural hazards), reducing costs for existing and future closed landfill remediation, increased sorting and recovery of resources, minimising the frequency of illegal dumping of waste.

Comment:

The applicant has not provided evidence to support the claim that "*Backing out of fossil fuel use for electricity generation from increased electricity production at Kate Valley*". As stated in the supporting evidence provided[8], Kate Valley has the capacity to produce electricity for up to 4,000 homes max, with the use of 4 x 1 megawatt Jenbacher generators. However, an excess of 700 m^3/h of landfill gas needs to be burned via a landfill flare already, when all generators are at maximum generating capacity. The supporting evidence states that once landfill gas generation exceeds 3,800 m^3/h a second burning flare will be installed at Kate Valley. It is mentioned that additional generators may be sourced in future, up to another 4-6 and these would produce sufficient electricity for a further 10,000 homes. In short, having more landfill gas available does not instantly translate to '*backing out of fossil fuels'*. By Kate Valley's own accounts, currently, excess gas is being burnt via a flare. The short term plan envisages the installation of another flare to burn further landfill gas and only the longer term future may see the installation of additional generators, at significant cost. These would arguably mean electricity generation for the immediate vicinity, but not at levels considered 'regionally significant'.

The applicant has made the assertion that a C&D waste landfill within the region will minimise the frequency of illegal dumping. The occurrence of illegal dumping will not be a linear relationship between cost – opportunity. There are varying social factors that are required to address illegal dumping, and provision of a cheaper disposal option will likely not be a significant benefit felt across the region. A review of the CRC's Pollution Hotline does not indicate a significant level of illegal dumping across the region. This is a claim was supported with an excerpt of a news article but is not evidence of a wider regional issue that can be addressed with this proposal.

[8] CR_GAS_Booklet_FINAL.cdr

Significant Regional Benefit of the Quarry Operation

Comment: The quarrying operation supports the primary industries by supplying AgLime; however, so do many other sites within the vicinity of the site and across the region. The applicant has not provided evidence to show why the operation at this site provides a significant regional benefit.

Please also find below the CRC's general comments in accordance with section (17)(1)(a) of the FTAA

Consultation Process

In Attachment 9, the applicant references consultation having been undertaken with the CRC, and in particular mentions the meeting on 5 May 2025, listing details of the discussion on the day. The CRC comments that this meeting was merely a notification of the applicant to CRC that referral under FTAA will be sought and seeking confirmation on matters listed in the Attachment, while the substantive RMA applications would remain on suspension. **Appendix 2** contains the meeting minutes for 5 May 2025. Following this meeting, no further engagement was sought on the proposal. The RMA proposal at this point in time was undergoing a review of proposed conditions in advance of the proposed caucusing and hearing at the request of the Hearing Commissioners.

RMA Application

The applicant has highlighted that the project presented for FTAA referral is essentially the same as that presented in the RMA application, with minor changes that have resulted from a review of Councils' s42A reports and feedback from submissions. It is considered that the concerns raised in CRC's s42A report (related to the RMA proposal), are also relevant to the FTAA and the request for comments under s17(1)(a). The Hon Minister is referred to **Appendix 1**, which contains the CRC's s42A report prepared for the RMA proposal.

In particular, the following matters still required resolution (contained within the conclusion and summary of the effects assessment within the s42A report):

- *A key limitation regarding this proposal is the effect of the engineered landfill mitigation (liner installation, post-closure capping, and underdrainage piping) on the natural inland wetland, particularly the lower wetland. Despite proposed remediation of the modelled loss of baseflow, the NES-F directs the decision maker to not grant consent due to the effects that the water take will have on the wetland. The applicant disputes this position.*

- *In respect to the actual effects on the environment, in most respects, they indicate that given the engineered mitigation proposed, the effects will largely remain no more than minor. I consider this conclusion is only valid for the relative short timescale that the engineered mitigation is intact and maintained, therefore for the duration of the operational lifetime of the landfill, and only upon addressing the reviewer's comments:*

    - *The landfill design, which is largely consistent with Class 1 requirements, is considered to be appropriate for the proposed waste acceptance criteria. The construction of the landfill liner and leachate collection and disposal system will ensure that generated landfill leachate will be unlikely to leak into the surrounding environment at volumes that are of concern. Any leakage is proposed to be monitored and redirected to offsite disposal until such time that leakage can be remedied or contained. The feasibility of such remediation or containment needs to be further explored at the hearing. The availability for offsite*

disposal of leachate should also not be assumed and is at discretion of WDC's acceptance criteria at the disposal site.

- *Adverse effects on air quality and sensitive receptors are acceptable and are suitably addressed with proposed mitigation. However, uncertainty remains regarding sources of water for dust suppression purposes.*
- *Adverse effects on groundwater and surface water (quality and ecology) from the landfilling activity will be no more than minor but are a direct function of the adequacy of the engineered mitigation, and the waste acceptance criteria and the efficiency of the early detection and trigger action protocol. This assessment is a conclusion for the leachate Scenario 1 and 2 as modelled by the applicant;*
- *Adverse effects on groundwater and surface water users will therefore be acceptable when considering surface water and groundwater quality effects arising from landfilling;*
- *Works within the bed and within riparian margins of the Karetu River and the Eastern Watercourse can be appropriately managed to ensure that adverse effects are no more than minor in relation to sediment discharges;*
- *The proposed water take from the Karetu River can be managed within permitted activity limits and is therefore deemed to be less than minor.*
- *Adverse effects on amenity values will be no more than minor and therefore will be acceptable. I not that the use and restrictions on the use of the public road will have to be addressed by the District Council.*

- *However, adverse effects on terrestrial ecology, herpetofauna in particular, may be significant. In respect of the terrestrial ecology effects, the proposed avoidance/ remediation/ mitigation and compensation measures are unable to be assessed at this stage, as the proposed measures are based on flawed site surveys. The surveys also did not include the riparian margins of the site. The CRC's expert's conclusion stated that significant residual effects will likely ensue on lizard habitat and populations as a result of this proposal.*

- *Adverse effects from the management of stormwater on site during construction and the operational phase are currently uncertain, as the applicant has referred to generic management plans with an indication of what may be adopted on site via indicative plans. In theory, stormwater management can be designed to ensure that adverse effects on the receiving environment (the Karetu River and the Eastern Watercourse) can be adequately managed. The CRC's expert reviewer has highlighted some aspects that need to be resolved. Stormwater management will also have to address legacy issues on site. I also note that the management of stormwater, as proposed, relies on the detection of effects within the river, when effects have already occurred, to trigger the need for improvement actions. In this respect it is largely too late.*

- *Adverse effects on the natural inland wetlands cannot be adequately assessed. Remediation has been proposed to counteract the loss of baseflow to the wetland. However, the success of such measure is uncertain, and the applicant proposes to base the decision on which remediation option to choose on site constraints and stability considerations. Therefore, the most successful remediation option may not be chosen and there is no certainty.*

- *There are also cultural values to consider, an evaluation of which can only be undertaken once the decision makers have heard from Mana Whenua and matters are discussed in detail. The direct submission of Te Ngāi Tūāhuriri Runanga states that the proposal is unacceptable.*

- *A key consideration is that of the Waste Acceptance Criteria proposed for the site. Expert evidence states that the proposed acceptance criteria will include persistent chemicals that will not naturally degrade at the same rate as the proposed engineered containment, despite adherence to the WAC. The difference in degradation is decades/ centuries vs. millennia. While the landfill design is in*

general accordance with the requirements stipulated by WasteMINZ for the proposed WAC, the geology of the site does not naturally provide attenuation, nor containment of the generated leachate, should, and when leakages occur. This constraint is also recognised by the WasteMINZ Guidelines, which highlight a need to consider underlying geology due to the finite lifetime of engineered mitigation. This conclusion considers that a relatively large proportion of the more contaminated material listed in the WAC will be disposed of at the site, as cheaper alternatives exist for the disposal of 'clean' material. I note that a significant degree of uncertainty remains regarding the actual composition and proportion of waste streams to be accepted, and this in turn influences the below conclusions;

- *The application included modelling of the groundwater hydrology and thus the likely leachate plume and subsequent Scenario calculations for leachate discharge.*
    - *The CRC's experts state that the modelling has underlying limitations, which have not been accounted for, such as the potential for preferential flow paths and thus accounting for double porosity of the site. This would only affect the time it takes for leachate to travel to the receiving environment.*
    - *The effects assessment presented by the application for the leakage scenarios also includes an assumption of the hydrology of the Karetu River, which is not supported by baseline monitoring. The CRC's expert review concluded that the assumptions made by the applicant are overrepresentations and therefore, the dilution factor applied to contaminant concentrations may be much lower.*
    - *There are also some limitations within the Scenario 1 and 2 modelling (such as not accounting for contaminants persisting under prolonged MALF condition) which could indicate noticeable effects, such as algal blooms, even for Scenario 1 and 2.*
    - *Leachate Scenario 3 shows that concentrations including (but not limited to) PFHxS, PFOS and arsenic could rise to within an order of magnitude of drinking water MAVs.*
    - *If 100% of the daily average leachate volumes are discharge to the river, ammonia and chromium guidelines would be exceeded, with effects on aquatic ecology likely to occur.*
    - *Arsenic concentrations have not been modelled downstream even though it is a contaminant of concern. This could have implications for ecological guidelines values and drinking water standards.*
    - *The leachate scenarios do not address the potential impacts on the Karetu River after closure of the landfill, when leaks in the liner could become larger over time and thus pose a threat to water quality in the Karetu River for an indefinite amount of time post-closure. While the applicant has referenced the potential for remediation, no details have been provided what this would entail and whether remediation is realistic.*
    - *Further, the deposition of PFAS, an unavoidable contaminant in the C+D waste industry, could pose a long-term risk to aquatic ecology and human health and this has not been quantified.*
- *This also highlights uncertainties around the performance of the leachate collection system and the underdrainage system, which prevents groundwater coming into contact with the liner, which could promote degradation and waste, which will cause additional leachate to be generated.*
- *The location chosen for the proposed fill site is not considered entirely appropriate. Once the liner and the remaining engineered mitigation degrades or fails, a discharge of persistent contaminants into the surrounding environment will occur. The site's geology will not assist in assimilating the leakage and may in fact favour preferential flow paths into groundwater, and ultimately surface water. I have addressed this in an earlier section and described that this matter requires careful consideration of tolerance for high probability for risk of adverse effects in the future vs. benefit gained from this proposal in the shorter term.*

- *In summary, the CRC's groundwater expert and surface water expert have stated that when assessing the worst-case scenario, adverse effects will likely occur to groundwater quality, surface water quality, surface water ecology and potentially water users downstream of the landfill site to varying degrees. These are effects that will manifest in the future over longer timescales, once the engineered mitigation loses its effectiveness.*

- *A risk also remains that these effects manifest themselves at an earlier stage, due to inadequate construction of the landfill, natural hazards or abandonment of the site and operational requirements. I consider that this can be quantified with a lower probability, as these aspects can be managed with conditions, or are generally deemed to pose a low risk (natural hazards).*

- *A question remains regarding the post-close management of the site, appropriate durations and bond requirements. While experts agree that these are all necessary aspects for this proposal, a suitable timescale is subject to debate, particularly considering the proposed WAC, the eventual discharge from the landfill once mitigation fails, and the permanent nature of the proposal, which will at some point in time, became a public liability.*

- *There are also several other matters that may result in changes to the risk profile of the proposed landfilling activity, including inadequate receiving environment monitoring and uncertainty about the response to monitoring, as well as the management of stormwater. The application has also suggested the provision of management plans that are important for an overall review of the proposal, but these are to be submitted once/if consent is granted.*

- *I therefore consider that the residual adverse effects will be more than minor and unacceptable. The appropriateness of the landfill design in all other aspects does not reduce the scale of the effects to a minor level, compensate for the siting constraints or allow for an overall conclusion to be considered acceptable*.

The CRC trust these comments will assist the Hon Minister's considerations in making decisions on whether to accept the referral application and to refer the project. Should you require any further information or have additional queries, please do not hesitate to contact us.

Note: All comments will be made available to the public and the applicant when the Ministry for the Environment proactively releases advice provided to the Minister for the Environment.

Managers signoff



Tim Davie
Acting Director Operations
Environment Canterbury

Date: 30 September 2025

Appendix 1: CRC's s42A report for the RMA applications CRC243699- CRC243706

Please see document attached.

Appendix 2: Meeting Minutes for 05 May 2025

Pre-Application Advice for Whiterock Lime Limited – RMA254576

Disclaimer: This technical advice note does not constitute legal advice and should not be relied upon as such. Please note this preliminary advice has been given prior to any official guidance from the Ministry for the Environment relating to the Canterbury Regional Council's (CRC's) role under the Fast-Track Approvals Act 2024.

Meeting Date:	05 May 2025

Executive Summary

Whiterock Lime Limited (Whiterock) (the referral applicant) have sought a meeting with Canterbury Regional Council (CRC) to discuss to potential option of using the Fast-Track Approval Act (FTAA) for the Whiterock quarry and managed fill project at 150 Quarry Road, Loburn. The project is not listed in Schedule 2 of the FTAA.

CRC Staff – Katie Nagy, Nardia Feehan and David Sluter (Consent Planning)
Whiterock – Shaun Coakley and Tom Wilson (Protranz) and Brent Hamilton (WSP)

Introduction

Fast-Track Act Consenting:
For a FTAA referral application under the Act, the applicant is required under section 11(1)(a) to consult with relevant local authorities. Whiterock will need to provide evidence of this consultation as part of their referral application.

This pre-application meeting forms part of this consultation and discusses the process going forward for any potential applications by Whiterock under the FTAA.

Whiterock Quarry and Managed Fill Project:
The applicant requested a pre-app meeting to discuss the proposed Fast-Track application. Specifically, the applicant sought advice relating to a suite of consents to enable ongoing quarrying and a managed landfill. The proposed application under the FTAA will be materially the same as that applied for under the RMA process, with some minor changes around rule interpretation and assessment. The key driver for a FTAA application relates to the costs and timeframes under the RMA as well as NES-F Regulation 45B in relation to the drainage of a wetland.

It is the position of the CRC that Regulation 45B(6) gives clear direction that 'a resource consent for a discretionary activity under this regulation must not be granted. It is noted that the applicant does not agree with CRC's interpretation.

Broadly, the consents required include:

s9: vegetation clearance in riparian margin, earthworks, deposition of material, earthworks within set back distances to wetland, reduction of the area of a wetland
s13: works within waterway, removal of ford structure, creation of stormwater and drainage water outfall into riverbed, introduction of plants
s14: groundwater take for dewatering (temporary construction and permanent lowering of water table), water take from gallery/ bore, water take from within 100 m of the wetland
s15: stormwater discharges (construction and permanent), drainage water discharges (construction and permanent), discharge of water treatment chemicals, discharge to air from bulk storage, handling, processing and landfilling, discharge of contaminants into air from a fuel burning device, discharge of fill material into land, discharge of water into land or water, discharge of hazardous waste

Minutes – Notes – Advice

- Applicant confirmed working on Fast Track referral application with lodgement intended as soon as possible.
- Brent presented copy of COVID Fast Track guidance notes to local authority and assumes FTAA process to be similar due to a lack of guidance and clarity from the EPA at this stage.
- Nardia noted that during the referral application stage, CRC is invited by the EPA to comment on any existing consents as per Section 30 as well as regional significance and regional strategy alignment.
- Nardia noted that generally EPA appear to be more stringent than CRC regrading application completeness (in comparison to s88 acceptance) and to ensure list of required documents is submitted as part of the application.
- The CRC has been drafting meeting minutes with other applicants to include in their application to show that consultation has taken place. It is suggested that these minutes are submitted as part of any referral application.
- Applicant sent letters to Ngai Tahu, Ngai Tūāhuriri and MfE.
- Costs recovered by CRC under RMA code up until referral application lodgement and comments invited through Fast Track process, then EPA manage costs.
- Applicant detailed project brief and the 'managed fill' project; existing applications have been in process for approx. 1 year. This application is currently at the hearing stage, but on hold, while FTAA option is investigated.
- Whiterock Lime Limited (WLL) is the FTAA applicant (RMA applicant was Protranz International Limited) and WLL is the landowner currently. This applicant change is in part to avoid confusion between Protranz Earthmoving and Protranz International.
- Brent looking at aspects of the s42A report from Council; essentially the new proposal will be the same scope of application with minor activity changes to meet some agreement with the CRC's s42A report.
- Wildlife Permit from DOC in place so not being pursued as part of FastTrack approvals.
- The applicant would need to withdraw the Council RMA applications if referral is successful and before any substantive application is accepted.

- NES-F: the remedial option (replace water) for the wetland is likely to not be feasible and therefore this will be addressed differently in the FTAA application.
- For ease of review, Brent will list the changes to activity sought between the RMA application and the FTAA amended proposal.
- Hazardous substance storage raised – Brent disagrees with need for s9 consent.
- Requirement for the applicant to provide a summary of enforcement action taken to date: The compliance issues raised in the s42A report for the site were agreed to not be enforcement action, just warnings. Brent to confirm with the compliance team that this is correct.
- It was agreed thee was no regional administered infrastructure in the vicinity of the site or impacted by the project e.g flood protection vegetation or stop banks etc.
- Landowners and immediate neighbours will be informed of substantive application - applicant will need to consult with direct neighbours.
- If referral approved, then key will be conditions for the proposal; Nardia noted that recent case was a requirement from Panel Convenor for relevant authority and applicant to work together on conditions. Brent stated will look to consult on conditions prior to substantive application lodgement.
- Nardia suggested that the applicant request for a substantive app s30 confirmation as this will be asked of CRC by the EPA as part of the completeness check and necessary for any substantive application.
- Timeframes: Application for referral to be drafted by end of week and lodging in 10 working days.

ACTION – David to send out minutes from meeting
ACTION – Applicant to proceed with fast track process
ACTION – Brent to provide overview of key changes and differences between the existing RMA application and the FTAA application.

Additional Information

Charging: Work will be charged to the existing Pre-App code for the project
Process: Whiterock to continue to pursue fast track referral at this stage
Communication (going forward): Email between David, Nardia and Brent
Timelines for pre/ referral and substantive notification: Looking to lodge referral application imminently and then if approved substantive application will quickly follow

Next Steps:
CRC will write up minutes from meeting and distribute

Signed by

Nardia Feehan
Principal Consent Planner

David Sluter
Senior Consents Planner - Project Management Officer

Before the Independent Hearing Panel appointed by the Canterbury Regional Council

IN THE MATTER OF The Resource Management Act 1991

AND

IN THE MATTER OF Applications CRC243699 to CRC243706 by Protranz International Limited to expand and continue to operate a lime quarry and to establish and operate a managed landfill

Section 42A Officer's Report

Date of Report: 09 March 2025

Report of Katie Nagy

1. My full name is Barbara Katharina Nagy and I am employed by the Canterbury Regional Council (CRC) in my current role as a Resource Management Technical Lead. I have been employed by the CRC since early 2017 in various roles, including as a Principal Consents Planner from December 2023 until September 2024.
2. I hold a Bachelor of Science degree in Geography and Biological Sciences from the University of Canterbury. I also hold a double degree from the University of Life Sciences Vienna (Dipl.-Ing., an engineering equivalent degree) and a Master of Natural Resource Management and Ecological Engineer from Lincoln University.
3. I have 8 years resource management experience, having worked for the Canterbury Regional Council in various roles. Most of my experience relates to compliance monitoring of resource consents and regional plans, ranging from subdivision developments, industrial sites, three waters related projects, quarries, cleanfill sites and landfills, among others. I have worked in the role of a Resource Consent Planner and Principal Consents Planner, preparing recommendations for and making decisions on a range of resource consent applications including land development projects, discharges to land, water and air, and industrial developments.
4. This report is prepared under the provisions of Section 42A of the Resource Management Act 1991 (RMA). This section allows a Council officer to provide a report to the decision-maker on a resource consent application made to the Council and allows the decision-maker to consider the report at the hearing. Section 41(4) of the RMA allows the decision-maker to request and receive from any person who makes a report under Section 42A of the RMA "*any information or advice that is relevant and reasonably necessary to determine the application*".
5. This report will provide the decision-maker with information and advice related to:
    a. The background to the application;
    b. Details of the notification of the application and submissions received;
    c. An outline of the relevant legal and planning provisions;
    d. Comments on the assessment of environmental effects provided (including a summary of the advice received from the technical experts);
    e. Details of regional policies that are relevant to the applications;

f. Recommendations in relation to the matters specified In Part 2 of the RMA;

g. Recommendations on the decision to be made by the decision-maker, including on whether the application can be granted or should be declined.

6. This report draws on the technical advice provided by several experts including staff employed by the CRC, external consultants Tonkin + Taylor Limited, SLR Consulting, as well as the audit of the applicant's Assessment of Environmental Effects (AEE) and supporting technical appendices, proposal description, description of the affected environment and the rule assessment provided in the notification recommendation report. Each expert has prepared a report in accordance with Section 42A of the RMA. Conclusions made in each technical expert's report are referenced in this report.

7. The following is the list of appendices attached to this report. Note that the expert evidence is listed in order of reference within the *Assessment of Effects* section of this report:

   a. **Appendix 1:** List of notified parties

   b. **Appendix 2:** Rule assessment tables

   c. **Appendix 3:** Summary of submissions

   d. **Appendix 4:** CRC, Contaminated Land and Waste report, prepared by Dr Michael Massey

   e. **Appendix 5:** CRC, Groundwater Quality report, prepared by Dr Matt Silver

   f. **Appendix 6:** Tonkin + Taylor, Landfill Engineering report, prepared by Anthony Kortegast

   g. **Appendix 7:** Tonkin + Taylor, Stormwater report, prepared by Peter Cochrane

   h. **Appendix 8:** Tonkin + Taylor, Geotechnical report, prepared by Clive Anderson

   i. **Appendix 9:** Tonkin + Taylor, Hydrogeology report, prepared by Sally Lochhead

   j. **Appendix 10:** CRC, Hazards Assessment Memorandum, prepared by Nick Griffiths

   k. **Appendix 11:** SLR Consulting, Surface Water Quality and Ecology report, prepared by Fleur Tiernan

   l. **Appendix 12:** CRC, Water Quantity and Hydrology report, prepared by Lucy Just

   m. **Appendix 13:** LizardExpertNZ, Herpetology report, prepared by Dr Mandy Tochter

   n. **Appendix 14:** SLR Consulting, Wetland report, prepared by Dr Stephen Rate

   o. **Appendix 15:** Tonkin + Taylor, Air Quality report, prepared by Richard Chilton

   p. **Appendix 16:** CRC, Addendum to evidence, report prepared by Dr Michael Massey

8. It should be emphasised that any conclusions reached, or recommendations made in this report are not binding on the decision makers. It should not be assumed that the decision-makers will reach the same conclusion or decision after having considered all the evidence to be brought before the panel by the applicant and submitters.

Introduction

9. Protranz International Limited ('Protranz' or 'the applicant') has applied for resource consents to continue and expand an existing lime quarry operation and establish and

operate a managed landfill, specifically a construction and demolition (C+D waste) waste landfill at 150, 154, 175 and 176 Quarry Road, Loburn, legally described as:

a. Lot 1 DP 388690 – the existing quarry pit at 150 Quarry Road
b. Lot 2 DP 497185 – top of quarry bench at 154 Quarry Road
c. Lot 4 DP 755 – quarry bench at 174 Quarry Road
d. Part Lot 2 DP 755 – SNA area at 176 Quarry Road
e. Crown owned land – riverbed
f. Road Reserve; and shown in Figure 1.

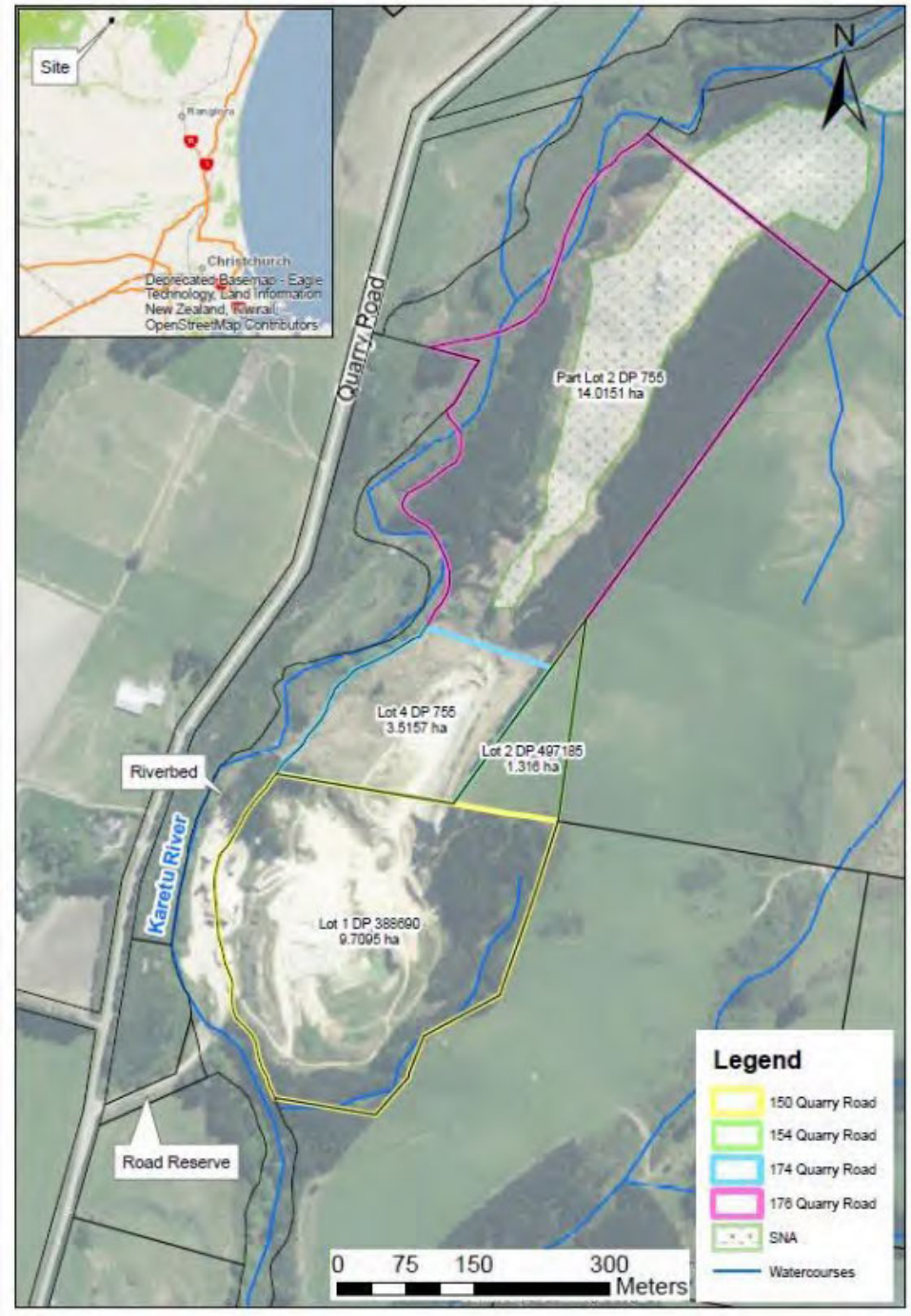


Figure 1: Location of the proposed activities.

10. The following resource consents are being sought:

    a. **CRC243699**: A s9 land use consent to undertake vegetation clearance and earthworks in river riparian areas for any defence against flood water improvements and pipelines for outfalls.

    b. **CRC243700**: A s9 land use consent to undertake excavation where <1m to groundwater and within 50 m of a surface water body, and deposit of material including managed fill landfill materials over an aquifer.

    c. **CRC243701**: A s13 land use consent to undertake the removal of a ford crossing structure, and outfall pipe construction in the bed of rivers.

    d. **CRC243702**: A s14 water permit to temporarily take and use of groundwater for site dewatering to install a landfill underdrainage system.

    e. **CRC243703**: A s14 water permit for a non-consumptive take and use of groundwater via a landfill underdrainage system to maintain groundwater level separation from the landfill liner.

    f. **CRC243704**: A s15 discharge permit to temporarily discharge site dewatering water, sediment and sediment laden water and water treatment chemicals onto land and into water.

    g. **CRC243705**: A s14 discharge permit to discharge stormwaters and water treatment chemicals onto land and into water, solid and hazardous waste to land, and landfill liner leakage into land that may enter water

    h. **CRC243706**: A s15 discharge permit to discharge contaminants to air from the development and operation of a quarry and managed fill landfill, including the handling, processing and storage of bulk solid materials.

11. The resource consent application was prepared and submitted on behalf of the applicant by Mr Brent Hamilton of WSP New Zealand Ltd. The application is accompanied by the following assessment of effects on the environment (AEE) and technical supporting documents:

    a. WSP, Jeanette Tucker: Stormwater Management Plan (Appendix C)

    b. WSP, Maia Bellingham: Preliminary Site Investigation (Appendix D)

    c. WSP, Amanda Wells, Sophie Hill, Charlotte Buxton-Blue: Geotechnical Report (Appendix E)

    d. WSP, Katie Coluccio, Eric van Nieuwkerk: Groundwater and surface water effects assessment (Appendix F)

    e. WSP, Mark Hansen: Ecological Impact Assessment (Appendix G)

    f. WSP: Design Drawings and Concept Design (Appendix H)

    g. WSP: Vehicle Movements and Material Balance Summary (Appendix I)

    h. WSP, Adam Muller: Landfill Design Report (Appendix J)

    i. WSP, Andrew Hart: Waste Acceptance Criteria (Appendix K)

    j. WSP: Monitoring Programme and TARP (Appendix M)

    k. WSP, L J Robertson: Emissions Plan (Appendix N) – no longer relevant after the withdrawal of CRC243707

    l. WSP, Mayce Bates: Engagement Report (Appendix O)

    m. WSP, Tim Strotter: Slope Stability Assessment (Appendix Q)

    n. WSP: Containment Risk Assessment (Appendix R)

o. WSP, Iris Xu: Air Quality Assessment (Appendix S)

p. WSP, Michael Topp: High Level Transport Assessment (Appendix U)

q. WSP, George van Hout: Noise Impact Assessment (Appendix V)

12. The application was lodged on 02 April 2024.

13. A land use consent application has also been lodged with Waimakariri District Council (WDC), referenced as **RC245076**, at the same time as the regional resource consent application. The applicant requested a joint notification process.

14. Processing of the regional and district resource consent applications has been aligned as far as practicable to ensure the process can be managed as efficiently as possible.

15. The applicant requested public notification of the consents.

16. Note that the above list of resource consents sought represents the consents and activities applied for by the applicant. As part of my rule assessment in a later section of this report, I have determined that several other activities are inherent to the proposal and require resource consents that have not been applied for, or have been addressed as permitted activities instead. These mostly include activities associated with effects that are likely to occur in an adjacent wetland, as identified by CRC's technical experts, the use of water, and the discharge of wastewater. They include:

    a. The reduction of the area of a wetland due to the modelled reduction of baseflow to the wetland;

    b. The take of water (baseflow) from within 100 m of a wetland;

    c. Earthworks within 50 m of the wetland for the remediation proposal;

    d. The discharge of water into the wetland for the remediation proposal;

    e. The take and use of water via an infiltration gallery;

    f. The discharge of on-site wastewater,

    g. In-stream diversions associated with the proposed removal of the ford, and

    h. Hazardous substance storage within the proposed leachate pond.

17. I also note that on 18 November 2024 the CRC was notified that the applicant wishes to withdraw the proposal for the coal fuelled rotary lime drying kiln. Instead, the drying kiln will be fuelled by two diesel burners. Subsequently, **CRC243707**, a discharge permit to discharge contaminants to air from an external combustion heat device (furnace) and associated particulates from the rotary kiln drying lime (processing of bulk solid materials) was withdrawn and the 'processing' component of the activity, being the discharge of particulates from the rotary kiln drying, was amalgamated into CRC243706 instead.

18. The applicant proffered a set of conditions (see Appendix Y of the lodged application) for the resource consents sought (Proposed Conditions).

19. Initial technical advice was sought from CRC staff and external parties for the purpose of identifying omissions or areas where further information from the applicant may be required. The experts engaged include:

    a. CRC Senior Scientist, Groundwater Science, Dr Matthew Silver

    b. CRC Principal Science Advisory, Contaminated Land, Dr Michael Massey

    c. CRC Senior Scientist, Groundwater Science, Mark Trewartha

    d. CRC Science Team Leader, Natural Hazards, Nick Griffiths

    e. CRC Scientist, Hydrology, Lucy Just

f. SLR Consulting, Principal Consultant, Ecology & Marine Science, Fleur Tiernan

g. SLR Consulting, Senior Ecologist, Dr Stephen Rate

h. Lizard Expert NZ, Principal Herpetologist, Dr Mandy Tochter

i. Tonkin + Taylor, Principal Geotechnical Engineer, Clive Anderson

j. Tonkin + Taylor, Senior Landfill Engineer, Tony Bryce

k. Tonkin + Taylor, Technical Director, Anthony Kortegast

l. Tonkin + Taylor, Stormwater Specialist, Peter Cochrane

m. Tonkin + Taylor, Senior Hydrogeologist, Sally Lochhead

n. Tonkin + Taylor, Air Quality Specialist, Richard Chilton

20. Following the initial, high-level review of the applicant's AEE by Environment Canterbury staff and external experts, a request for further information (RFI) under Section 92(1) of the RMA was sent on 20 June 2024. A response to the RFI was received in late August and early September 2024.

21. The proposal, as amended by the RFI responses and further correspondence with the applicant, has been considered in this report.

22. I undertook a site visit on 30 June 2024, together with district council staff, technical experts acting on behalf of the CRC, the applicant and the applicant's experts.

Background

Existing Quarry Operation

23. The property has been subject to limestone quarrying and processing since the 1950's. The applicant recently purchased the site and has continued to use these activities. The applicant now wishes to expand the operation and include a managed fill.

24. Part of the site includes Crown Road reserve access and Crown riverbed, which has been occupied by the previous and current owners for over 60 years. I am not aware of any formal agreements between LINZ and the applicant for the use of the land for existing activities.

25. Current activities on site include:

a. Lime extraction and handling,

b. Bulk storage of materials;

c. Lime processing, which includes screening, crushing and drying via an onsite rotary kiln, converting lime into carbon dioxide and ag-lime;

d. Coal storage and operation of a coal fired kiln up until November 2024. Note that this is proposed to be replaced by diesel;

e. Take and use of groundwater (hydraulically connected to the Karetu River) via an infiltration gallery;

f. Discharge of human effluent via a septic tank; discharge location unknown;

g. Stormwater and sediment-laden discharges onto and into land and into the Karetu River; and

h. Hazardous substance storage.

26. I have also observed works in the riparian margins of the Karetu River for the installation of bunds, for the purpose of flood defence and stormwater management. Works included vegetation clearance and earthworks within the riparian margin.

27. Many of the above existing activities on the face of it appear to be unauthorised but these are relevant as they form part of the proposal. I have expanded on this below.

Other Resource Consents Required and/or Held

28. The applicant currently holds no and, in the past, has not held, resource consents for the existing quarry site from the CRC. This report discusses the necessity of resource consents for the existing on-site activities in the *Legal and Planning Matters* section.

29. I note that several submissions have raised the above. In summary, the applicant currently undertakes and/or has undertaken the following activities, that are to the best of my knowledge, without appropriate authorisation from the CRC:

    a. The take and use of water from an infiltration gallery;

    b. The discharge of domestic wastewater (human effluent and greywater);

    c. Earthworks (quarry within 1 m of the aquifer and within 50 m of the Karetu River);

    d. Earthworks and vegetation clearance in riparian margins;

    e. Discharge of sediment-laden water, stormwater, and other contaminants from the site into the Karetu River;

    f. Discharges into air from the handling, processing and storage of bulk materials (lime production).

30. In relation to on-site wastewater treatment and disposal, there is no available reticulated wastewater system, and all on-site wastewater generated at the site is disposed of on-site at a location near the point of generation, adjacent to the Karetu River. The applicant confirmed that wastewater is discharged into an existing septic tank, that is assumed to discharge into land via a soak hole or tile drain nearby the facilities. The applicant confirmed that, as the discharge is likely within 20 m of the Karetu River and within 1 m of groundwater, permitted activity Rule 5.7 of the Canterbury Land and Water Regional Plan (CLWRP) cannot be complied with and therefore, the current wastewater disposal requires a resource consent.

31. The applicant outlined that a new system would have to be installed in accordance with permitted activity rules or alternatively, the site's wastewater could be taken off site for disposal. An application for the wastewater discharge was not part of the lodged proposal and to date, the applicant has not confirmed a preferred approach for the disposal of wastewater on site.

32. The applicant referenced Permitted Activity Rule 5.111 of the CLWRP as the applicable rule for the take and use of surface water for small and community takes. The site currently sources water from an existing infiltration gallery and circulation pump adjacent to the Karetu River beside the weighbridge. The gallery is also used to supply the plant and operations buildings, and to provide stockwater to a neighbouring property.

33. The infiltration gallery is not currently listed on the CRC's database. The provided information indicates that the water take location is below the river, and by definition of the CLWRP is therefore treated as a groundwater take with a direct hydraulic connection to the Karetu River[1].

[1] Groundwater means all water beneath the surface of the earth contained within the saturated zone, but excludes the water chemically combined in minerals; and surface water means all water above the ground surface and within a lake, river, artificial watercourse or wetland.

34. In addition, I note that the justification for the requirement for consent CRC243703 is falsely assessed as the use of CLWRP Rule 5.6.

    a. The Supreme Court in its decision in *Cloud Ocean Water Limited v Aotearoa Water Action Incorporated* [2023] instructed that the CLWRP does not provide the framework to address 'take and use' consents in separate 'take' and 'use' components and thus permits. Therefore, the 'take' of water must be read conjunctively with the 'use' of water.

    b. There are some situations in the CLWRP where the take of water is anticipated without the associated use, and these have been specifically addressed in provisions.

    c. Where there is no specific activity rule, it is not possible to 'disaggregate' the take from the use under the LWRP, and therefore the general 'take and use' rules must be used. These are either regional rules, or the relevant sub-regional rules.

35. Additionally, the proposed take, as assessed by Option 1 and 2 (discharge into surface water or discharge onto land where it will enter surface water) is not non-consumptive[2] as per the CLWRP. Only Option 3 (reinjection well) is a non-consumptive take and subsequent discharge, addressed by a separate CLWRP rule (5.131).

36. I therefore consider that Option 1 and 2 presented as scenarios for CRC243703 can be addressed by the generic regional water take and use rules (as a permitted activity under 5.114), or alternatively, applied for under the relevant sub-regional rule (Rule 8.5.12). Option 3 (the non-consumptive take and subsequent discharge) can be addressed as proposed by CRC243703.

37. A land use consent is required and has been applied for from WDC (application **RC245076**) for earthworks and vegetation clearance within waterway margins, general earthworks for formation of a managed fill landfill, the bridge structure within a waterway setback, increased rates of mineral extraction, to operate a managed fill landfill, the construction of stormwater outfalls, and earthworks and material storage associated with quarrying / landfill construction.

38. As stated above (and noted in the Rule Assessment below), I consider that several other consents are needed for this proposal but have not been applied for. This includes an application for activities that contravene the Resource Management (National Environmental Standards for Freshwater) Regulations 2020, related to natural inland wetlands. The applicant and CRC's technical expert have both confirmed that the wetlands meet the definition of 'natural inland wetlands' as defined in the NPS-FM. I note that the applicability of Regulation 45B (construction of specified infrastructure – landfills and cleanfill areas) has been subject to debate with the applicant. The CRC maintains that as 45B(4) and (5) are relevant, 45B(6) directs the decision maker to not grant consent unless conditions as listed can be satisfied. In the absence of this assessment by the applicant, the CRC considers that conditions of 45B(6) are not sufficiently met. However, due to the assertion by the applicant that no consent is necessary (Appendix B of the application and the s92 response on this matter), I have continued with my report should the decision makers be of a mind to consider that 45B is not relevant to this proposal.

39. The applicant has also referenced in-stream diversions to facilitate the removal of the existing ford crossing and to avoid sediment discharges. No such application has been made.

[2] Any reference within the CLWRP to 'non-consumptive' water takes requires that the water is returned to the same waterbody as its source. For a groundwater take it means that the water is returned to the same aquifer or groundwater source as the abstraction and that the discharge is within 50 m of the abstraction point.

40. Leachate stored within the proposed leachate ponds falls under the definition of a 'hazardous substance' within Schedule 4 of the CLWRP, and as such, the storage of leachate within the ponds should be addressed as a s9 matter requiring consent. However, I note that the design of the storage pond, incl. proposed mitigation, has been accounted for in the application for CRC243700.

Compliance History

41. I have reviewed the compliance history of the site. I am aware of two incidents notified to the CRC:

    a. **PE233858**: notified in February 2023, citing that the site is operating without the correct resource consents. This Pollution Event was closed with an understanding that the applicant was in the process of undertaking pre-application meetings with the CRC to obtain the relevant authorisations for the site.

    b. **PE245319**: a formal warning letter was issued to the applicant on 17 June 2024, following a site visit, requiring immediate improvements to stormwater management, sediment discharges and contaminant discharges from site into the Karetu River. I am of the understanding that improvements have been made to the site to give effect to the actions required within the warning letter, but no follow up visit has yet been conducted during a rain event to assess the effectiveness of the improvements.

Notification

42. The applicant requested public notification of the applications pursuant to s95A.

43. The applications to WDC and CRC were jointly notified on 11 September 2024.

44. Direct notice was served on the potentially affected parties listed in **Appendix 1**. This list consists of, among others:

    a. Te Ngāi Tūāhuriri Rūnanga and Te Rūnanga o Ngāi Tahu;

    b. Local residents and land owners that are directly adjacent to the Karetu River downstream of the site;

    c. Local residents and land owners who own properties along Quarry Road and Loburn Whiterock Road, and minor adjacent roads;

    d. Recognised stakeholders, such as Forest & Bird, DOC, Fish & Game;

    e. the local school along the main road leading to the quarry;

    f. LINZ and District Council;

    g. Central Government entities, incl. Te Mana Ora.

Submissions

45. Submissions closed on 09 October 2024.

46. During late November 2024, the CRC became aware of issues with the online submission form on the CRC's website. Several submitters have reported that submissions were not recorded, despite having received an automated email confirming receipt of the submission.

47. The applicant was advised of this issue on 11 December 2024. A notice was published on the CRC's website and the local papers used for the original notification the week prior to Christmas, requesting that submitters notify their missing submission by the 31st

January 2025 and requesting proof of the original confirmation email for late acceptance of the submission.

48. In total, 573 submissions were received. Of those, 24 were re-submissions. A summary of submissions is outlined below:

    a. 510 submissions oppose the proposal in whole or in part;

    b. 6 submissions indicated a neutral position in whole or in part;

    c. 57 submissions support the proposal in whole or in part.

49. Of the submissions received, 89 indicated that they wish to be heard.

50. A full summary of submissions received is included in **Appendix 3.**

51. Given the high number of submissions, I have grouped the matters raised in submissions in general topics to ensure all relevant matters are covered. The following is a list of key issues that I will be addressing further in my report:

    a. **Water quality**- Many submitters are concerned about the potential risks the proposed landfill to groundwater and surface water quality, and particularly on private drinking water sources. Specific issues identified by submitters include the potential for contamination and leaching over an extended length of time causing adverse effects on the water quality and the ecosystems, as well as on people's and animals health from ingesting potentially contaminated water.

    b. **Water quantity** – Some submitters are concerned about the use of water from the Karetu River as mitigation for dust suppression and other ancillary activities, particularly, as the Karetu River runs dry and therefore may not be a reliable water source, but also because residents are concerned about sufficient volumes of water being available for domestic water needs, which they see as taking priority over dust suppression.

    c. **Landfill design** – Many submitters have raised concerns about the landfill liner design, the breakdown rate and expected lifetime of the liner and the potential for damage of the liner considering the underlying geology of the site, which is generally understood to be porous limestone.

    d. **Air quality**- Many submitters have raised concerns about the potential for adverse effects arising from dust discharges, both nuisance and health related impacts, particularly in relation to asbestos. Concerns have been raised regarding the high wind zone, prevailing wind direction carrying contaminants into the direction of residents' properties.

    e. **Earthquake risk** - Many submitters have raised significant concerns of the proximity to nearby fault lines and have questioned the ability for the design of the landfill to cope with a large magnitude earthquake. They point out that if the liner should fail or landfill collapse, this may have significant consequences on the water bodies and water supply through the discharge of contaminants from the landfill into those waterbodies.

    f. **Flooding risk** - Submitters have also raised concerns regarding the proximity of the site to the Karetu River and have cited history of flooding and the potential of the site becoming inundated, and thus the risk of carrying contaminants into the waterway.

    g. **Long term management responsibility** - Some submitters raised concerns around the long-term management and ownership of the site and raised questions regarding who will be responsible if it was abandoned in the future. Submitters have also referenced the deposition of 'forever chemicals' and a concern that these will eventually contaminate water.

h. **Ecology** – Many submitters have made specific reference to the ecology of the local environment, citing freshwater flora and fauna species, lizards and avifauna as a concern.

i. **Wetland** – Two submitters are concerned about the impact of the proposal on the two on-site wetlands and questioned whether the appropriate consents were applied for.

j. **Kate Valley regional landfill** - Some submitters questioned why the region needed another landfill, and that Kate Valley Landfill would cater for the proposed volumes of materials. The term 'Kate Valley' was cited 67 times in the submissions.

k. **Cultural values** – Some submitters raised concerns around the proposal's effects on the cultural values of the surrounding environment and not being consistent with the principles of the Te Tiriti o Waitangi.

l. **Submissions in support** – Submissions in support of the proposal have cited the economic benefit of being able to dispose of waste closer to the source when well managed. This benefit is cited to be felt mostly by developers, tradesmen and clients and rate payers as a whole, by providing effective and efficient waste management. Submitters have also voiced support on the basis that this proposal will create further capacity at Kate Valley landfill and enable it to last longer and therefore save ratepayers funding another landfill.

52. To address these submissions and provide an audit of the assessment of actual and potential adverse effects, I have assessed the submissions received according to themes identified above in the body of this report and have provided responses to those themes throughout. To assist the decision makers, I have identified some specific submissions in the body of this report; however, I have identified where more submitters than those listed have submitted on a particular matter.

53. The decision makers are also referred to the summary in Appendix 3. Key words were allocated to each submission, sometimes several, counted and grouped to provide an indication of the key concerns of the submitters.

    a. The following key words/ themes were present in >20% of the submissions: general environmental impact, surface water quality, containment failure, drinking water, traffic safety and traffic in general

    b. Also, of concern (10% > 20%) are: general ecology, groundwater quality, air quality, general water quality, long term responsibility, site selection, Kate Valley (as an alternative), human health impacts, asbestos, noise, general community impact, amenity and recreation, earthquake hazard, flood hazard, wind hazard, trust in applicant and landfill liner lifetime.

Description of the Activity

Overview

54. A detailed description of the proposed activity is provided in the application (Section 4 of the main AEE), the supporting technical reports and appendices. Relevant appendices to refer to for more detailed information and descriptions are:

    a. Appendix F: Groundwater and Surface Water Effects Assessment (in part)

    b. Appendix H: Design Drawings Set

    c. Appendix J: Landfill Design Report

d. Appendix K: Waste Acceptance Criteria Report

e. Appendix L: Site Management Plan

55. Following the s92 request and further clarification, the applicant provided updated appendices, including Appendix H and L.

56. Appendices C (Stormwater Management Report), M (Monitoring Programme and Triggers and Actions Response Plan) and Appendix L (Site Management Plan), among others, outline mitigation and monitoring measures proposed for the site. Proposed conditions are contained within Appendix Y.

57. The details of the proposed Waste Acceptance Criteria (WAC) were also discussed and clarified in more detail during May 2024, together with the applicant, the CRC and experts to ensure that technical experts and the applicant agreed over what is proposed for the site.

58. In summary, Protranz proposes to continue and expand the existing lime quarrying and processing operation and establish an inert construction and demolition waste and contaminated soil, incl. asbestos, landfill within the quarried areas of the site.

59. The WAC for the site does not entirely match one of the classes as described in the WasteMINZ Guidelines[3], as the applicant has proposed a mixed approach. I have therefore purposely labelled the site as 'managed landfill' to ensure that it is not interpreted as 'managed fill' consistent with the Class 3 acceptance criteria under WasteMINZ.

60. Landfilling operations are proposed to occur concurrently with quarrying. Quarrying is proposed to continue over the next ten years, during the staged development of the landfill. Landfilling will commence within the quarry footprint after the construction of the first of two stages of the landfill.

61. The site will share a common access point, overburden disposal area, and stormwater management systems.

62. The key features of the proposed design include: a landfill liner at the bottom of the landfill, a leachate drainage system to capture leachate above the liner, a leachate pond to collect captured leachate, and underdrainage system installed below the liner to control groundwater levels to ensure they remain below the base of the landfill, and capping following completion of filling.

63. A more detailed description of activities is provided below. I have also provided references to specific sections of the application, where necessary.

Proposed Quarry and Processing Activities

Excavation/ Quarrying and Storage of Excavated Materials

64. Section 4.5 of the AEE (p 47/106) describes the proposed quarrying activities. Appendix I contains a summary table detailing expected overburden and limestone volumes. Key points are:

a. The combined lime and overburden extraction rate will be ca. 100,000 tonnes/ 40,000 m^3 per year.

b. In total, it is proposed to extract ca. 55,000 bulked/banked cubic metres[4] (bm^3) of lime over 10 years.

[3] WasteMINZ Technical Guidelines for Disposal to Land, version 3.1, 2023

[4] Material which has been excavated in some way and swelled as a result of the space that now exists between its elements.

c. Ca. 44,000 bm^3 of overburden soil already exists on the site from the activities to date. 130,000 bm^3 additional topsoil, subsoils and siltstone overburden material will be extracted over the next 10 years.

d. This is a grand total of 229,000 bm^3 of excavated volumes.

e. Reuse will be for the liner, subgrade, intermediate and daily covers and capping and consist of ca. 170,000 bm^3.

65. The existing benched area to the north of the extraction pit will be used for storage of topsoil and subsoils.

66. Not all overburden material may be used for cover material, depending on suitability. Therefore, some material may need to be transported off site.

67. The application states that a peak total of 40,000 bm^3 during Stage 2 of the development consisting of overburden and onsite and imported clean topsoil and aggregate may be stored for future use in the landfill.

Processing, Handling and Storage of Lime

68. Lime processing and handling will continue on site. Processing includes screening, crushing and drying via an onsite rotary kiln converting lime into carbon dioxide and ag-lime. Further screening reduces the max granule size to ca. 2 mm.

69. The maximum capacity of the kiln is 20 tonnes per hour. The original application quoted that average lime processing volumes will be 300 tonnes per day, while the total handling rate (incl. excavation and conveyance) will not exceed 100 tonnes per hour, therefore 15h per day average operation of the kiln.

70. The original AEE (section 4.5.4) referenced the use of a coal fired furnace. However, this proposal was amended, and it is proposed to use two small diesel burners (2 x 154 kW) instead. The replacement diesel burners will be two B30A burners using a combined 75 L/hour of diesel.

71. The original proposal included the installation of a multicyclone to manage particulate emissions from the coal fired burner. This no longer forms part of the proposal.

72. Dried lime will be stored in existing sheds on the lower elevations of the site. Indoor storage volumes are up to 3,000 tonnes and outdoor storage volumes are 10,000 tonnes. Some bulk lime is proposed to be taken off site unprocessed.

73. The original proposal states that the kiln will operate between 1100 and 1500 hrs Monday to Saturday, excluding public holidays, in order to target conditions during the day that are most conducive to dispersion and dilution of emissions. In the calculation used for CO_2 discharges from the diesel fired burners, the worst-case scenario was presented, which is an 8 hrs per day, 6 days per week and 50 weeks per year use. Both of these proposed operating hours are at odds with the proposed output capacity of 300 t /day, which would require 15 hours of operation at peak output of 20 t/hour. The proposed operating hours will need to be clarified by the applicant.

Dust Management during Quarrying and Processing

74. Water will be used as a primary means of dust suppression, and the application states that 90 m^3 of water will be stored for dust suppression purposes. However, the RFI response to questions posed by the air quality expert stated that 400 m^3 of water storage will be available for use. In the response to general questions (the same RFI), 200 m^3 of onsite water storage is referenced. The applicant has not been clear nor consistent on this matter.

75. Water will be sourced from:

a. decanting of the Sediment Retention Ponds (SRP);

b. via rain collection,

c. the taking of water from the Karetu River via a groundwater take, or

d. by supplementing water from off-site sources, such as district council supply point, via truck and trailer units (25 m^3 per unit).

76. Appendix L (Site Management Plan) of the application contains further information on dust management in section 8.3, incl.:

a. Checking and reviewing conditions during windy days at 15-minute intervals;

b. Wet suppression of unpaved roads during dry, windy periods, using 1L/m^2/hr;

c. Availability of a water cart with a 20 m^3 capacity. With a refill and application cycle of 1 hour, the water cart can treat up to 2 ha;

d. Possibility of using soil binders (co-polymer) to reduce windblown dust generation, incl. use of soil binders on high traffic areas with re-application;

e. Limiting vehicle speeds to 20 km/h.

Proposed Landfill Activities

Overview

77. The applicant has labelled the proposed landfill as a Class 3 Managed Landfill in accordance with the WasteMINZ Guidelines (2023), with the inclusion of inert and sorted construction and demolition (C&D) waste and other specific inert wastes including contaminated soils and asbestos.

78. A liner design consistent with the Class 1 Landfill requirements is proposed for the site and is discussed in a later section of the report.

79. Leachate extraction will be designed to capture any mobilised contaminants.

80. The total airspace capacity of the landfill will be 500,000 m^3 across a 4.0 ha waste placement footprint, with an average landfilling rate of 30,000 tonnes per year determined by demand. It is expected that the landfill will have a lifespan of approx. 20 years.

81. Development of the landfill will occur in two stages in the existing quarry pit area. It is proposed to form a suitable floor and slopes.

Landfill establishment and design features

Landfill Construction

82. During landfill construction, internal access haul roads will be built to allow vehicles to access required areas. Additionally, a temporary access road will be built during construction of Stage 1 to allow access to Stage 2. Details of the haul roads, and construction roads have not been provided by the applicant.

83. Access to the northern stockpiling location is via an existing track, which will remain during Stage 1 construction. A new ramp is proposed to be constructed to the stockpile area during construction of Stage 2. Details have not been provided.

84. The current overburden storage/stockpiling has been observed to cause instability near the stormwater ponds (Appendix E), with slopes currently at 30 degrees and seepage occurring where slope failure has occurred. Future stockpiling on site will be constructed with batter angles of ca. 18 degrees.

85. Landfill construction will be developed in the following sequence:

a. Stage 1 subgrade preparation: earthworks to prepare the landfill subgrade

b. Base liner installation for Stage 1: construction of Stage 1 liner system

c. Stage 1 waste filling and Stage 2 subgrade preparation: concurrent waste deposition in Stage 1 and earthworks for construction of Stage 2 subgrade

d. Stage 1 intermediate cover and Stage 2 base liner installation: implementing intermediate covers for Stage 1 while constructing the landfill liner for Stage 2

e. Stage 1 final capping and Stage 2 intermediate cover and waste filling

f. Final capping for Stage 1 and intermediate cover for Stage 2

g. Final capping for Stage 2

86. Drawing C201 in Appendix H visually depicts this sequence of construction.

87. I also note that the applicant proposes to backfill the existing quarry pond (exposed groundwater) with virgin excavated natural materials (VENM), as defined by the WasteMINZ Guidelines (2023). Material will be sourced from stockpiled overburden or other natural materials from the site.

Landfill Base and Liner Composition

88. The proposed landfill base floor is located above modelled groundwater levels, with a base liner geomembrane 1.5 metres above the modelled groundwater levels. Therefore, fill is required to achieve the design floor levels. This will consist of VENM.

89. The floor grading requires a min. 2% fall in accordance with WasteMINZ (2023) for Class 1 designs, with a max. fall of 33% to achieve a cohesive soil liner.

90. The floor design is to be constructed to enable a gravity drain towards the leachate sump (low point) in each stage of construction. Gravity pumping may also be incorporated into Stage 2.

a. Stage 1 fall to low point on southwestern extent of landfill;

b. Stage 2 fall to low point on western extent of landfill.

91. The liner design is detailed in Appendix J (Landfill Design Report). Key elements of the design are reiterated here and depicted in **Figure 2**:

a. A 600 mm thick compacted cohesive soil layer with permeability $<10^{-9}$ m/sec (*this supports and acts with the geomembrane to provide a composite barrier effect*);

b. Above that, the main floor liner will consist of a geomembrane layer, consisting of a 1.5 mm thick high-density polyethylene (HDPE) geomembrane (*the primary leachate barrier*);

c. Cushion geotextile (*to reduce the risk of the overlying leachate drainage aggregate puncturing the geomembrane*);

d. Above that, the landfill floor will contain a 300 mm thick drainage aggregate blanket, incorporating the leachate collection pipework, operating under gravity drainage (*to collect and convey leachate to the leachate drainage system)*

e. A separation geotextile is placed on top of the drainage blanket and pipework (*to reduce contamination of the underlying drainage layer by preventing fines from migrating downwards from the overlying waste*);

f. Above this layer, a min of 500 mm layer of suitable fine grain waste or contaminated soil will be placed to ensure the protection of the liner and leachate collection system from any large objects in the waste.

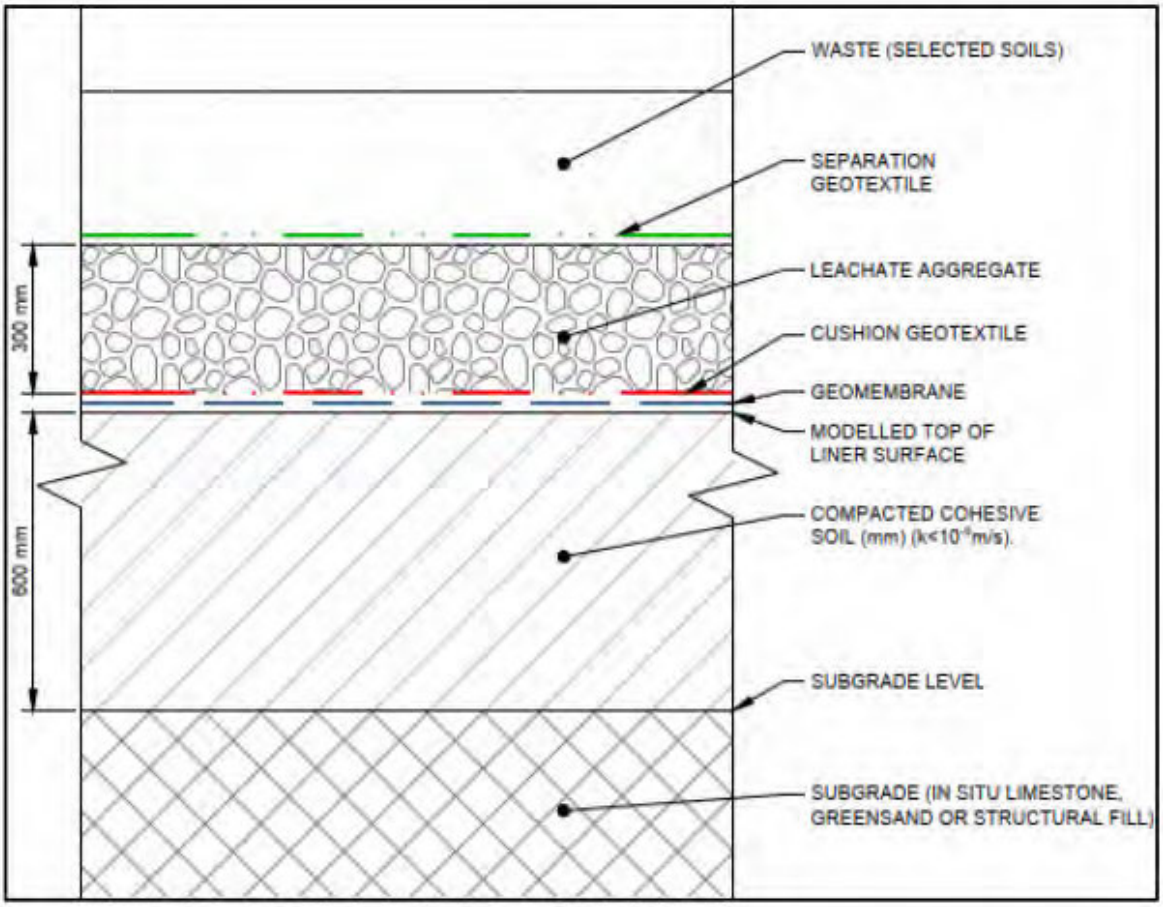


Figure 2: Landfill liner design schematics

Batter Liner and Wall Liner

92. The design for the side wall liner is based on the Class 1 WasteMINZ Guidelines (2023). Details are provided in Section 11.4 of Appendix J.

93. Appendix E (Geotechnical Assessment) informs the max. recommended slopes and benching for the landfill batter and wall areas.

94. A batter liner will be used for areas sloped 3H:1V and a wall liner for steeply sloping walls (1H:1.75V). Both of these liners include a 1.5 mm HDPE geomembrane.

95. Sidewalls are not proposed to include a leachate drainage blanket due to steep slopes.

96. Sidewalls will be sprayed with polyurea to form a 2.0 mm thick layer over shotcrete. Further details are presented in Section 11.5 of Appendix J.

97. The sidewall liner will constitute less than 5% of the overall liner, and is not present in Stage 1 of the landfill.

98. **Figure 3** and **Figure 4** below show a typical design for a batter liner and a wall liner, respectively.

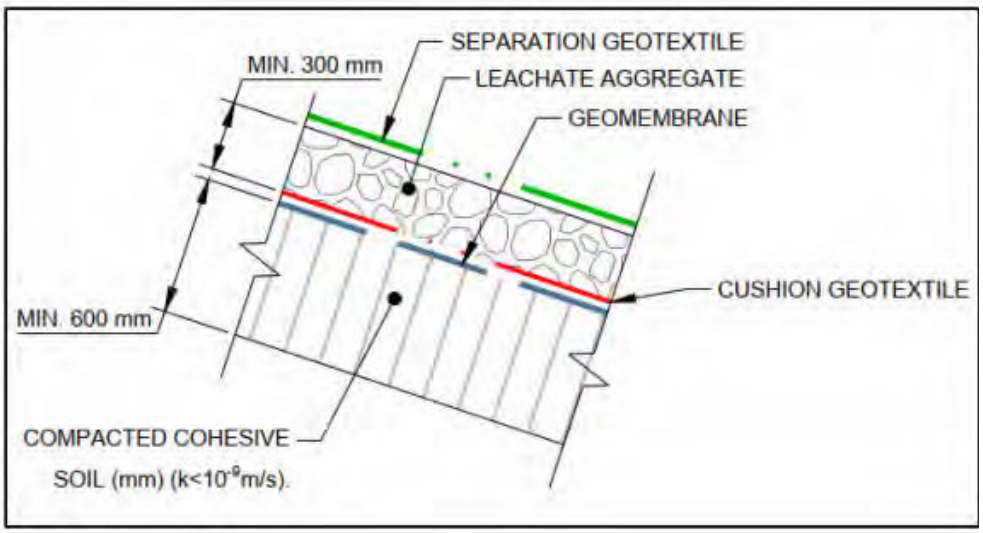


Figure 3: Batter liner design details

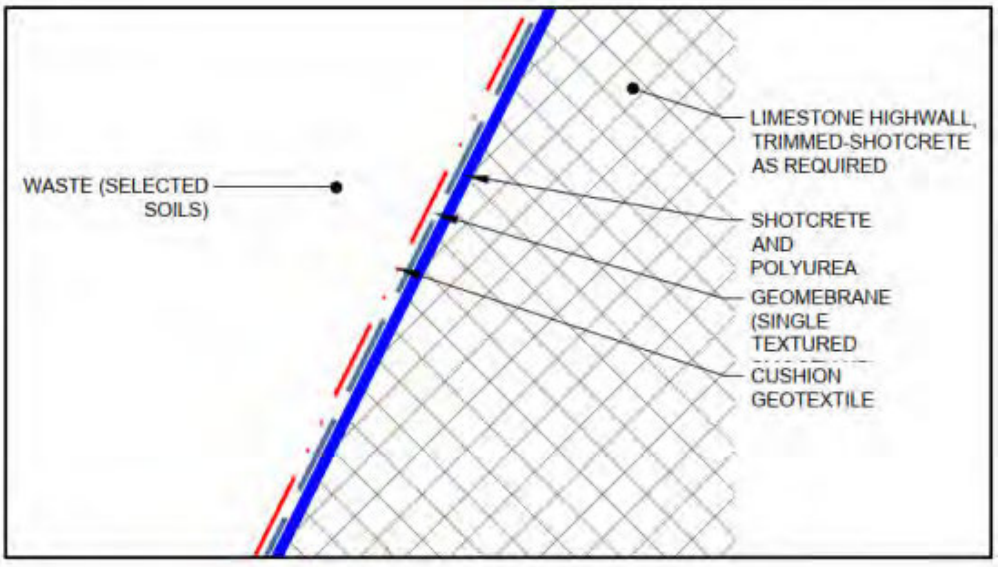


Figure 4: Wall liner design details

Groundwater management and underdrainage system

99. The design incorporates a groundwater underdrainage pipe and trench system below the base liner to lower groundwater levels and separate groundwater from the liner and maintain at least 1.0 m separation. Drawing C400 contained in Appendix H shows the proposed location of the underdrainage lines.

100. Initially, site dewatering will be required for the construction of the liner system and this is anticipated at a higher rate than during the operational stage.

101. Groundwater collected via the underdrainage system will be discharged to the Karetu River, via one of the following proposed options:

    a. **Option 1:** direct discharge to the Karetu River via an outfall near the underdrainage collection sump;

    b. **Option 2:** discharge to an area planted with wetland species and subsequent discharge to the Karetu River located at the lower-lying river terrace to the northwest of the site;

c. **Option 3:** a discharge to ground through a reinjection well into the Karetu silica sand formation. Water from the Karetu silica sand formation naturally flows into the Karetu River downstream of the site.

102. The applicant estimates that the rate of groundwater underdrainage take and discharge is an average rate of 0.39 L/s, or 34 m^3/day. The rate of take will be higher during the construction of the landfill base and liner system.

103. The underdrainage system will contain water quality sensors to detect potential leachate leakage. In such cases, an automatic valve will be activated, and underdrainage water will be diverted to the leachate pond via the underdrainage sump diversion line.

Cell Drainage and Leachate Collection System

104. Leachate will be generated by rainfall infiltration into the landfill, by incidental liquid contained within the received waste and via operational activities such as truck washing and wheel washing. The landfill will continue to generate leachate into the foreseeable future, including post-capping and post-closure phases and therefore leachate will require ongoing removal and disposal off site.

105. It is expected that the range of leachate generation will vary from 1 to 50 m^3/day, with an average of 12 m^3/day. The design is such that the head of the leachate on the lining system does not exceed 300 mm.

106. A leachate sump is to be placed at the low point of each landfill stage and gravity fed from the sump into the leachate pond.

107. Pumped extraction can also be incorporated, if necessary.

108. The leachate pond consists of a double liner system composed of an upper primary HDPE geomembrane, underlain by a geonet leakage detection layer, underlain by a composite liner with the same specification as for the leachate barrier on the landfill floor. Details are provided in Appendix J, Section 10.6.2.

109. Leachate from the pond will be pumped to leachate tanks (a single large tank or multiple smaller tanks) on the leachate hardstand. Leachate will be loaded onto tanker trucks from there and removed off site to the municipal wastewater treatment plant for disposal.

110. The leachate hardstand will be bunded and is a low permeability hardstand area, and designed to comply with relevant engineering standards. Details have not yet been provided.

111. The sizing of the leachate collection pond (>800 m^3 below the pond nominal operating level) has been informed by two scenarios, based on HELP modelling:

    a. The access road and/or receiving wastewater treatment plant is out of action and leachate is unable to be removed for 14 days. This gives a leachate accumulation of 490 m^3 overall (or 35 m^3/day), and

    b. The peak daily flow off a fully open sub-cell. This will be sized to a 10% AEP 24-hour scenario leachate volume. This would occur when a cell is constructed, has initial waste placed but still large areas of drainage gravel exposed and connected to leachate drains. An open area of 7,000 m^2 was assumed, with a rainfall of 107 mm (NIWA HIRDS, RCP 8.5). This requires a volume of 749 m^3.

112. For contingency, additional storage is made available by:

    a. Providing a freeboard between the nominal max operating level and max level below the spillway level. The preliminary design provides for 1.5 m of freeboard.

    b. Closing the valve at the landfill leachate sump gravity outlet pipe and allowing leachate to be retained above the landfill liner until pond volume is available.

c. Pumping of leachate from the pond, or from the sumps, and introducing leachate back into the waste if suitable conditions are present, i.e. leachate recirculation.

d. Providing provisions for additional leachate storage ponds or tanks.

113. Refer to **Figure 5** for a schematic representation of the underdrainage system, leachate collection system, and options for the discharge of underdrainage water.

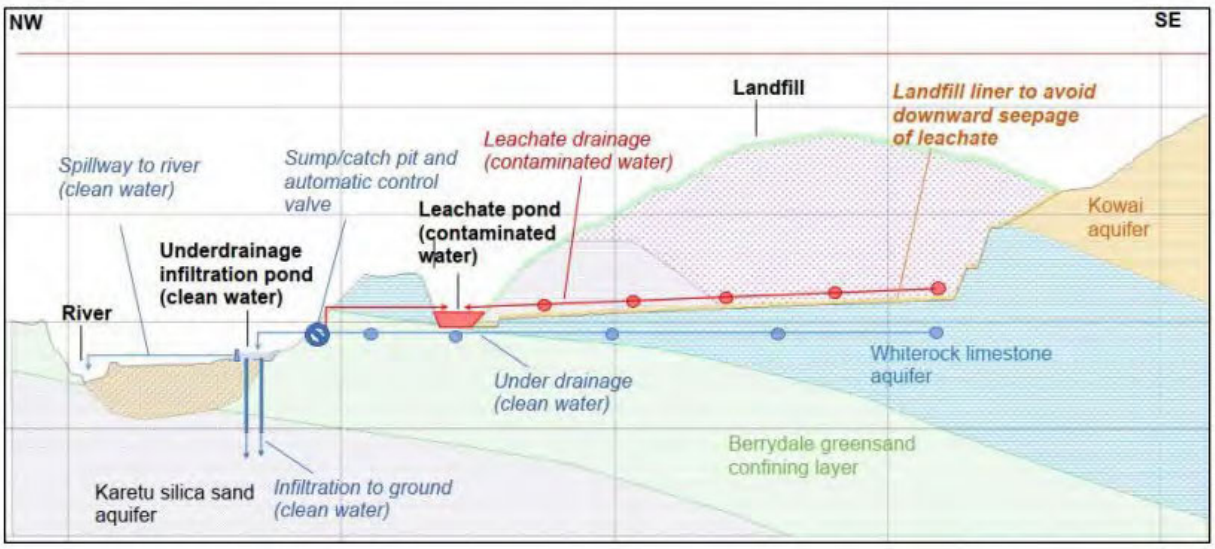


Figure 5: Representation of the underdrainage system and leachate system proposed for the site.

114. Appendix F contains details regarding an assessment of potential leakage through the liner (p43/173). The two scenarios presented are for a 'good contact case', which assumes a high degree of contact between the HDPE liner and the compacted cohesive soil liner and a 'poor contact case', which assumes a lower degree of contact between the layers. **Table 1** contains a summary of the estimates.

Table 1: Estimated leachate leakage through the landfill liner (from Appendix F).

Scenario	Leachate leakage through liner (L/ha/day)	Total leachate leakage through liner (L/day)
Good Contact Case	176	474
Poor Contact Case	287	776

Landfill Operation

Site Access, Container Transfer Area & Site Facilities

115. Hours of operation will be restricted to 0700 to 1900 hrs Monday to Saturday, excluding public holidays.

116. The applicant proposed to use the existing building infrastructure on site, which consists of, and is depicted in drawing C200 contained in Appendix H, and in Figure 6 below:

a. Storage sheds;
b. Storage bunkers;
c. Crusher, conveyor belt, processing facilities;
d. Site office, incl. facilities and
e. Weighbridge building and a weighbridge.



Figure 6: Site facilities

117. Additionally, Drawing C206 shows the location of the proposed stormwater management area (stormwater retention pond), the possible future container transfer area, stormwater roof retention tanks and outlets to the Karetu River, among others.

118. The applicant also mentioned the possibility of a prohibited waste storage area, which will be used to store unacceptable materials that have been identified upon arrival at the site (Appendix L of the application). It is stated that this will be a chemically resistant bunded area with secure storage, or a sealed, covered skip bin.

119. A perimeter fence, with a minimum height of 2.2 m will be established around the wider area, as shown in **Figure 7** below.

120. Lockable gates will restrict access outside of operating hours.

121. Site access will be from a single point off Quarry Road over a newly proposed 23 m single span bridge across the Karetu River. This bridge will replace the current access across the river via a ford and therefore prevent vehicle entry into the river. The ford is proposed to be removed.

122. The bridge construction details can be viewed in the AEE document, section 4.4 on page 46/106.

123. Internal haul roads will be built and extended as required by the design of the landfill.

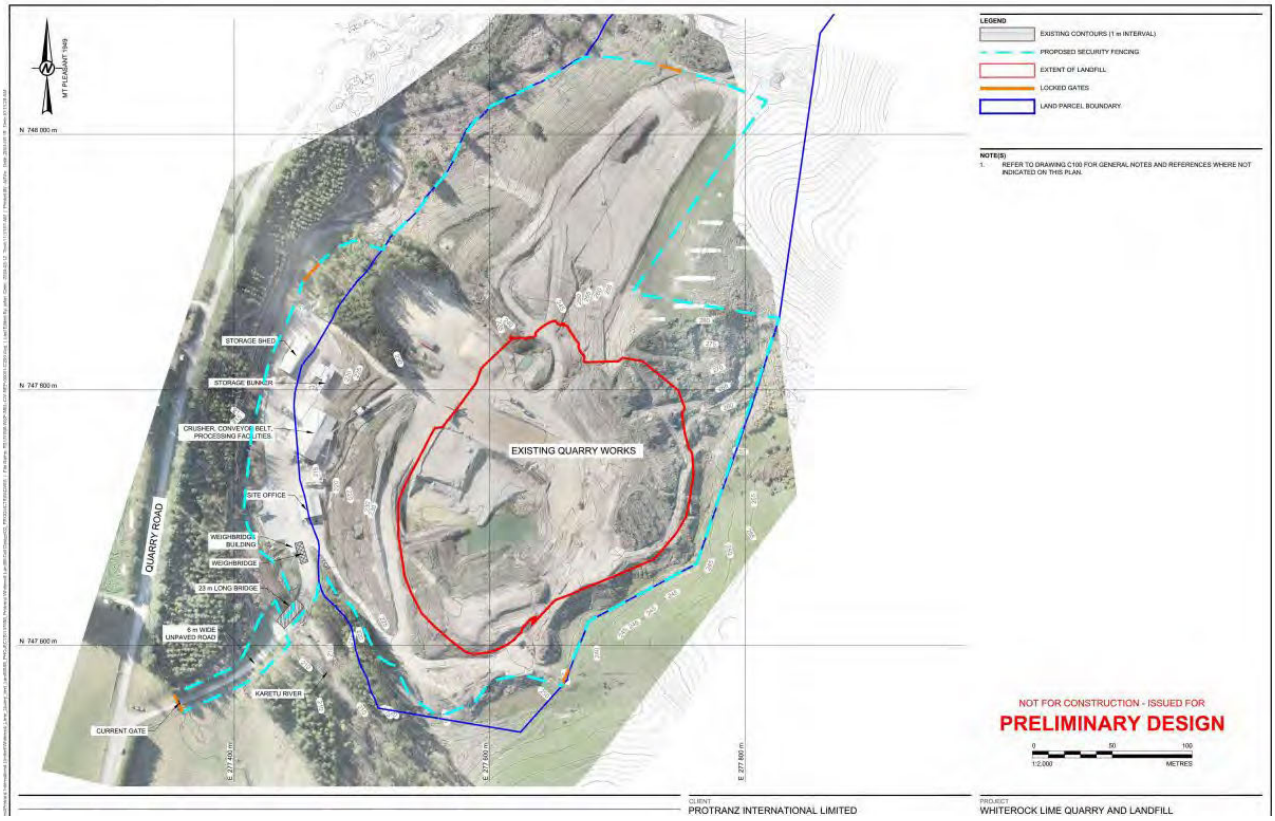


Figure 7: Proposed site security in the form of a perimeter fence and locked gates. Source: Appendix H, drawing C200

Waste Acceptance Criteria

124. Appendix K (Waste Acceptance Criteria) of the application contains details regarding the WAC for the site, which are based on the WasteMINZ Guidelines (2023) and include a list of accepted and prohibited wastes along with screening criteria for chemical contaminants.

125. The applicant considers that the proposed WAC are consistent with the requirements of a Class 3 managed landfill site but also intends to include inert construction and demolition waste (C+D waste) and asbestos.

126. By excluding degradable C+D waste, the applicant considers that the landfill is unlikely to produce landfill gas or significant landfill leachate.

127. Total Concentration Values have been proposed to assess potential toxicity as a proxy for Toxicity Characteristics Leaching Procedure (TCLP) limits. If Total Concentration Values are exceeded, TCPL testing is required to verify that WAC are being met.

128. Screening criteria for WAC are based on Class 3 WAC (where derived for select chemicals) and Class 1 leachability limits otherwise.

129. The WAC for the site consists of:

    a. A list of acceptable materials, as listed below.

    b. Maximum ancillary biodegradable materials (e.g. vegetation) to be no more than 2% by volume by load; and

    c. Maximum chemical contaminant leachability limits (TCLP concentrations) for potentially hazardous leachable contaminants.

130. **Acceptable materials** are:

    a. Cleanfill (non-contaminated soil, rock, gravel, sand, clay and other natural materials)

    b. Inert C&D waste materials, including:

        i. Reinforced or unreinforced concrete, concrete blocks;

        ii. Site clearance and excavation materials (incl. soils, clays and rocks);

        iii. Bricks, pavers and ceramics;

        iv. Tiles and pipes made of clay, concrete or ceramics;

        v. Roofing products (corrugated iron, steel, steel coated tiles);

        vi. Fibreglass;

        vii. Vehicle tyres, rubber;

        viii. Flooring products (underlay, vinyl/linoleum, clay tiles);

        ix. Wire, wire rope, wire netting;

        x. Inorganic insulation products;

        xi. Non-recyclable glass;

        xii. Non-recyclable steel and aluminium fittings (cable track, spouting);

        xiii. Plastic materials and items associated with C&D activities (incl. plastic bags, pipes, gutterings, building wrap);

        xiv. Waste containing asbestos;

        xv. Cured asphalt and other road pavement incl. those impacted by coal tar binders;

        xvi. Contaminated soils

    c. Asbestos containing materials will only be accepted to site for deposition if (refer to Appendix K for more details):

        i. Handled in accordance with Health and Safety at Works (Asbestos) Regulations 2016; and

        ii. Comprised of asbestos fragments/ asbestos containing materials that are appropriately contained to prevent airborne release of fibres;

        iii. Comprised of soil contaminated with asbestos fibres with a maximum concentration of 5%;

    d. Contaminated soils shall not exceed the WAC as listed in Appendix K, Section 5.6

131. **Prohibited materials** are those listed in **Table 2** below:

Table 2: Prohibited waste types, as shown in table 5-1 of Appendix K

Waste type	Description
Green waste or other organic waste	Other than ancillary biodegradable materials up to a maximum of 2% by volume per load as defined above
Hazardous substances and hazardous wastes	Including materials that are characteristically explosive, flammable, oxidising, corrosive, toxic or eco-toxic, except for substances in contaminated soils at concentrations not exceeding the waste acceptance criteria
Municipal solid waste	Including household and domestic waste, or equivalent commercial sources of waste
Industrial, commercial or institutional waste	Including bulk ash, coal mine waste, foundry sands, animal or human wastes (including medical and veterinary sources)
Liquid substances, slurries and saturated soil or sediment	Including, but not limited to, liquid hazardous substances, liquid petroleum products and waste, vacuum truck waste, and liquid coal tar
Radioactive wastes	Any radioactive substances or wastes with radioactive properties
Shredder floc	Including metal processing and recycling by-products containing heavy metals, mineral oils and hydrocarbon contamination
Unauthorised contaminated soil	Soil with detectable concentrations of per- and polyfluoroalkyl substances (PFAS) defined as soil with concentrations of PFOA, PFOS and PFHxS+PFOS above 0.1 µg/kg
Unsorted construction and demolition waste	Incl. the following organic materials: - wallpaper, lining paper and building paper; - formica, Laminex, parquet; - carpet, cork tiles; - organic insulation products (e.g. wool insulation) - textiles - untreated or treated timber; - softboard, hardboard, particle board, plywood, MDF, customwood.

132. The RFI response also confirmed that gypsum materials (GIB/ plasterboard) will be prohibited materials.

133. I note that the accepted list of materials includes ‘building wrap’ while the prohibited list includes ‘lining paper and building paper’. The applicant should clarify whether this distinction is deliberate or not, and how the difference will be practically assessed on site.

134. The applicant proposed that within the life of the consent, additional WAC may be needed for new contaminants that may become a concern. Therefore, the applicant has proposed to develop a process for emergent WAC to be incorporated into the Landfill Management Plan (Appendix L), and includes steps as outlined in section 5.7 of Appendix K.

135. Conversely, the current list proposed the acceptance of ‘non-recyclable glass, steel and aluminium’, which, in my interpretation means that as soon as these products are recyclable in any form, whether on a wide scale or small scale, they will no longer be accepted on site. The applicant should clarify if this is the intention of the wording.

Waste Acceptance Procedures

136. In accordance with Appendix K (Waste Acceptance Criteria) and Appendix L (Site Management Plan), waste acceptance to the site be controlled by:
    a. Limiting access to accredited external users and Protranz operators only;
    b. Issue of a *Waste Disposal Permit* to the person(s) depositing at the site;
    c. Via visual inspection and assessment for odours for materials that indicate the presence of prohibited wastes and to ensure consistency with the issued *Waste Disposal Permit*;
    d. Supervision of the tipping face will be maintained for all loads to enable visual inspection of covered (due to environmental controls) or wrapped loads.
137. Any material without a *Waste Disposal Permit* or that is not consistent with the WAC will be removed off site.
138. The *Waste Disposal Permit* is described to require the following steps:
    a. A contractual agreement between Protranz and the external waste generator;
    b. Full approval of waste haulers and induction prior to entry to the site;
    c. All wastes must be certified to comply with the WAC by a Suitably Qualified and Experienced Person (SQEP);
    d. Every batch of waste must be approved prior to dispatch from its source;
    e. Every load must be prebooked in advance and must be accompanied by a Protranz manifest.
139. Detailed records will be maintained of all wastes accepted at the site.
140. Verification sampling is not proposed for all wastes accepted onto site. However, isolated verification sampling will be considered for waste that is suspected to exceed the WAC.

Operational Capping

141. Section 4.6.6 and Appendix J (Section 7.12) and Appendix L include details regarding the waste cover and compaction requirements.
142. A daily cover is proposed to be placed, with a minimum thickness of 150 mm, consisting of soil or clay.
143. Intermediate covers are designed to minimise water infiltration where there will be delay in further waste placement, typically 90 days. The intermediate cover is to be a min. of 300 mm and to be made by in-situ overburden material. Areas that will remain exposed for more than one month should be vegetated or hydroseeded to enable grassing.
144. Compaction of the working face must take place at the end of each working day using a landfill compactor.
145. Progressive capping is proposed to reduce leachate generation from finished cells.

Management of Landfill Gas and Odours

146. The applicant considers that the landfill will not require landfill gas abstraction as only very limited, incidental organic content is accepted at the site. Therefore, the proposed waste is not expected to produce noticeable odours or quantities of landfill gas.

Placement of Waste and Dust Control

147. The Site Management Plan (Appendix L) contains details regarding the handling, management and placement of waste. Section 7.9 details procedures for placement and

compaction of non-asbestos waste, section 7.10 contains the details for the placement and compaction of asbestos waste.

148. The site infrastructure includes the proposal for a waste container area. Specialised mule trucks will periodically collect full container bins and transport them to the landfill disposal area and unload waste from there.

149. In general terms, the tipping face will be split into two area: one for non-asbestos waste and the other for asbestos containing wastes. Only one area for tipping will be available at one time. Once this area is deemed 'completed' the site will progress in a series of lifts to build up the site levels.

150. Regarding the asbestos waste, the following controls and operational parameters are proposed:

    a. A filling area of no more than 400 m^2 at any given time;

    b. Restrictions on delivery, handling or deposition of asbestos waste when wind speeds at the site are >5 m/s averaged over 60-minute periods and/or when wind speeds exceed 7 m/s averaged over 10-minute periods when measured at the site weather station;

    c. The use of water spray/ mist at the tipping face;

    d. The tipping face must be contained by spraying with proprietary dust suppressant polymer, covered with plastic sheeting and pegged or sandbagged down, covered with a minimum thickness of 100 mm of cleanfill within two hours of being tipped on site;

    e. Covering the tipping face at the end of the day

    f. Keeping sufficient supply of cleanfill and plastic sheeting on site to manage the above

    g. Decontamination of machinery before travelling or being used elsewhere on site.

151. Decontamination and wheel washing is also proposed in the application for:

    a. Washing of the outside of containers that have had waste tipped into the pit from the waste container area. This will also include a wheel wash prior to exiting the containment area;

    b. Wheel washes at the tip face once waste has been discharged into the pit;

    c. Washing of any plant or vehicles used to spread and compact managed fill before travelling outside the containment area to be used elsewhere on site.

152. Decontamination will be carried out in the designated decontamination pad that is protected from wind exposure and contoured or bunded so that runoff is captured and contained in an isolated wash sump. Wash water will be disposed into the leachate pond. Collected solids will be discharged into the active tip face at an appropriate time.

Stormwater Management

153. Stormwater Management has been addressed in Appendix C.

154. Sources of stormwater and run-on water have been identified as:

    a. Operations and plant area: stormwater from the operations and plant area which has no contact with the managed fill area, incl. access roads;

    b. Dirty stormwater: stormwater runoff from the quarry operation and formation of the landfill floor, capping that has yet to be stabilised, overburden storage materials without contact to the managed fill area;

c. Clean water: water running from stabilised areas not disturbed by operations at the site, and runoff from stabilised capping.

155. The current status of stormwater management on site is as follows:

a. Very few of the existing buildings have gutter/downpipe systems;

b. Existing downpipes discharge directly onto the surrounding hardstand;

c. Roofs are constructed from unpainted, galvanised steel material;

d. An earth bund has been constructed along the western boundary of the site but the bund is not continuous and enables overland stormwater to exit from low point in the bund;

e. Internal access roads are not sealed and there is no formal stormwater infrastructure on site;

f. There are three informal water storage ponds at the northwest of the site (see e.g. **Figure 8**).

g. There is an existing conveyance channel which collects runoff from some of the existing access roads to the north of the storage bunker and directs water to ponds. The ponds are small and do not provide any material stormwater soakage. Discharge is to the river via grassed areas;

h. The application describes that currently unmanaged stormwater spills onto compacted hardstand transport limestone sediment into the Karetu River.



Figure 8: Stormwater storage ponds, from Appendix C, Figure 2-8.

156. The operations and plant area are separated into three sources itself again: a catchment consisting of buildings, one for materials store and the access roads.

157. The applicant is not proposing to adopt all options presented in Appendix C at the commencement of the proposed activities subject to this application but instead proposes to adopt a 'toolbox' approach and implement further measures when monitoring of water quality signals that more controls are needed. However, the following options will be adopted:
    a. Painting existing roof areas to reduce zinc contamination in stormwater runoff; and
    b. Stabilisation of the site entrance/ exit to prevent tracking of sediment from these areas.
158. The s92 response included further details:
    a. The lower operations and plant area hardstand will have drop out pits followed by decanting earth bunds for coarse grit and silt removal;
    b. The haul roads up will have a catchpit for its table drain and discharge via a grassed channel to the river,
    c. Revised drawings also seem to indicate that new gutters will be installed (see drawing C206, Appendix H).
159. Stormwater discharges will require an outfall into the Karetu River from stormwater generated from haul roading and roof stormwater. These are proposed to be designed in accordance with the Waimakariri District Council Engineering Code of Practice.
160. For the quarry and landfill areas, the proposal references the use of the CRC Erosion and Sediment Control Toolbox[5] to manage stormwater on the site to maintain discharge quality limits. Revised drawings showing stormwater management on site have been provided as part of the RFI response and can be found in Appendix H (pages 9-17/21).
161. The applicant has not provided a detailed design of stormwater controls for the site, but has noted that the following will be incorporated:
    a. Installation of clean water diversion channels to divert runoff from upstream, stabilised catchments
    b. Prevention of uncontrolled off-site discharges through bunding of earthworks, a series of diversion channels and attenuation with a sediment retention pond;
    c. Use of water treatment chemicals to achieve discharge quality limits;
    d. Installation of a flume to convey treated water to the Karetu River;
    e. Stabilisation of sub catchments with capping layers.
162. Measures outlined in Appendix C and proposed to be implemented on an 'as needed' basis include:
    a. Installation of gutters/ downpipes and stormwater storage to existing buildings with conveyance and/or collection of stormwater for reuse;
    b. Resurfacing and regrading of trafficable areas: sealing with compacted gravel material. This would enable sweeping and management of spilled materials from storage facilities
    c. Repairs to existing buildings: installation of exterior walls and missing sections of walls are to be repaired in the manufacturing and store areas to reduce airborne particles and dust, which may become entrained in water

[5] https://esccanterbury.co.nz

d. Bunding to western boundary: the current gaps in the bunding should be reinstated with engineered fill and the surface regraded to direct stormwater towards a controlled management area

e. Stormwater ponds/ catchpits: construction of a new stormwater pond to the north of the site and catchpits at the low points of the trafficable area near the entrance of the site and access road

f. 3.4.2 of the Appendix also includes non-structural site improvements that should be considered.

g. Improvements to existing roading: the placement of additional gravel material together with general maintenance of road surfaces

163. During construction of the landfill, the perimeter of the earthworks area will be bunded. A temporary sediment retention pond will be constructed in the location of the proposed leachate pond. Construction phase stormwater and sediment laden water from groundwater inflow will be pumped or conveyed to a sump into the SRP for settling of suspended solids prior to discharge into the Karetu River. Treatment with water treatment chemicals may be required. Note that the concept design provided as part of the RFI response identifies this pond to the east of the leachate pond.

164. A second SRP is to be constructed to the north of the landfill area prior to filling of Stage 1. A series of dirty water channels and contour drains will direct sediment laden water from Stage 2 earthworks areas to the northern SRP. Water treatment chemicals may be used for treatment of stormwater.

165. Pond sizing has been estimated at 580 m^3 and 240 m^3 to match a maximum contributing catchment of 1.6 ha and 0.8 ha respectively.

166. I note that the southern pond (in lieu of the leachate pond) is located outside of the 10 m buffer from a natural inland wetland (approx. 20 m).

167. Exact details of sediment retention pond sizing, construction, location of diversion channels, etc. have not been made available and have been deferred to completion of final designs. An indicative location is available in Appendix H and replicated below in **Figure 9**.

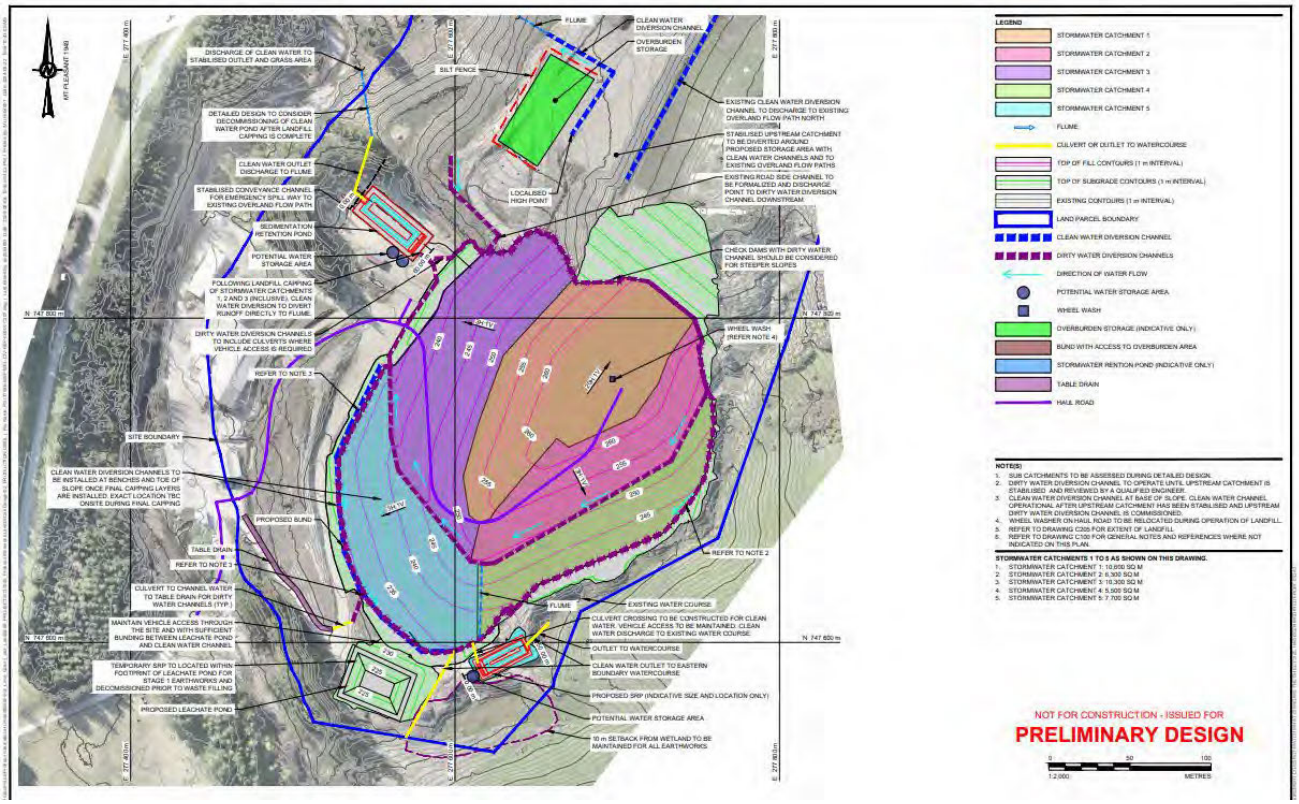


Figure 9: Indicative drawings showing locations of stormwater controls on site.

Hazardous Substances

168. The storage of hazardous substances is limited to minor amounts (small containers) of hydraulic oils, engine oils and plant lubricants, and diesel to operate the rotary drying kiln.

169. The applicant has also proposed the use of water treatment chemicals, such as PAC, PolyDADMAC etc. These will also need to be stored appropriately on site.

170. Diesel will be stored to fuel the rotary drying kiln. The applicant has not yet provided details regarding the quantity of diesel to be stored on site, but it is presumed that it will be able to meet the permitted activity rules of the relevant plan. This is further addressed in the planning section of this report.

171. Additionally, small mobile fuel containers will be used for refuelling of machinery.

172. While not identified as such by the applicant, the stored leachate on site within the leachate collection pond also fits the definition of hazardous substances as per the CLWRP.

Spills

173. The Site Management Plan (Appendix L), section 13, deals with emergency and contingency response, incl. spill management.

174. Standard measures, such as spill kits and clean up are proposed.

175. Appendix Y (Proposed conditions) further specifies the installation of signage, restricting refuelling to at least >10 m from open excavations, exposed groundwater or surface water and notification to the CRC, incl. an assessment to prevent recurrence of a similar event.

Monitoring and Mitigation

176. The applicant has proposed a suite of mitigation and monitoring to address the anticipated effects from the proposal. Most notably, Appendix M contains the Monitoring Programme and Trigger and Action Response Plan (TARP). Appendix Y contains the proposed conditions for the consent. Other mitigation is proposed throughout the appendices and the main AEE document.

177. Appendix M addresses monitoring of stormwater, leachate, groundwater, surface water, and ecological health (macroinvertebrates and fine sediment). It also has provisions for cultural health monitoring, but this aspect currently lacks a description and details.

178. Monitoring frequency, locations and parameters are included in Appendix M, Tables D and E.

179. The monitoring programme references a trigger action response plan with three trigger levels (TL1- noticeable effect, TL2- reduction/alert and TL3 – normal).

180. Each trigger level (TL) contains a list of possible actions should the specified parameters be exceeded. However, I note that the applicant proposes 'provisional' trigger levels and included a statement that triggers are to be reviewed after more baseline monitoring data is obtained.

181. Therefore, as stated in the application, the trigger levels for water quality and ecological health are intended as an environmental management tool. Responses are generally resampling for confirmation, site inspection, significance assessment, remediation and ongoing monitoring to confirm the effectiveness of the response.

182. Apart from Appendix M, mitigation and monitoring of the air discharges, wetland baseflow remediation and ecology are referenced throughout the appendices. Some mitigation, incl. post-closure procedures, currently lack detail and provision of details and procedures are deferred to a later date. This is addressed in more detail below:

Ecological Improvements and Mitigation

183. The applicant proposes to:

    a. plant riparian margins and stabilise waterways through indigenous planting; and

    b. fence the eastern watercourse and SNA area.

184. The application references the development of several management plans that will address the following:

    a. Bird Management Plan: in accordance with the Wildlife Act 1953;

    b. Vegetation Management Plan: process for selecting and sourcing appropriate indigenous plant species for the riparian and waterway stabilisation enhancement, maintenance and replacement.

185. A Lizard Management Plan: to avoid, minimise, and remediate project effects to indigenous lizards and their habitat and minimise the risk of disturbing or killing lizards; has been provided on 5 February 2025.

Wetland Management

186. The applicant proposes to capture groundwater seepage upstream of the current wetland and discharge water into the wetland to remedy the modelled predicted loss of baseflow (19% or 5 m^3 per day) which is a result of the proposed underdrainage take and installation of the impervious landfill liner. Two options are presented (as shown in **Figure 10**):

    a. Artificial Wetland: undertake earthworks upgradient from the existing wetland to lower the ground locally and to create a local spring, which will discharge into a

wetland species planted area for sediment filtering and then discharges into the existing wetland, or

b. Drainage: install land drains into the sediment formation to capture groundwater beneath dry land and divert water to the existing wetland.

187. No preference has been indicated in the application. The applicant states that decisions on the remedial option will be based on space constraints and land stability and will be decided, presumably, upon commencement of construction.

188. In the RFI response, the applicant also stated that additional baseline monitoring, and wetland delineation surveys are proposed to monitor changes in wetland extent and determine if further mitigation is needed to minimise the loss of value and/or extent. Therefore, monitoring has been included in Appendix M as part of the RFI response.

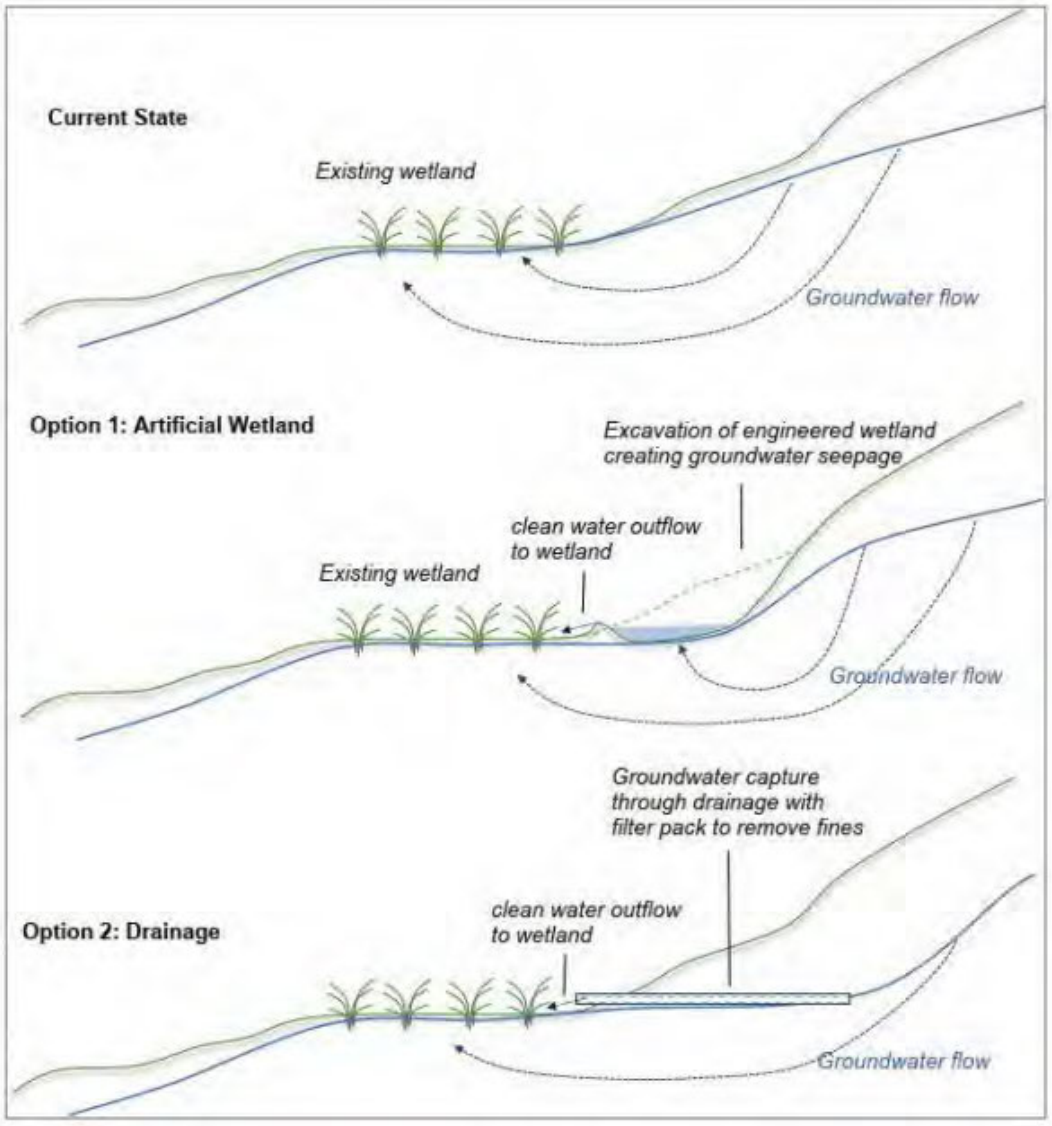


Figure 10: Wetland remediation options.

Other Mitigation

189. The applicant has indicated a willingness to include a cultural health monitoring programme but has not provided any details regarding this upfront.

Firefighting and Fire Risk Reduction

190. Section 5.4 of the AEE contains details regarding firefighting water requirements:
    a. Requirements include the storage and access to 125 m^3 water;
    b. Storage facilities will be fitted with tank adapters, meeting the New Zealand Fire Fighting Supplies Code of Practice SNZ PAS 4509:2008
    c. Water will be sourced by decanting water from the sediment retention ponds, via rain collection from building roof areas, the taking of water from the Karetu River (pursuant to s14(3)9e) of the RMA) or by supplementing water from off-site sources, such as district council supply points.

Pests

191. Appendix L, Section 8.6 deals with pest control, section 8.7 deals with weed and noxious plant control.
192. The application further proposes the development of a pest animal management programme (Appendix Y).

Dust Suppression for Landfilling Activities

193. The RFI response included an estimated area for dust suppression for the proposed landfilling activities:
    a. Main haul roads: 0.2 ha
    b. Backfilling for landfill floor with cohesive soil for Stage 1, assuming 25% of total area: 0.7 ha
    c. Active material storage and ancillary earthwork areas: 0.5 ha
    d. Total area for dust suppression: 1.4 ha
194. The RFI response to the questions posed by the air quality expert estimated that the total water demand would be up to 185 m^3/day.
195. Another response to the RFI (general questions) estimated that 2.0 m^3 per day will also be needed for the asbestos control fog cannons at peak times.
196. In the same response, it was estimated that 100 m^3 per day peak would be required for dust suppression.
197. Therefore, the proposed volume of water needed for dust suppression activities and the total storage of water on site (c.f. paragraph 63) is currently uncertain.

Closure and Post-Closure Management

Final Capping and Rehabilitation

198. Section 12.3 of Appendix J contains details of the final cap design. **Figure 11** shows a typical final cap design.
199. The final landform should be formed to a 3H:1V batters and 7 m wide benches at approx. 10 m vertical spacings.
200. The final capping consists of a multi-layer system to separate landfill waste from the surface and restrict rainfall infiltration into the landfill.
201. The final landform will be revegetated to support final land uses such as light grazing or natural state vegetation.
202. Appendix Q addresses final landform stability. However, the application refers to further geotechnical stability analysis and testing during the detailed design of each stage

based on the proposed excavation/ filling arrangements. This detailed design will also assess how placement of waste can achieve waste stability during closure and post-closure.

203. **Figure 12** below depicts the rendered design for the post-closure state of the site, compared to the current site.

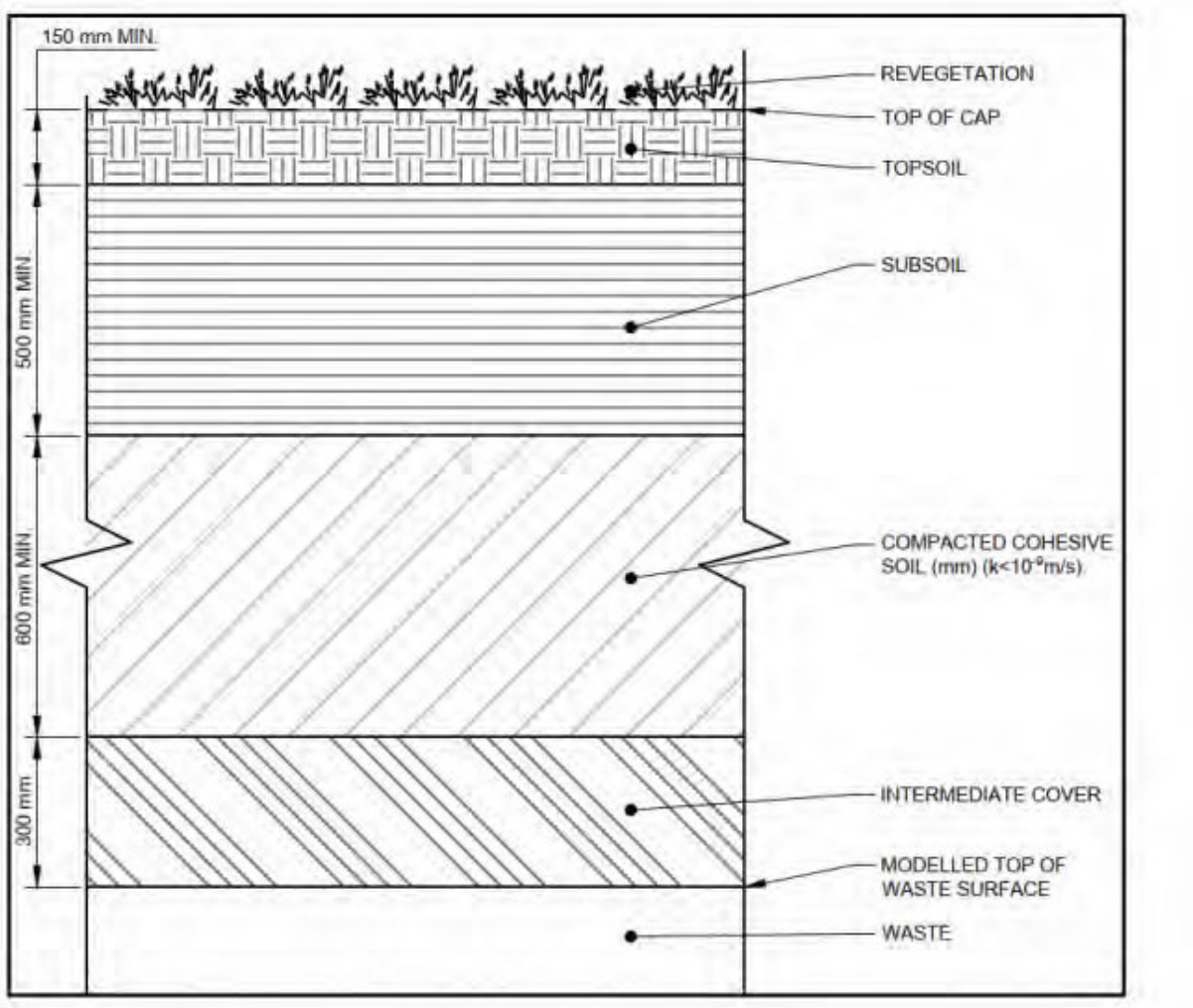


Figure 11: Final capping design schematics



Figure 12: Digitised post-closure landscape at the site (Current site: left; After closure: right).

Post-Closure and After Care

204. The applicant has referred to a Landfill Closure Plan (LCP) but intends to provide this for certification within 5 years of commencement of the activity. A general description of closure activities has been provided in Appendix J, Section 13, including reference to aftercare and maintenance of the landfill cap.

205. I note that the proposed conditions (Appendix Y) reference the timeframe as *"…no less than one year prior to the conclusion of the filling activity on the site*", the final LCP must be submitted, which will also cover the proposed 10-year aftercare period.

206. Reference has also been made to ongoing environmental monitoring as required by consents. In the RFI response, the applicant noted that a portion of the gate fee will be attributed to post closure management.

207. Leachate management and removal of leachate, and the maintenance of the groundwater drainage system will be ongoing.

Bond

208. Appendix Y contains the proposed conditions. The applicant has proposed providing a single joint bond between the CRC and WDC pursuant to sections 108(2)(b) and 108A of the RMA.

209. The proposed conditions also include a description of the process of setting such bond, bond amounts, a dispute resolution process and review conditions at 5 yearly intervals.

210. The applicant stated that the bond calculation will include consideration for future post closure, monitoring and maintenance, and remedy obligations, which will be detailed in the Post Closure and Aftercare Plan, to ensure that the site will not become a public liability.

Description of the Affected Environment

211. The applicant has provided a description of the affected environment in Section 3 of the application (page 24/106 onwards). This is supported by the application's appendices and further information provided in the s92 response.

Site Setting and General Site Information

212. The subject site is located in the Waimakariri Sub-Region within the CLWRP, within the Ashley-Waimakariri Plains Area, but directly borders the Hurunui Sub-Region and Hurunui District.

213. The site is within the Rural Zone in the Waimakariri District Plan. The northern extend of the site is also within a Significant Natural Area (SNA V074) – shrubs and grasslands on cliffs and rock outcrops.

214. The site has been used as a limestone quarry since the 1950s and lime extraction has varied over the years from 15,000 to 35,000 tonnes per year.

215. Existing infrastructure on site includes: a weighbridge and building with staff facilities, a site office, the main processing facility including a furnace and rotary kiln, crusher, lime and urea silos, conveyor belt machine and storage sheds for machinery and bunkers for coal storage.

216. Onsite water supply is provided via an existing infiltration gallery located adjacent to the Karetu River by the weighbridge. The gallery also supplies water to rural stock water users.

Neighbouring Sites and Sensitive Receptors

217. The surrounding environment is rural and predominantly used for grazing agriculture and exotic plantation forestry to the south. The Karetu River forms the western boundary of the site.

218. There are two residential dwellings located within 250 m of the boundary of the site, with the nearest receptor only 100 m from the site's western boundary, adjacent to the processing plant. This site is also approx. 200 m from the closest point of the quarry/landfill area. An additional temporary dwelling (tiny house) is located within 250 m of the boundary, adjacent to the quarry land parcel.

219. Other dwellings, within 1 km of the site boundary, in total, three, are more than 500 m from the site boundary.

Climate and Meteorology

220. The nearest weather station is the Fox Creek weather station, located 5.3 km to the NW. Median rainfall in the past 15 years was 1,059 mm but annual rainfall has been significantly lower than the median in the last 15 years, with 890 mm in 2019 and 823 mm in 2020. Monthly rainfall is generally higher in the winter months.

221. The applicant has provided a site-specific wind rose using CALMET meteorological data for the time period 2019-2020. The site is located in an environment that experiences predominantly NNE wind in autumn and winter, and NW wind in spring and a combination in summer.

222. The site is not located within a Canterbury Air Regional Plan (CARP) Clean Air Zone or gazetted airshed.

Topography

223. The land on which the quarry is sites is relatively steep. The elevation of the quarry site ranges from about of 260 metres above sea level at the NE of the site at the head of the quarry walls to about 215 m asl in the SW at the ford through the Karetu River.

224. The general fall is from east to west within the quarry operation.

Geology

225. The applicant has provided an overview and details of the geology of the site in Appendix E of the application.

226. In summary, the site contains a diverse range of geological units, incl.: Kowai Formation, Mount Brown Formation, Takoma Siltstone and Waikari Formation, Omihi Formation and Loburn Formation, Waipara greensand, Ashley Mudstone, Homebush and Karetu Sandstones.

227. The three main lithological units within the quarry include the Tokama Siltstone, Whiterock Limestone and Berrydale Greensand units. The base of the groundwater system is identified as low permeability basement rocks of greywacke and/or argillite of the Torlesse supergroup.

228. Refer to **Figure 13** for a visualisation of the different geological units found at the site.

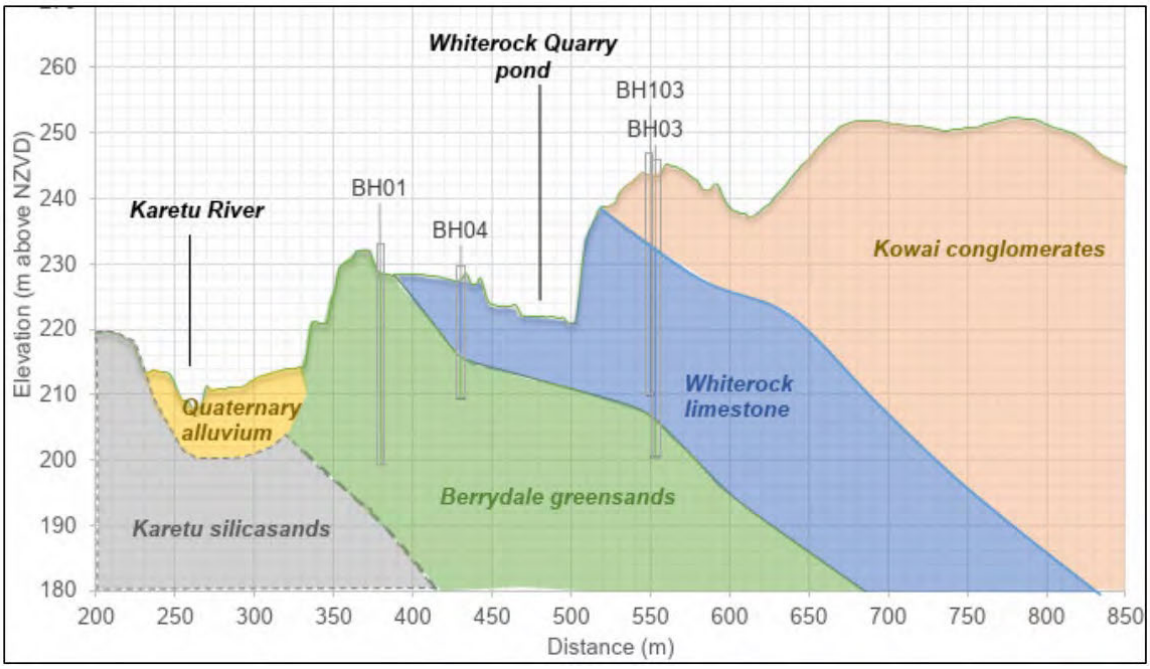


Figure 13: Geological cross section of the Whiterock quarry.

229. Appendix E also outlines observations made on site during investigations and recommendations for the design of future pit slopes, including batter face angles, bench heights and overall slope angles. The appendix is accompanied with an annotated site plan on page 47/211, identifying areas of slope instability, overburden locations, the north-south striking fault, visible geological features, among other things.

Seismicity

230. In Appendix E, the applicant states that small scale faults have been observed on site in the eastern quarry walls and there is a possible north-south striking fault along the western boundary of the quarry. Larger active faults are mapped in the vicinity of the site, such as the Mt Lowry Fault, approx. 2 km south of the site. It is further stated that the smaller faults on site are expected to be secondary to the larger faults in the area. It is estimated that the return period for fault rupture is in the order of hundreds of thousands of years.

231. The Mt Thomas Fault is 4 km west of the site. Other faults, such as the Janet Fault and the Grey Fault are 6 km and 10 km NE of the site.

232. No active faults are mapped within the site.

Flooding

233. The applicant reviewed the 1 in 200-year and 1 in 500-year flood events modelling and noted that only the western part of the site, incl. the accessway and buildings are within the WDC High Hazard zone for flooding.

234. In his memo (**Appendix 10**), CRC Team Leader, Natural Hazards Science Nick Griffiths agrees with the modelling presented by the applicant He further commented that some flooding could occur around the existing site buildings in large (>50 year ARI) flood events and confirmed that the existing quarry flood and proposed landfill is not susceptible to flooding from the Karetu River.

Contaminated Land

235. The applicant has provided a Preliminary Site Investigation (PSI) in Appendix D of the application.

236. Two HAIL (Hazardous Activities and Industries List) activities have occurred on site in isolated areas. These are

    a. A17 – Storage tanks or drums for fuel, chemicals or liquid waste, associated with an above ground storage tank for diesel and

    b. E3 – Cement or lime manufacture using a kiln including the storage of wastes from the manufacturing processes.

237. HAIL activities are located on the lower terrace of the site, where the plant is located.

238. Soil disturbance and activities described in the application are located outside of the footprint of these areas.

239. Once landfilling commences, the footprint of the fill area will be listed as a HAIL activity G3 - landfills.

Groundwater

240. The Groundwater and Surface Water Effects Assessment (Appendix F) provides a detailed description of the groundwater environment.

241. The site is in the Loburn Fan Groundwater Allocation Zone. The current allocation status of the Loburn Fan GAZ is 89 % allocated as of 15 August 2024, leaving a further 12,387 per annum m^3 for available allocation.

242. The western portion of the site (incl. the buildings) is located over the unconfined/ semi-confined aquifer system. No aquifer is mapped on the western half of the quarry site in the CRC Canterbury Maps GIS system.

243. Five geological formations can be identified across the site, as listed in Appendix F.

244. The application notes that groundwater in the relevant hydro stratigraphic units is likely sourced entirely from rainfall recharge that falls in the hills above the quarry to the east. Recharge of the Karetu silica sand unit is likely to be predominantly from the Karetu River.

245. Groundwater has been assessed via eight monitoring wells, measured since October 2022, and it has been determined that shallow groundwater is at average depths of 2.26 metres (measured in BH02) to 17.71 metred (measured in BH03) below ground level in the wider quarry pit area.

246. It is expected that groundwater levels and flows are largely controlled by the Karetu and Grey Rivers, with drainage to the west and east but regional groundwater will generally flow southwest. A conceptual model of groundwater flows is provided below in **Figure 14**.

247. The Berrydale greensands are of low permeability and form the confining layer separating the overlying Whiterock limestone and Kowai hydrostatigraphic units from the underlying Karetu silica sands.

248. Water quality results and a discussion are presented in Appendix F, section 4.6. Groundwater results are based on sampling undertaken over two monitoring rounds.

249. In summary, groundwater is considered to be grouped into:

    a. Upper (shallow) Whiterock limestone groundwater;

    b. Deeper Whiterock limestone and upper Berrydale Greensand groundwater; and

c. Karetu silica sand groundwater and surface water of the Karetu River.

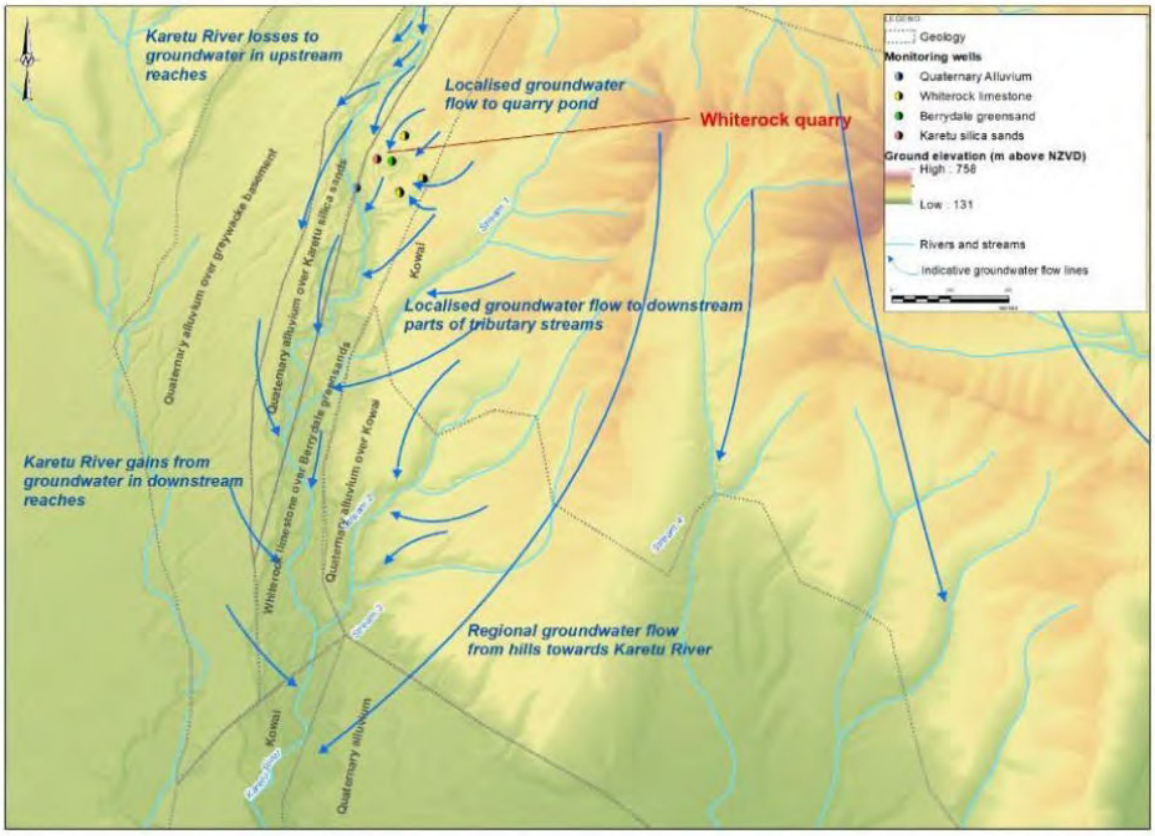


Figure 14: Conceptual model of local and regional groundwater flows at the site.

Groundwater Users

250. There is one registered groundwater take downgradient of the site. Water supply well BW23/0559 is located 500 m southwest of the site (102 Quarry Road) on the true right bank of the Karetu River and is 3.44 m deep.

251. I note that there is no reticulated supply of water available for residents in the area and therefore consider it likely that the majority of the properties downgradient of the site utilise bore water or surface water for domestic and stock supply purposes. This has also been confirmed by a number of submissions of local residents, who have reported sourcing water for domestic use/ stock water use from shallow bores.

Surface Water

252. The site is located directly adjacent to the Karetu River. The Karetu River flows in a southerly direction and joins the Grey/Okuku approx. 5 km south of the site. The river is classified as a hill-fed lower river in the CLWRP and is within the Ashley River Catchment surface water allocation zone. The A and B Blocks (more reliable) are fully allocated. Allocation in the C Block (less reliable) is available.

253. Adjacent to the site, the Karetu River is a low gradient, sinuous river with a ford which provides the access to the site.

254. The application states that the mean flow of the Karetu is 0.2143 m^3/s, the median flow is 0.0895 m^3/s and the 1 in 5-year low flow is 0.0155 m^3/s. These numbers are based on NIWA's NZ River Maps database and are not based on recorded stream flows. The

applicant carried out one occasion of stream gauging at two sampling locations along the Karetu River on 16 May 2023 to obtain data on the river hydrology. Based on the data obtained, the applicant concluded that the NIWA estimate of the MALF is reasonably representative of the actual MALF.

255. In her evidence (**Appendix 12**), CRC Scientist Ms Lucy Just noted that she does not agree with this conclusion, as a single flow gauging at the Karetu River does not demonstrate that the modelled NIWA MALF is reasonably representative of the flow value. In her evidence, she shows that the NIWA modelled values are likely an overestimation of the Karetu River MALF.

256. The applicant states that the Karetu River loses water in the upper reaches, where it recharges the Quaternary alluvium and the underlying Karetu silica sands. Much of the river recharge flows back into the river in the downstream reaches, where the river is gaining water. Downstream, near the confluence with the Grey River, the Karetu frequently runs dry and is a losing reach.

257. Ms Just disagrees with this characterisation and notes that a CRC report from 2004 (Chater, M. CRC Report No. U04/16)[6] describes that the Karetu River in fact dries in the lower reaches, from around 800 m below Whiterock Loburn Road, during lower flow periods when surface flow is lost to groundwater. The information presented by the applicant directly contradicts this information and staff observations.

258. It is stated that all water that infiltrates at Whiterock quarry will eventually reach the Karetu River, either through direct groundwater inflow, or through groundwater receiving streams or wetlands that form tributaries to the Karetu River.

259. The site also contains a further watercourse, not identified on Canterbury Maps, and referred to in the application as the ‘eastern boundary watercourse’.

260. Water quality sampling results are provided in Appendix F of the application. The water quality samples are based on two rounds of monitoring undertaken at the site on 18 and 19 October 2023. In summary, drinking water standards and environmental guidelines are not exceeded in any of the samples. I note that as part of her evidence, Fleur Tiernan has noted (**cf. Appendix 11**) that the existing water quality of the river is to be considered a critical information gap, considering the limited sampling undertaken by the applicant and the lack of data otherwise.

261. Refer to **Figure 15** for the surface water features on site.

[6] Chater, M 2004: 7-day Mean Annual Low Flow Mapping for the Ashley Catchment Area. Environment Canterbury Report No. U04/16, April 2004



Figure 15: Surface water features on site

Surface Water Users

262. There are no registered downstream surface water takes on the Karetu River.

263. K34/0645 is an infiltration gallery, at 5 m depth and located 1.5 km upstream of the site, associated with CRC194412.

264. However, during community engagement undertaken by the applicant, multiple landowners/ persons confirmed that they either use a shallow water supply well or infiltration galleries near or immediately adjacent to the Karetu River to abstract water for stock water supply or domestic purposes. Shallow groundwater is likely to be hydraulically connected to the river.

265. I note that there is no reticulated supply of water available for residents in the area and therefore consider it likely that many of the properties downgradient of the site utilise bore water or surface water for domestic and stock supply purposes. This was confirmed by a number of submissions by local residents.

Ecology

266. Appendix G of the application describes the ecology present on site. In summary, the report highlights that:

    a. Bats: A review of previous surveys and several surveys by a WSP bat ecologist in the Mount Thomas foothills area failed to confirm bat presence in the area. A further survey was undertaken in October 2022 and no bats were detected.

    b. Birds: Fifteen species of indigenous birds were heard or seen on-site during surveys or identified by eDNA samples collected from the Karetu River. This included a "*Threatened – Nationally Vulnerable*" karearea/ eastern falcon which was observed traversing the site. The overall ecological value of birds has been assessed as **moderate**.

c. Herpetofauna: the site falls within the geographic range of seven indigenous lizards and two introduced frog species. Overall, the ecological value of lizards is assumed to be **high**.

d. Aquatic Ecology: the wider Ashley River catchment identifies 14 species of freshwater fauna, of which two are nationally threatened and seven are nationally at risk. Identification was via eDNA sampling. Species include longfin eel, Canterbury galaxias, shortfin eel, upland bully, trout. While the western watercourse ecological values are described as minimal, the aquatic ecology values of the Karetu River as described as **very high**.

Wetlands

267. There are two wetlands on the property. The lower wetland is reported to be hydraulically connected to the regional groundwater table and is groundwater receiving. The upper wetland does not receive groundwater flows, based on numerical groundwater modelling (Appendix D of the application).

268. Based on the applicant's description and confirmation from Dr Rate, both wetlands are considered 'natural inland wetlands' under the National Policy Statement for Freshwater Management.

Cultural Matters

269. The site is located within the rohe of Te Ngāi Tūāhuriri Rūnanga.

270. On the CRC Canterbury Maps GIS system, the site is not identified as a Rūnanga sensitive area, silent file area, statutory acknowledgement area or subject to any other Ngāi Tahu layers.

271. However, under the proposed Waimakariri District Plan, the Karetu River is mapped as a Ngā Wai site (SASM028), an area of significance to Ngāi Tahu as a tributary to the Ōkūkū River. The Ōkūkū River catchment is recognised for mahinga kai, habitat and containing taonga species. This is also reflected in policy direction, which identifies the Ōkūkū River catchment as a priority and its upper reaches are particularly important for tuna habitat.

Amenity and Recreation

272. The site is not publicly accessible via paper roads immediately downstream of the site.

273. The closest access to the river is from Loburn Whiterock Road, approx. 2 km downstream at the bridge. Further access is available to the Karetu River at the confluence with the Grey River, approx. 6 km downstream from the site.

274. The applicant states that amenity and recreational values are primarily associated with the river, as the surrounding land area is in private ownership and not directly accessible.

275. I note that the submission by White Rock Community Incorporated (SUB034701) pointed out that the paper road that leads to the applicant's access is indeed used, or has been used by the public in the past for access to the river. However, it is alleged that the applicant has illegally blocked this access road by installing a gate across the road, without evidence of permission by the land owner of the paper road, therefore restricting the use of the river at this location for amenity and recreation.

276. Common recreational values are associated with angling, water-based activities such as swimming and kayaking, and cycling and horse riding along roads in the wider area.

Legal and Planning Matters

Resource Management Act (1991)

277. Under Section 9 of the RMA, land use activities require a resource consent (land use consent) if a national environmental standard or regional rule is contravened.

278. Under Section 13 of the RMA, the use, erection, reconstruction, placement, alteration, removal of structures in, on or under the bed of any lake or river, and the excavation, drilling, tunnelling and disturbance of the bed, introduction or planting of any plant, deposition of any substance in, on, or under the bed, or reclamation or drainage of the bed requires a resource consent unless expressly allowed by a national environmental standard, a rule in a regional plan or a rule in a proposed regional plan.

279. Under Section 14 of the RMA, the taking, using or damming of water requires a resource consent (water permit) unless the taking, using or damming of water is expressly allowed by a national environmental standard, a rule in a regional plan or a rule in a proposed regional plan.

280. Under Section 15(1) of the RMA, the following discharges require a resource consent unless the discharge is expressly allowed by a national environmental standard, a rule in a regional plan or a rule in a proposed regional plan:

    a. Contaminant or water into water;

    b. Contaminant onto or into land in circumstances which may result in that contaminant (or any other contaminant emanating as a result of natural processes from that contaminant) entering water; or

    c. Contaminant from any industrial or trade premises into air; or

    d. Contaminant from any industrial or trade premises onto or into land

281. The proposed quarry and landfill operation meets the RMA definition of '*industrial and trade premise'*, and therefore I consider that sub-sections 15(2) and (2A) are not relevant to this proposal.

National Environmental Standards

Resource Management (National Environmental Standards for Freshwater) Regulations 2020

282. The application includes an assessment of the NES-F on page 4/23 of Appendix B, concluding that none of the Regulations apply to the proposed activity.

283. I disagree with this assessment made by the consultant and consider that consents are required under the NES-F. Advice on this matter has been sought by CRC's legal counsel the planning team. Despite ongoing communication with the applicant on this matter and a request for an amended assessment of the NES-F, the applicant has declined to supply one and has opted to refer this matter to the Hearing Panel instead, given they have requested the proposal to be publicly notified. I recommend this be addressed as a preliminary matter by the Panel prior to the hearing commencing, so it can be resolved because it will have obvious implications on processing.

284. Part 3, subpart 1 of the NES-F deals with natural inland wetlands.

285. Regulation 45A is specific to quarrying activities, and Regulation 45B is specific to landfills and cleanfill areas. I consider that both regulations require assessment.

286. Further, Regulations 52 and 53 deal with the drainage of natural inland wetlands, but only apply if earthworks and the taking, using, damming or diversion of water is not

addressed by any of the Regulations 38-51. Therefore, Regulations 52 and 53 are not relevant for this proposal.

287. I note that '*earthworks'* in the NES-F adopt a wider definition than the definition in the LWRP. The NES-F defers to the National Planning Standards 2019 for a definition:

"*means the alteration or disturbance of land, including by moving, removing, placing, blading, cutting, contouring, filling or excavation of earth (or any matter constituting the land including soil, clay, sand and rock); but excludes gardening, cultivation, and disturbance of land for the installation of fence posts."*

Regulation 45A Discretionary Activities – Quarrying Activities

Conditions		***Assessment***
(1) Vegetation clearance within, or within a 10 m setback from, a natural inland wetland is a discretionary activity if it is for the purpose of quarrying activities.		**Does not apply** - The proposal includes a min. 10 m set back from the wetlands on site.
(2) Earthworks or land disturbance within, or within a 10 m setback from, a natural inland wetland is a discretionary activity if it is for the purpose of quarrying activities.		**Does not apply** - The proposal includes a min. 10 m set back from the wetlands on site.
(3) Earthworks or land disturbance outside a 10 m, but within a 100 m, setback from a natural inland wetland is a discretionary activity if it—	(a) is for the purpose of quarrying activities; and (b) results, or is likely to result, in the complete or partial drainage of all or part of the wetland.	**May apply** – see assessment below. It is debatable whether the earthworks alone would cause drainage of the wetlands, as the result will more likely be from the diversion, drainage of water from the excavation pit as a consequence of the activities on site.
(4) The taking, use, damming, or diversion of water within, or within a 100 m setback from, a natural inland wetland is a discretionary activity if—	(a) the activity is for the purpose of quarrying activities; and (b) there is a hydrological connection between the taking, use, damming, or diversion and the wetland; and (c) the taking, use, damming, or diversion will change, or is likely to change, the water level range or hydrological function of the wetland.	**May apply -** The aquifers beneath the quarry are currently being drained due to the quarry pond in the centre of the site. Groundwater from the pond is pumped out of the pond to control water levels. The current drainage is approx. 32 m^3/day from the quarry pond, when access to the area is required. Appendix F of the AEE contains further information but estimates that the 32 m^3/day drainage leads to a baseflow reduction of 19% compared to a situation where groundwater levels remain untouched. This estimation was made on the basis of ongoing daily baseflow reduction and not one-off extraction campaign related emptying of the pond. I consider that even without the landfill proposal, the current quarrying proposal may not comply with these requirements due to the earthworks and land disturbance which require the ongoing removal of water from the pond, depending on the exact extent of

		the quarry pit and the wetland. Based on aerial imagery, this may be within the 100 m distance mark. However, without further information on the frequency of baseflow reduction/ pond emptying, I am unable to determine in how far this Regulation applies to the quarrying activity in isolation.
(5) The discharge of water into water within, or within a 100 m setback from, a natural inland wetland is a discretionary activity if—	(a) the discharge is for the purpose of quarrying activities; and	**Does not apply** – there is no discharge of water into water within, or within a 100 m setback from the natural inland wetlands arising from the quarrying activity alone. Therefore, I consider this part does not apply.
	(b) there is a hydrological connection between the discharge and the wetland; and	
	(c) the discharge will enter the wetland; and	
	(d) the discharge will change, or is likely to change, the water level range or hydrological function of the wetland.	
(6) A resource consent for a discretionary activity under this regulation must not be granted unless the consent authority has first—	(a) satisfied itself that the quarrying activity will provide significant national or regional benefits; and	Based on the available information, I am unable to determine whether Regulation 45A indeed applies to the quarrying activity. It is presumed that quarrying can continue without the need to expand the quarry depth, which requires the removal of water from the quarry pond. Even in the case of one-off removal of water from the pond, it is unlikely to affect the water level range or hydrological function of the wetland significantly in isolation.
	(b) satisfied itself that there is a functional need for the quarrying activity in that location; and	
	(c) applied the effects management hierarchy	

Regulation 45B Discretionary Activities – Landfills and cleanfill areas

Condition	***Assessment***
(1) Vegetation clearance within, or within a 10 m setback from, a natural inland wetland is a discretionary activity if it is for the purpose of constructing or operating a landfill or a cleanfill area.	**Does not apply** - The proposal includes a min. 10 m set back from the wetlands on site.
(2) Earthworks or land disturbance within, or within a 10 m setback from, a natural inland wetland is a discretionary activity if it is for the purpose of constructing or operating a landfill or a cleanfill area.	**May apply** - The proposal includes a min. 10 m set back from the wetlands on site. However, the remediation options to supplement the baseflow of the impacted wetland include either the artificial creation of an additional wetland by lowering the local site level and intercepting water, or discharge of water into the wetland via a drainage pipe. Both of these options require earthworks and it is uncertain whether these will be within 10 m of the wetland.

(3) Earthworks or land disturbance outside a 10 m, but within a 100 m, setback from a natural inland wetland is a discretionary activity if it—	(a) is for the purpose of constructing or operating a landfill or a cleanfill area; and (b) results, or is likely to result, in the complete or partial drainage of all or part of the wetland.	**Does not apply -** The installation of the liner, landfill and sealed leachate pond will be within 100 m of the natural inland wetlands. It is debatable whether the earthworks alone would cause drainage of the wetlands, as the result will more likely be from the diversion or drainage of water as a consequence of the activities on site. Earthworks are also proposed as an option to remediate the loss of baseflow to the wetland, by artificially inducing springs upgradient of the existing wetland (as described above) These earthworks will not result in the partial or complete drainage of the wetland. Further earthworks are proposed for the construction of a sediment retention pond. Concept design submitted as part of the s92 response indicate that the location of the sediment retention pond will likely be within 100 m of a wetland. However, the earthworks are unlikely to cause the effects specified by this condition. I note that while the sediment retention pond is intended to capture sediment laden water as a result from earthworks and ongoing stormwater management, the pond is an integral part of the proposal to enable the landfilling activities. Equally, this assessment could be made under Reg 45A but this would not change the overall outcome of the assessment.
(4) The taking, use, damming, or diversion of water within, or within a 100 m setback from, a natural inland wetland is a discretionary activity if—	(a) the activity is for the purpose of constructing or operating a landfill or a cleanfill area; and (b) there is a hydrological connection between the taking, use, damming, or diversion and the wetland; and (c) the taking, use, damming, or diversion will change, or is likely to change, the water level range or hydrological function of the wetland.	**Applies** - Appendix F of the AEE describes a modelled baseflow reduction of 19% to the southern wetland on site due to the installation of the liner, the underdrainage system that will lower the water table, and a reduced rainfall infiltration beneath the landfill footprint once the liner is installed. Additionally, during the construction phase, a higher groundwater take is expected (74 m^3/day instead of the modelled 32 m^3/day)
(5) The discharge of water into water within, or within a 100 m setback from, a natural inland wetland is a discretionary activity if—	(a) the discharge is for the purpose of constructing or operating a landfill or a cleanfill area; and (b) there is a hydrological connection between the discharge and the wetland; and	**Applies -** The proposed mitigation to counteract the modelled reduction in baseflow is capture of groundwater seepage and subsequent discharge into the wetland to compensate the predicted loss. This could be accomplished either by

	(c) the discharge will enter the wetland; and (d) the discharge will change, or is likely to change, the water level range or hydrological function of the wetland.	(a) earthworks undertaken upgradient of the wetland. The ground would be lowered locally, creating a spring that discharges into an engineered wetland for sediment filtration prior to discharging into the existing southern wetland, or (b) the installation of land drains to capture groundwater beneath dry land, which would be then diverted into the existing wetland. The discharge is for the purpose of constructing or operating the landfill, as it forms part of the remediation package presented in the application. The remediation would not be necessary if not for the partial drainage of the baseflow. The purpose of the discharge is the supplementation of the wetland baseflow, and therefore a hydrological connection between the discharge and the wetland is desirable. The discharge is proposed to enter the wetland and the purpose of the discharge is to change the water level range of the wetland.
(6) A resource consent for a discretionary activity under this regulation must not be granted unless the consent authority has first—	(a) satisfied itself that the landfill or cleanfill area – (i) will provide significant national or regional benefits; or (ii) is required to support the quarrying activities regulated under regulation 45A; or (iii) is required to support urban development regulated under regulation 45C; or (iv) is required to support the extraction of minerals regulated under regulation 45D; and	The applicant has not provided an assessment to demonstrate how the proposal will provide a significant national or regional benefit in accordance with (a)(i). I consider that the proposed landfilling activity is not required to support any of the activities (ii) to (iv).
	(b) satisfied itself that – (i) there is no practicable alternative location for the landfill or cleanfill area in the region; or (ii) every other practicable alternative location in the region would have equal or greater adverse effects on a natural inland wetland; and	I consider that there are several alternative locations within the Canterbury region that have the relevant authorisation to dispose of most (if not all) of the proposed waste streams. These include Kate Valley landfill in **Hurunui**, operated by TransWaste Canterbury Limited, Frews Quarries Ltd in **Hororata**, Leggett Road Limited in **Templeton** and operated by Protranz staff, Canterbury Environmental Solutions Limited ('Taiko landfill') in **Cave**, **South Canterbury** and Redruth landfill in

		Timaru operated by Timaru District Council. I also note that a site has for a proposed Managed Fill facility has been included on Schedule 2 of the Fast-track Approvals Bill in **Aylesbury/Kirwee** (Southern Screenworks). This site does not contain any wetlands and is a practicable alternative location for disposal of Managed Fill waste.
	(c) applied the effects management hierarchy.	n/a

288. I consider that the proposed activity requires a resource consent under the NES-F as a discretionary activity, due to Regulations 45B(4) and (5).

289. It is noted that the applicability of the above rules for the proposal presented in the application has been debated with the applicant and agreement has not been reached. The applicant considers that the proposed mitigation in the form of supplementation of the expected baseflow reduction with intercepted water will render the above rules irrelevant.

290. I consider that in accordance with Regulation 45B(6) a resource consent can only be granted if (b) can be satisfied. My assessment concludes that suitable alternative locations already exist within the region, and even locally, and therefore potentially resource consent cannot be granted under a strict interpretation of the NES-F. However, obviously the applicant has a different view and as stated above they have chosen to address this matter in the hearing.

291. Given the space constraints at the location of the proposal, I consider it unlikely that the proposal can be amended in such a way as to avoid the reduction of the baseflow of the wetlands on site. However, as the applicant does not consider NES-F relevant, no alternatives have been provided in the AEE.

292. It should not be assumed that the decision-makers will reach the same conclusion or decision after having considered all the evidence to be brought before the decision makers by the applicant and submitters and therefore, despite the direction in the NES-F, I have continued with the assessment of the application for completeness.

Resource Management (National Environmental Standards for Air Quality) Regulations 2004

293. The application addressed the expected air quality effects associated with the lime drying furnace and kiln emissions and concluded that the proposal is not expected to result in an exceedance of the NES-AQ standards. Results are available in section 7.2 of Appendix S and updated results in the RFI response. These results relate to the proposal which included a coal fired furnace for the processing plant.

294. That aside, the applicant and Mr Chilton (**Appendix 15**) have a conflicting view of what constitutes the 'site boundary' for the purposes of the NES-AQ. The applicant included the legal road reserve and riverbed, both occupied by the applicant, as part of the site boundary. Mr Chilton disagrees with the inclusion of these land parcels for the purposes of the assessment.

295. However, he agrees that the change from the coal fired furnace to the diesel fired unit will result in significant reductions in SO_2 emissions when compared with the earlier assessments, which in his expert opinion, would readily meet the requirements of the NES-AQ.

296. I expect that evidence that will be provided by the application at the hearing will support this statement, but a detailed assessment will be required to confirm that the NES-AQ regulations are not relevant for the proposal.

Resource Management (National Environmental Standards for Greenhouse Gas Emissions from Industrial Process Heat) Regulations 2023

297. The original application included an emissions reduction plan (Appendix N of the AEE) to address the NES-GHG requirements from the operation of the coal fired furnace.

298. Due to the proposed changes which replace the coal fired furnace with a diesel fired furnace, the applicant can now operate as a permitted activity under Regulation 10, which relates to appliances that burn fossil fuels other than coal. The relevant criterion is whether the site is considered a low emission site.

299. Regulation 3 defined a low emission site as a site that emits less than 500 tonnes of carbon dioxide equivalent of greenhouse gas from heat devices that are not backup devices.

300. While the applicant has not provided details regarding the combined 308kW diesel fired appliances (2 x 154 kW), Mr Chilton (**Appendix 15**) has provided an initial assessment based on the following:

    a. Diesel calorific value of 42,800 kJ/kg

    b. Thermal efficiency of 75%

    c. A fuel density of 0.83 kg/L

301. Based on the above, he calculated that the plant could consume up to 75 L/h and based on a CO_2 emission factor for diesel of 2.671326212 kg CO_2 e/L, the plant would have to operate no more than 2,495 hours per year, and consume no more than 187,000 L of diesel per year in order to be classified a low emission site under the NES-GHG.

302. Mr Chilton considers that based on the application and frequency of operation, this should be achievable.

303. I note that this matter needs to be further clarified by the applicant as part of the hearing, namely confirmation that the low-emission status can be achieved.

Regional Plans

Canterbury Land and Water Regional Plan (CLWRP)

304. The application included a comprehensive review of the CLWRP in Appendix B of the AEE.

305. **Table 3** includes an assessment against the CLWRP. Full assessments against each rule can be found in **Appendix 2** of this report. Note that where my assessment differs from that made in the application, indication is given.

Canterbury Air Regional Plan

306. The Canterbury Air Regional Plan (CARP) became operative on 31 October 2017. Its principal purpose is to maintain air quality where it provides for people's health and cultural wellbeing, or to improve if it does not, whilst recognising the investment in, and significant contribution to the economy and social wellbeing of Canterbury of industrial and trade activities that discharge into air. Full assessments against each rule can be found in **Appendix 2** of this report. Please refer to **Table 3** below for a summary.

Table 3: Rule Assessment Summary

Activity	Rule	Activity Status	Comment	RMA	Consent number
National Environmental Standards for Freshwater 2020					
Taking/diversion of water within 100 m of a wetland	Reg 45B(4)	Discretionary	assessed as n/a by consultant	s14	**Not applied for**
Remediation of loss of baseflow by discharging drainage water into wetland or onto land where it will enter wetland	Reg 45B(5)	Discretionary	assessed as n/a by consultant	s15	**Not applied for**
Canterbury Land and Water Regional Plan					
Wastewater from the existing treatment system	5.9	Restricted Discretionary	see Table A-1[7]; current system cannot comply with PA Rule 5.7, but may not be required as can be trucked off site	s15	**Not applied for**
Wastewater from a new treatment system	5.9	Restricted Discretionary	see Table A-2; new system cannot comply with PA Rule 5.8, but may not be required as can be trucked off site	s15	**Not applied for**
Discharge of hazardous waste	5.89	Discretionary		s15	CRC243705
Discharge of construction phase stormwater	5.94B	Restricted Discretionary	See Table A-3	s15	CRC243704
Discharge of operational phase stormwater	5.97	Discretionary	See Table A-4 and A-5	s15	CRC243705
Discharge of water treatment chemical residuals	5.100	Discretionary	See Table A-6	s15	CRC243704, CRC243705
Installation, maintenance and decommissioning of bores	5.104	Permitted	See Table A-7	s9	n/a
Decommissioning of a bore	5.107	Permitted	See Table A-8	s9	n/a
Take and use of groundwater (small and community water takes)	5.114A	Restricted Discretionary	See Table A-9	s14	**Not applied for**, assessed as permitted under 5.111 by applicant
Take and use of groundwater from the underdrainage system (Options 1 and 2)	5.114	Permitted	See para 11-13 of Appendix 2 for explanation	s14	n/a

[7] Referenced tables can be viewed in Appendix 2

Discharge of drainage water taken from the underdrainage system (Options 1 and 2)	5.100	Discretionary	See Tables A-10 and A-11	s15	CRC243705
Non-consumptive take of water and discharge via reinjection well	5.132	Discretionary	See Table A-12	s14 and s15	CRC243703, CRC243705
Temporary take of groundwater for dewatering purposes and subsequent discharge	5.120	Restricted Discretionary	See Table A-13	s14 and s15	CRC243702, CRC243704
Installation of the stormwater and underdrainage outfall structure	5.141A	Discretionary	See Table A-14	s13	CRC243701
Use and maintenance of the stormwater and underdrainage outfall structures	5.139	Permitted	See Table A-16	s13	n/a
Bridge installation, associated take and discharge, or diversion of water	5.137	Permitted	See Table A-15	s13, s14, s15	n/a
Use and maintenance of the bridge structure (abutments)	5.139	Permitted	See Table A-16	s13	n/a
Use and maintenance of a ford river crossing and culvert	5.139	Permitted	See Table A-16	s13	n/a
Removal of the ford crossing	5.6	Discretionary		s13, s15	CRC243701, CRC243704
Diversions associated with the removal of the ford crossing	5.6	Discretionary		s14	**not applied for,** but could be undertaken in the dry, in which case no consent is needed
Diversions associated with the installation of the bridge abutments and outfall structures	5.140	Permitted	See Table A-17	s14	n/a
Temporary discharges associated with the bridge installation and outfall structures installation	5.141A	Discretionary	See Table A-18	s15	CRC243704
Vegetation clearance and earthworks outside the bed of a river and associated discharges	5.169	Restricted Discretionary	See Table A-19 and A-20	s9, s15	CRC243699, CRC243704
Introduction or planting of any plant into the bed of the river, and associated discharges	5.163	Permitted	See Table A-21	s13, s15	n/a

Bed and bank river habitat enhancement	8.5.37	Permitted	See Table A-22	s13	n/a
Reduction of the area of a wetland	5.162	Non-complying	See para 26-31 of Appendix 2 for explanation	s9	**Not applied for** as assessed as permitted by applicant
Earthworks adjacent to a wetland, but within 50 m of the wetland boundary for the remediation proposal	5.176	Restricted Discretionary	See Table A-23 for rule wording, para 32-33 Appendix 2 for explanation	s9	**Not applied for** as assessed under 5.159, disagree with assessment
Discharge of water into wetland (remediation proposal)	5.100	Discretionary	See Table A-10 for rule wording, para 32-33 Appendix 2 for explanation	s15	**Not applied for,** assessed as permitted under 5.159 by applicant
Discharge of construction phase stormwater during construction of remediation for wetland	5.94B	Restricted Discretionary	See Table A-3 for rule wording, para 32-33 Appendix 2 for explanation	s15	**Not applied for,** assessed as permitted under 5.159 by applicant
Excavation over aquifers	5.176	Restricted Discretionary	See Table A-23	s9	CRC243700
Deposition of material	5.178	Restricted Discretionary	See Table A-24	s9	CRC243700
Storage of hazardous substances in portable containers	5.179	Permitted	See Table A-25	s9	n/a
Storage of hazardous substances other than in portable containers	5.182	Discretionary	See Table A-26	s9	**Not applied for**, as not assessed by the applicant as a separate matter from CRC243700
Canterbury Air Regional Plan					
Fuel burning device	7.20	To be clarified	see Table A-27	s15	To be clarified
Handling of bulk solid materials	7.63	Discretionary	see Table A-28	s15	CRC243706
Storage of bulk solid materials	7.63	Discretionary	See Table A-29	s15	CRC243706
Discharges from landfilling activity	7.63	Discretionary		s15	CRC243706
Processing of material (rotary kiln drying)	7.63	Discretionary		s15	CRC243706

Overall Activity Status

307. The High Court in Affco New Zealand Ltd v Far North District Council determined that all consents for a project should be carefully considered jointly and that they must consider if the consents are “overlapping” or are of a standalone nature.

308. I consider that applying a bundling approach is appropriate as many of the activities and mitigation measures to address effects of the activities are interrelated. Therefore, the proposal is overall assessed as a **non-complying activity**.

Recommendation on the Substantive Decision

309. Prior to making a recommendation on whether an application should be granted or refused, Section 104 of the RMA specifies what must be considered when determining an application.

Consideration of Applications (Section 104)

310. Section 104(1) of the RMA outlines the matters which, subject to Part 2, the consent authority must have regard to in considering an application.

311. The Court of Appeal considered the application of Part 2 under Section 104 in *R J Davidson Family Trust v Marlborough District Council [2018] NZCA 316, [2018] 3 NZLR 283.* That decision found it is necessary to consider Part 2 in making decisions on consent applications, where it is appropriate to do so. Whether it is "appropriate" depends on the planning documents in question.

312. The Court of Appeal stated that consent authorities should continue to undertake a meaningful assessment of the objectives and policies of the relevant plan. Where those documents have been prepared having regard to Part 2 of the RMA, and with policies designed to achieve clear environmental outcomes, consideration of Part 2 is not likely to be necessary as "genuine consideration and application of relevant plan considerations may leave little room for Part 2 to influence the outcome." The consideration of Part 2 is not prevented, but it cannot be used to justify an application that is otherwise not supported by objectives and policies.

313. In light of this judgment, Part 2 of the RMA is required to be considered when determining an application for resource consent, but the objectives and policies still hold significant weight, and in most cases (unless the plan has not been prepared in accordance with Part 2), will largely be determinative unless the consent authority has doubt as to whether the planning documents have been prepared in a manner that appropriately reflects Part 2.

314. I have therefore outlined my consideration of those matters in Sections 104 and 105 of the RMA, and finally considered whether it is necessary to resort to Part 2 of the RMA in order to determine this application.

Assessment of Effects on the Environment

Actual and Potential Effects on the Environment (Section 104(1)(a))

315. Section 104(1)(a) of the RMA requires decision makers to have regard to the actual and potential effects of an activity on the environment.

316. The applicant’s assessment of actual and potential effects (pages 69 to 93 of the AEE) to focussed on the following effects:

a. Effects on water quality;
b. Effects on water quantity;
c. Effects on aquatic ecology;
d. Effects on water users;
e. Effects on terrestrial ecology;
f. Effects on land stability;
g. Effects from fire and flood hazards;
h. Effects on air quality and human health;
i. Effects of greenhouse gas emissions;
j. Effects of transportation;
k. Effects on Te Ngai Tūāhuriri Runanga values and use;
l. Effects on landscape values;
m. Effects on amenity and recreation values;
n. Effects on wider community;
o. Containment failure risks.

317. As an overall non-complying activity, the consent authority's discretion is unrestricted and all actual and potential effects of the activities must be considered. Notwithstanding this, where an individual activity has been classed as a restricted discretionary activity, the matters of discretion have been used to guide the audit of the effects assessments provided.

318. Given the nature of the proposal, I consider that the following matters provide for the principle actual or potential adverse effects that need to be considered for the determination:

a. Adverse effects from inadequate waste acceptance criteria;
b. Adverse effects of inadequate engineering design and landfill location;
c. Adverse effects from inadequate management of stormwater;
d. Adverse effects during landfill post-closure and aftercare periods;
e. Adverse effects from default by the consent holder;
f. Summary and overall risk from landfill operation, incl. containment risk failure;
g. Adverse effects on the groundwater environment;
h. Adverse effects on the surface water environment;
i. Adverse effects on water quantity and allocation;
j. Adverse effects on groundwater and surface water users;
k. Adverse effects on terrestrial ecology and wetlands;
l. Adverse effects on air quality;
m. Adverse effects on cultural values; and
n. Adverse effects on amenity and recreation values;
o. Overall summary of and risk from proposal.

319. The definition of 'effect' in the RMA also includes positive effects. Therefore, I have also considered positive effects of the proposal.

320. A discussion of the above matters is provided in the following sub-sections.

Permitted Baseline Assessment

321. The permitted baseline refers to permitted activities on the subject site and a comparison of adverse effects that may result from those activities with adverse effects that may result from the proposed development.

322. The applicant has not assessed a permitted baselines for the activities at the discretion of regional council.

323. I note that the receiving environment in this assessment consists of:

    a. The existing environment and associated effects from lawfully established activities;

    b. Effects from any consents on the subject site (not impacted by the proposal) that are likely to be implemented;

    c. The existing environment as modified by any resource consents granted and likely to be implemented; and

    d. The environment is likely to be modified by activities permitted in the plan.

324. In this instance, the receiving environment includes the proposal site, located within a rural setting, being occupied by a mixture of plantation forest, indigenous vegetation and open pastureland. The existing site also contains a lime quarry that has been in operation for several decades, but this is further discussed in relation to the district council application and relevant for this assessment. The permitted activity status of the activities on site are in question.

325. There are no unimplemented consents of relevance that are likely to be implemented that I am aware of. However, there are permitted activities being undertaken in the surrounding area, such as water takes from the Karetu River or from groundwater connected to the Karetu River, which form part of the existing environment.

Adverse Effects from Inadequate Waste Acceptance Criteria and Waste Handling

326. The WasteMINZ Guidelines (2023) state that waste acceptance criteria (WAC) are developed to provide confidence that waste materials placed within a facility do not result in an unacceptable adverse effect on human health or environmental receptors. The adequacy of the WAC is highly dependent on the site location, engineering design and operational controls.

327. The proposed landfill is a hybrid landfill (under the WasteMINZ classification). It will accept *managed fill*, which includes *cleanfill* material and *controlled fill* material, but also construction and demolition waste material listed under the Class 2 classification, as long as it is deemed to be inert and not putrescible. The site will also accept chemical contaminants in excess of the specified Class 3 waste acceptance criteria (more aligned with Class 1 criteria). Additionally, though not addressed by the WasteMINZ Guidelines, the site will accept asbestos containing waste. The site will not accept putrescible waste, some industrial wastes such as bulk ash and foundry waste, or municipal solid waste and has only selected inert materials from the Class 2 list from the WasteMINZ Guidelines (2023).

328. A list of the proposed acceptance criteria and prohibited materials can be found in Appendix K of the applicant's AEE.

Technical Assessment of the Waste Acceptance Criteria

329. In relation to the proposed WAC, I note that both Dr Massey (**Appendix 4**) and Dr Silver (**Appendix 5**) have included the following statements in their evidence:

a. Contaminants of concern include, but are not limited to trace elements, pesticides, hydrocarbons, asbestos, per- and polyfluoroalkyl substances (PFAS), and incidental amounts of combustible or putrescible wastes, such as vegetative matter.

b. This list is expanded on by Dr Silver, noting that the following contaminants should also be expected: volatile organic compounds (VOCs) including benzene, toluene, ethylbenzene and xylenes (BTEX) and polyaromatic hydrocarbons (PAHs).

c. Though gypsum wallboard (drywall, GIB board) is prohibited in the proposed conditions of CRC243705, sulphates and PFAS (a common coating of gypsum wallboard) are potential contaminants of concern, even if gypsum is only inadvertently placed at the site.

d. PFAS are not routinely tested in soil at this time (by depositors and suppliers of waste), and PFAS are also ubiquitous in construction materials. Dr Massey therefore considers that it is likely that PFAS-contaminated material will be accepted at the site, despite the proposed prohibition.

e. Dr Silver goes further and notes that the question is not whether PFAS will be in the waste, but how high the accepted waste PFAS concentrations will be. He cites a study showing that material such as concrete, asphalt pavement, asphalt shingles, and construction and demolition debris fine particles also contain PFAS, albeit at lower levels. However, on average, leachate from a construction and demolition waste fill will likely have higher concentrations of PFAS than leachate from a municipal Class 1 landfill.

f. Depending on the final WAC and how waste will be screened, there is a potential for major practical challenges in avoiding high PFAS levels when accepting C+D waste. Dr Silver therefore considers that there remains a real risk of PFAS leachate leaking into the environment.

g. Sulphate on its own is not generally considered a health hazard but it can transform into hydrogen sulphide (H_2S) in low-oxygen conditions. Hydrogen sulphide gas generation can be more prevalent in a C+D waste landfill due to the presence of gypsum wallboard, which is ubiquitous in C+D waste in New Zealand because it is so commonly used. I note again that the applicant proposes to prohibit the acceptance of gypsum wallboard in general.

h. Coal tar containing roading materials are included in the WAC. These typically have a high concentration of polycyclic aromatic hydrocarbons (PAHs). PAH-contaminated sediment is known to be particularly toxic to aquatic organisms, so it is important to prevent the discharge of PAH contamination to the nearby Karetu River.

i. Dr Massey considers that other contaminants likely to be persistent and deposited at the site include zinc, copper, nickel, and pesticides. Other common trace metal contaminants observed in soils in Canterbury include lead, manganese, chromium, and arsenic.

j. Dr Silver also describes the risk of perfluoroalkyl acids (PFAAs) such as PFOA, PFOS and PFHxS, and PFAA ‘precursors’, which under common environmental conditions transform into PFAAs. These are stable products and highly persistent in the environment.

k. Precursors have been present in PFAS formulation since about 1960 in industrial and consumer products, firefighting foams and polymer and non-polymer formulations used in building and construction materials.

l. He states that PFAS in construction and demolition waste is largely PFAS mass in 'precursor' chemical species and cites guidance from the U.S. organisation *Interstate Technology and Regulatory Council* stating that:

"Landfills containing sources of PFAS may continue to release PFAS to leachate at slow by relatively steady rates for decades following initial placement. "

330. Dr Massey considers that the proposed WAC will result in highly contaminated soils being accepted to a site, when compared with a relatively low contaminant concentration Class 3 landfill, as set out in the WasteMINZ Guidelines (2023).

331. As much of the contamination emplaced at the site will be persistent and not degrade over time, the hazards from discharges will not appreciably decrease over time, except as material is weathered on a geologic timescale (millions of years), as cited above when referencing the *Interstate Technology and Regulatory Council*.

332. Therefore, Dr Massey has made the following recommendations in relation to WAC:

a. That gypsum wallboard, treated timber, as well as sawdust or wood chips from treated and untreated timber, and all other material listed in Appendix K, Section 5.4 (Table 5-1) are explicitly prohibited.

b. The prohibition of carpet should include carpet padding, which can be a source of PFAS.

c. The inclusion of a PFAS limit on CRC243705 as a condition of consent. Even though PFAS-contaminated materials are not proposed to be accepted at the site, they may be inadvertently placed at the site and Dr Massey does not consider that a prohibition is achievable in practice because it is commonly contained in materials that will end up in the fill, which is also reflected by statements made by Dr Silver. Proactively including PFAS limits on acceptance criteria on the consent will avoid compliance issues in future.

    i. The limit should be 1 microgram per kilogram (1 part per billion) as an 'incidental' total PFAS limit (the sum of all PFAS lab analytes).

d. That a list of acceptable materials is explicitly included as a condition of consent.

e. He supports the proposal and intent outlined in Appendix K, Section 5.7 regarding the inclusion of new WAC for emerging contaminants, as they arise. This extends to minor updates to WAC only. He does not support a process that could be used to make major changes to the WAC, such as changing the WAC to accept unsorted C&D waste material or municipal waste. A major change in WAC should not be allowed with an incremental process, causing a slow 'creep' of scope.

f. That continuous gas monitoring for oxygen and hydrogen sulphide in the quarry/landfill pit is included, even though gypsum wallboard is prohibited in CRC243705 Schedule B revision 1, proposed by the applicant.

g. That a higher sampling frequency of PFAS is adopted, if gypsum products have been found to be inadvertently emplaced at the site.

h. That the Toxicity Characteristic Leaching Procedure (TCLP) limits as set out in Table 5-4 of Appendix K are aligned with those of a Class 1 landfill, as set out in the WasteMINZ Guidelines.

i. If leachate is highly alkaline in pH, such as from acceptance of concrete, he recommends the high-pH Australian Standard Leaching Procedure (ASLP) testing in addition to TCLP.

333. In relation to asbestos acceptance, he considers that:

    a. A condition is included specifying the mitigation measures and acceptance of asbestos as outlined in Appendix K of the application.

    b. Material should be handled in accordance with the Health and Safety at Work (Asbestos) Regulations 2016 and subsequent updates thereof.

    c. Asbestos transport should be wetted, covered and managed accordingly. I note that transport is a matter for the District Council to address further.

334. Mr Kortegast (**Appendix 6**) has also addressed the proposed WAC in his evidence when reviewing the suitability of the landfill design.

335. I note that while his conclusion states that the landfill design is generally acceptable for the proposed WAC (discussed in the next section), he makes this statement on the basis that most of the material accepted on site will be consistent with Class 3 material, with a minority of Class 1 contaminated soils. He also states that a significant degree of uncertainty remains over the makeup of the overall waste streams, such as an unspecified proportion of waste with leachable contaminants at levels that would otherwise require disposal at a Class 1 landfill facility. The application is not specific on the overall waste stream makeup and the degree of risk that the waste mass could therefore pose is uncertain.

336. Dr Massey has proposed that the site will indeed accept a large majority of contaminated soils, purely because more cost-effective and closer options exist for lesser contaminated material elsewhere within Canterbury. One of such facilities is operated by the applicant. He therefore considers that material with significant amounts of contamination (at the top end of acceptance criteria) will be the primary targeted market.

337. Clarification will be required from the applicant regarding the above, and if possible, a statement regarding the proposed proportions of each waste category. This is a critical consideration when assessing the suitability of the site and its geological setting for the proposed waste streams.

338. I note that further clarification is required from the applicant regarding the following items:

    a. The application proposes prohibiting the acceptance of liquid wastes. Some incidental moisture will be present in accepted waste, and for clarity, if granted, conditions should specify the % of the liquid content/ moisture by weight to avoid later debate.

    b. The application provides conflicting information regarding the acceptance of building wrap vs. building paper/ lining paper. If there is a discernible difference between these materials, the applicant should clarify and also address how this will be screened in practice.

    c. The application proposes the acceptance of non-recyclable materials (e.g. glass), which would indicate that if recycling becomes available, specified materials should no longer be accepted. It is uncertain how ‘recyclable’ shall be defined in this context. Does this mean that e.g. transport overseas to facilitate recycling therefore excludes this waste stream from the WAC?

Proposed Waste Handling and Deposition

339. The applicant has proposed the retention of the existing site facilities, and the development of several others to support the proposal. These includes stormwater pond/ sediment retention ponds, leachate pond, container waste area, prohibited waste storage area, relocatable wheel washes and decontamination areas, among others.

340. The applicant proposes to manage stormwater that has come into contact with waste via the leachate management system. Wash water from truck washing will also discharge to the leachate system.

341. In his evidence, Dr Massey commented on the feasibility and practicality of the existing and proposed facilities on site, in combination with facilities required for mitigation and vehicle manoeuvring. Appendix H of the application (revision 1) contains drawings of proposed locations of these facilities on site, such as drawing C206 for facilities, and C207 for pond structures and some of the erosion and sediment control features (such as sediment retention ponds and diversion bunds).

342. Dr Massey also commented on existing site practices and raises concern over stormwater management and the management of contaminated material stockpiles in particular. He recommends that:

    a. Adequate stormwater and sediment management is implemented to eliminate the discharge of contaminated sediment and stormwater from the site.

    b. Based on the site visit and the lack of sediment management, he anticipates that management of contaminated soils will become a problem. He therefore recommends:

        i. Prohibiting stockpiles of contaminated material outside of the landfill footprint;

        ii. Keeping contaminated soil stockpiles away from the river;

        iii. Bunding soil stockpiles that are outside of the landfill footprint;

        iv. Paving roads on site and implement good housekeeping, such as regular sweeping.

    c. I note that design drawing C207 recommends the use of a boundary silt fence to contain runoff from the proposed northern overburden stockpile site. While the silt fence on its own would not be considered sufficient protection from sediment-laden discharges into the Karetu River, the drawing also indicated a dirty water diversion channel towards the proposed sediment retention pond. Further discussion regarding stormwater management is provided in a later section.

343. In his evidence, Mr Cochrane (**Appendix 7**) also comments that a risk of contamination of stormwater with landfill waste coming onto site or being disposed of at site is a risk. Typically, this must be managed via careful separation of stormwater to avoid contact with contaminants, which includes good site management practices, careful monitoring of stormwater quality and the ability to divert stored contaminated stormwater on-site.

Submissions

344. There were many submitters raising concerns around the type of waste and the location being inappropriate for storage of contaminated waste, lack of information and the need for another landfill in the region as there are adequate waste disposal options available elsewhere.

345. TransWaste Canterbury Ltd (SUB034870) states that they expect the development of WAC and lists of prohibited waste in alignment with proposed class of landfill. The stated class must not be subject to change without a consent holder undertaking a full assessment of the effects in alignment with the Technical Guidelines. This is supported by the recommendations made by Dr Massey, as addressed above.

346. The submission by TransWaste Canterbury Ltd. also mentions that the design requires technical evaluation of landfill gas and management of odour compounds, which has not been provided by the applicant. Dr Massey has made similar recommendations in his s42A report. Submission SUB034639, of N Coughlan, also references that the

acceptance of contaminated soils, asphalt and tar waste, which contain PAHs can create pockets of gases that will release into the air. I defer this assessment to a later section and adopt the recommendations of Mr Kortegast (**Appendix 6**) on these matters.

347. Submissions (such as SUB034639) have also raised the lack of experience by the applicant and inadequate infrastructure on site in relation to waste handling, when compared to facilities such as the regional landfill at Kate Valley. This mirrors the concern raised by Dr Massey in his evidence.

348. Turning my attention towards Kate Valley Landfill, many submitters highlighted the regional landfill as having the capacity and ability to take and manage all the waste proposed by the applicant. This use of Kate Valley (Class 1) versus a landfill such as the one proposed, which will accept a lower class of waste, is addressed in Dr Massey's expert evidence in **Appendix 4**.

Summary and Recommendations

349. If the decision makers are of a mind to grant this application, the following is recommended:

    a. The adoption of Dr Massey's recommendations and conditions of the consent;

    b. Clarification regarding the intended proportion of the proposed waste streams and subsequent incorporation into the consent conditions. Currently a significant degree of uncertainty remains regarding the proportion of the proposed waste streams, which in turn informs all other potential adverse effects related to the release of landfill leachate.

Adverse Effects from Engineering Design and Inadequate Landfill Location

350. The applicant has adopted a design philosophy of a Class 1 landfill, incl. a liner system, underdrainage for groundwater, a leachate collection system and in terms of waste, TCPL limits for Class 1 landfills. The proportion of waste streams to be accepted at the site has not been clarified by the applicant.

351. For Class 1 landfills (and similarly for Class 2), the WasteMINZ Guidelines (2023) state that such landfills require:

    a. Thorough assessment of siting constraints (geology, hydrogeology and surface water hydrology) with the goal of achieving a high level of containment;

    b. Engineered environmental protection (i.e., liner, leachate collection system and an appropriate cap), all with appropriate redundancy.

    c. Landfill gas management; and

    d. A rigorous environmental monitoring (groundwater and surface water) as well as operational monitoring (waste acceptance, sediment runoff, leachate quality and quantity, etc.) and reporting regime.

352. The main contamination risks are related to leachate and contaminated stormwater, and due to the nature of the proposed activity and dust. The toxicity of leachate and to some extent stormwater will be a function of the type of waste accepted at the site.

353. Overall, I consider that the adequacy of the proposed landfill engineering design in the context of the geological setting, and operational considerations are critical for ensuring that environmental effects are avoided, or that they can be mitigated or remedied to an acceptable level.

Technical Review of Landfill Engineering Design

354. Mr Kortegast from Tonkin + Taylor Ltd was engaged to review the proposed landfill engineering design, as well as the suitability of local geological setting for landfilling activities. The landfill design review report is attached as **Appendix 6** to this report, and the geotechnical assessment and review of the applicant's slope stability assessment is attached as **Appendix 8** to this report.

355. Mr Kortegast assesses the landfill design in detail in his report; incl. recommendations to improve the reliability of the design.

356. In terms of the landfill liner system, he notes that:

    a. The proposed landfill bottom liner design aligns with the standard Class 1 liner composite design. Given that the WAC include chemical contaminant limits allowable at a Class 1 landfill, this is an appropriate approach.

    b. The sidewall liner design is unconventional and does not adhere to Class 1 design requirements but is likely to provide an effective barrier for leachate. Mr Kortegast further states that the sidewall liner gradient is steep, and therefore the risk of lateral leachate migration is low. The main barrier component that needs to be considered is the floor liner.

357. Mr Anderson (**Appendix 8**) also comments on the clay soil liner and states that:

    a. Even if the HDPE lining eventually deteriorated and started to leak, leakage through the underlying 600 mm clay soil lining would be extremely slow, if properly constructed.

    b. With a maximum permeability of 1 x 10^{-9} m/s, this would mean that leachate of a depth of 300 mm would take 38 years to flow from the top of the lining into the receiving environment.

    c. It is critical that the correct material type is selected, and the liner is properly constructed so that cracks cannot form due to post-construction shrinkage (from loss of moisture). Stringent quality control requirements are required, incl. certification by a suitably qualified engineer.

358. Dr Massey has also provided commentary regarding the sidewall design. He leaves conclusions on the suitability of the use of this design to Mr Kortegast's expertise but highlights that:

    a. He is not aware of any data to support the use of polyurea coating in landfill liner applications. A study by *Peng et al*. (2024)[8] estimates the service life to range from years to decades as a coating for concrete water pipes, so much shorter than the proposed landfill base liner.

359. In terms of leachate collection, Mr Kortegast has not raised any concerns regarding the design. He states that the proposal includes a conventional design that is appropriately engineered for the liner proposed.

    a. He recommends that the second leachate pump shown as 'indicative' in Stage 2 should be included in the final design to reduce reliance on the long-term performance of sump 1, reduce drainage path length and add redundancy to the system.

360. Mr Kortegast notes that while he agrees that based on the assertion that the landfill will accept Class 3 fill, landfill gas generation will likely be low. However, moisture conditions in the waste and waste composition (which is not entirely proposed to be consistent with

[8] Peng, C; Ren, J; Wang, Y. 2024. Degradation Behavior and Lifetime Prediction of Polyurea Anti-Seepage Coating for Concrete Lining in Water Conveyance Tunnels. *Materials* 17, 1782. https://doi.org/10.3390/ma17081782

Class 3 fill acceptance criteria), may mean that minor landfill gas, including hydrogen sulphide, may be generated.

361. He further states that based on the applicant's assertion that gypsum wallboard materials and biosolids will be prohibited, controlling moisture levels in the waste is also key to effective management of landfill gas at C+D and inert waste sites. Provided that moisture levels remain reasonably low, and the waste stream is controlled, landfill gas generation is likely to represent a low risk.

    a. He recommends that the site could add landfill gas capture in the future should this prove necessary, and the final cap design could readily incorporate sub-cap landfill gas capture, if required.

    b. I note that Mr Kortegast did not quantify what '*reasonably low'* moisture levels may represent and therefore this should be clarified further.

362. Mr Kortegast has summarised that in general, the s92 queries were adequately addressed, and where they have not been sufficiently addressed it if expected that they will be in the final design, which he proposed should be peer reviewed. He notes that operational changes can be made if considered necessary in the future.

363. Mr Kortegast then addresses risk factors that need to be considered, given the proposed design and the setting of the site:

    a. Defects in the liner: He notes that the risk of defects in the liner, due to poor construction can be mitigated with appropriate Manufacturing Quality Assurance (MQA) and good Construction Quality Assurance (CQA). This was also raised in Mr Cochrane's report specifically regarding the clay liner.

        i. Given the sensitivity of the environment, he further recommends the use of electrical leak detection surveys prior to waste being placed at the site to ensure that very small defects can be detected and repaired in time. This step is particularly critical in and around the leachate sump.

        ii. He states that if the leak detection survey was undertaken, the liner would meet industry best practice, and the number of defects should be no more than a few minor defects (each 1-5 cm^2) per hectare of liner, so in total between 0 to 12 defects for the site footprint.

        iii. Leakage would only occur with the presence of leachate head and in combination with defects, location of defects and the presence of wrinkles in the liner.

        iv. In most typical landfills, there is usually a combination of some defects and some wrinkles. Some wrinkles will remain over the long term (at least hundreds of years), and some degradation of liner integrity will occur in and around wrinkles. Over time, this can lead to a reduction in overall barrier performance.

        v. This does not mean that the liner has failed but rather it becomes progressively less effective as an environmental barrier over a long period of time. This is only of significance where leachate head is present in degraded locations.

    b. Seismic rupture of the liner: Mr Kortegast considers that the risk from seismic rupture is low in this instance. While there is a potential for fault movement near the site, it is likely to occur on one of the active faults in the area, at least 1.6km to the south of the site. Significant shaking could lead to deformation or partial rupture of the liner but in the worst case, depending on where liner damage occurred, if could be exposed and repaired. Mr Anderson also comments on the likelihood and consequences of seismic events in relation to liner defects (**Appendix 8**).

c. Sidewall liner design: The sidewall design is unconventional, and Mr Kortegast states he is not aware of it having been approved for a Class 1 landfill design. The design does not fully align with Class 1 design practice but overall, he concludes that it is acceptable for reasons outlined in his report.

d. Leachate drainage system and groundwater drainage: There is the possibility of reduced performance of the underdrainage system over time, due to blocking and clogging. This will depend on the nature of the waste streams and operational practices over time. The expectation at a conventional Type 1 landfill is that the drainage layer can perform for the period of the landfill operation and the aftercare period, being between 50-100 years. Mr Kortegast notes that there are lots of examples of chemical clogging in short timeframes (months to years) accruing as a result of high gypsum loadings. He states that overall, the applicant has provided an adequate underdrainage design which includes the ability to access and flush the system (see drawing C303[7]). In such designs the primary leachate drains are often increased in area to provide additional redundancy, which is proposed by the applicant, but in a modest size.

e. Leachate generation rates: The applicant has estimated the average leachate generation based on HELP[9] modelling, and estimated a range of 1-15 m^3 day for a cell area of 7,000 m^2. The highest predicted rate was 50 m^3/day, and the annual total average ca. 15 m^3/day.

    i. Mr Kortegast compared these figures with actual leachate generation rates at Kate Valley landfill, factored for rainfall. The comparison shows similar estimates to the upper range prediction of the applicant. However, Kate Valley landfill has a higher organic and moisture content than would be allowed at this site and therefore, he considers the likely range of generation will be between 1- 15 m^3/day for the whole footprint, as estimated by the applicant.

    ii. If stormwater practices on site are managed well, this could be managed to the lower range of this estimate.

f. Liner leakage rates: The applicant has estimated leakage rates assuming that the leachate head will be a constant 300 mm, i.e. the base liner has full leachate head in the drainage blanket. Mr Kortegast makes the following comments:

    i. This assumption is conservative for the proposal and otherwise reasonable for wet landfills that also accept organic wastes and sludges. With the restricted WAC, the assumed leakage rates are therefore a conservative assessment of what should be expected at the site.

    ii. He notes that with a mid-range assumption for leachate generation across the footprint (7 m^3/day), the average head on the geomembrane would be in the order of 0.1 mm as opposed to the 300 mm assumed by the applicant.

    iii. Stormwater entering the cell and percolate through waste will be the main source of leachate. Leachate will only be generated at the part of the waste pile once field capacity is reached, or in case there is a direct seepage pathway through the waste.

    iv. A well-constructed liner subject to electrical leak detection survey at the site would produce less than 5-10L/ha/day.

[9] Unites Stated EPA (Hydrologic Evaluation of Landfill Performance) [HELP] version 3.95D.

v. Field data from actual landfills shows that defects and elevated leachate heads often result in leakage rates being higher (30-50 L/ha/day). Such sites are often constructed without liner leak detection surveys or wrinkle control.

vi. Leakage rates are based on assumptions incl. quality of the liner placement, the number of liner defects and the actual leachate head. This also related to how stormwater is being managed on site.

g. Risk to groundwater/ 'Forever Chemicals': Mr Kortegast further addresses the risk of leachate escaping the liner. He reiterates that managing the waste streams entering the site will be of high importance to managing the risk to the receiving environment. I note that the assessment of effects on the groundwater environment is being addressed separately by Dr Silver (**Appendix 5**), while the waste acceptance criteria are addressed by Dr Massey (**Appendix 4**), which has been discussed in an earlier section of this report. However, Mr Kortegast provides engineering advice in relation to the containment of PFAS contaminants in his evidence. He cited recommendations to reduce the risk of PFAS migrating through a conventional landfill liner with associated impacts on the environment as the following, where three or more need to be present:

i. Appropriate electrical leak location survey before and after the geomembrane is deployed and covered by the drainage blanket (to minimise the risk of defect-related leakage); and/or

ii. A high level of hydrogeologic protection and attenuation (good natural containment), and/or

iii. Excellent construction quality assurance, and/or

iv. An extra level of engineering in the form of a secondary leachate collection/leak detection and double composite liner system.

h. He therefore states that the following would be a prudent approach:

i. To require electrical leak detection as part of the quality assurance process;

ii. To routinely monitor the waste stream and leachate for PFAS and related chemical levels;

iii. To ensure through peer review that quality control is of an excellent standard;

iv. To ensure that the underdrainage system is configured to allow for monitoring and groundwater capture.

i. Landfill fire risk: Mr Kortegast discusses the risk of fires at the landfill. He notes that serious surface fires are not common and can usually be managed by conventional means. He considers that the risk of fire is lower than a standard Class 1 or 2 site, as the waste is proposed to be pre-sorted or will be demonstrated by soil like materials. The Site Management Plan should address the mitigation of landfill fires or hotspots should these develop.

j. Mr Kortegast's report also briefly addresses the local geological setting and the possibility of encountering karst features in the limestone geology beneath the site. I note that the WasteMINZ Guidelines specifically identify Karst areas as technical constraints for the site selection of fill sites for Class 1-4 landfills. This is discussed in more detail in the next section of the report. However, as far as landfill engineering is concerned:

i. The applicant (Appendix J, Section 2.2) notes that if encountered, karst features will be mitigated by over-excavating and backfilling. A set of conditions is proposed (Appendix Y) to address these requirements. However, Mr Kortegast raises the following concerns:

ii. The condition is not specific about the remediation works to be undertaken. The description includes grouting, an unspecified depth of excavation and replacement with engineered fill or increasing the thickness of the soil liner above the features.

iii. There needs to be approval by the CRC for any proposed remediation works and the proposed conditions (CRC243700) should be modified to include a design review step and CRC approval; and

iv. Geological inspections of trimmed base grade should form part of annual reporting requirements.

364. Overall, Mr Kortegast considers that the engineering design presented meets accepted landfill design for a Class 3 landfill site. Aspects of the engineering design align with Class 1 landfill requirements, which potentially enables a limited range of waste not normally allowable for disposal at a Class 3 site, provided that the recommended changes to conditions are adopted.

Review of Siting Constraints

365. In his report, Dr Michael Massey, CRC Principal Science Advisor – Contaminated Land (**Appendix 4**), discusses that in accordance with the WasteMINZ Guidelines, a critical mitigation measure to limit environmental effects from Class 2 or 3 landfills is appropriate siting. This recognises the guidance given in the WasteMINZ Guidelines, which state that (Section 4.1):

> *"The aim is to minimise the need for both mitigation of impact and ongoing management by selecting a site where, to the extent possible, natural conditions protect the environmental quality*" and
>
> "*Where an engineered liner system is used, it should be recognised that this system will have a finite lifetime, so consideration needs to be made of the ability of the underlying geology to limit discharges from the site…"*

366. He highlighted in his evidence that the proximity of the Karetu River and groundwater beneath the site are key considerations/ constraints at the site, particularly because the river is used for domestic supply downstream. Additionally, the site contains wetlands which will be impacted by the proposal, as well as indigenous wildlife habitat and fauna. This raises questions as to the appropriateness of the site for the intended purpose of a managed landfill.

367. He further outlines that beyond siting, engineered containment is mitigation measure for limiting certain environmental impacts and agrees that the proposed liner system, equivalent to a Class 1 landfill liner, in principle, is appropriate. Mr Kortegast (**Appendix 6)**, as noted above, agrees that an engineered Class 1 liner system provides an appropriate level of environmental containment, but the overall conclusion of appropriateness is a function of the Waste Acceptance Criteria for the site.

368. Dr Massey and Mr Kortegast note that the expected lifetime of an engineered liner system is approximately 400 to 700 years. After this point, geologic containment (i.e. engineered clay layers or natural containment from the surrounding geology) might provide some degree of containment of potential discharges, hence the importance of siting requirements. In his view, and supported by Mr Kortegast, the limestone material underneath the site does not provide good geologic containment over time.

369. I also note that other critical features of the proposal, such as the leachate collection system and the underdrainage system have shorter expected lifetimes, in the order of 50-100 years, perhaps longer, if an appropriate maintenance schedule is applied.

370. Mr Kortegast addresses siting in his report by stating that the risks associated with siting factors need to be balanced with the overall level of risk associated with the types of materials that are proposed to be disposed of. He also states that limestone geology is not generally considered a suitable setting for a Type 1 or Type 2 landfill site due to the possible presence of high subgrade permeability associated with karst erosion.

371. Mr Anderson, in his geotechnical review (**Appendix 8**) addressed the matter of limestone porosity in response to submitters' concerns that acidic leachate that escapes from the containment system will contribute to the erosion of the limestone rock. He notes that the overall, porosity of the rock encountered at the site is relatively low compared to the overlying Kowai Conglomerates and the underlying Karetu Silica sand, which is reflected in the groundwater modelling prepared by the applicant. If the containment system failed in a catastrophic manner, and if ongoing large quantities of acidic leachate escaped the landfill, then the limestone rock could chemically weather due to dissolution. Such process would react and dissolve the alkaline calcium carbonate limestone, increasing rock porosity and permeability. Although I highlight that Ms Lochhead in her evidence (**Appendix 9)** states that she expects the leachate to be slightly alkaline based on the proposed WAC. Other pathways of contaminant mitigation are further explored in later sections of this report.

372. In relation to the liner, Dr Massey further states that the impact of calcium due largely to the location in a limestone quarry (from limestone rock below the liner, or from concrete waste or daily cover obtained from the quarry placed on top) on clay layers in the engineered containment could be of concern. Calcium can exchange with other interlayer ions in micaceous clays, such as sodium ions on the bentonite clay contained in the geosynthetic clay liner (GCL), which causes the clay particles to contract and the lay liner to become more permeable. This geochemical process could potentially decrease the effectiveness of the engineered containment over time.

    a. On this matter, Dr Massey defers to a potential design solution that could be implemented to mitigate this effect but cautions that it should be an important consideration that needs to be further addressed during the hearing.

373. He further states that due to the certainty of defects developing in the liner system over time, the engineered containment should be considered a medium-term mitigation measure (decades to centuries). Over time, the engineered containment will become less effective, and the probability of environmental effects will increase. The nature of those effects on the environment, particularly those related to leachate will be discussed in depths in a later section of this report. The magnitude of impacts will depend on the mechanisms of discharge, and the toxicity of the leachate.

374. Mr Kortegast provided further context in relation to liner faults and degradation, which were discussed in the earlier section. He associates the risks of liner failure with a lower risk than proposed by Dr Massey. However, these discrepancies can be related to the respective timescales that are being assigned to the risk of failure and resulting effects, i.e. varying interpretations of 'short timescale'.

375. Mr Kortegast has provided a helpful comparison with the Kate Valley municipal landfill site in relation to natural containment provided by the underlying geology. Kate Valley has a favourable underlying geology with hundreds of metres of low permeability soft sandstone and siltstone rock underneath the site. The site therefore has good natural containment and attenuation as a back up to the engineered liner system.

376. The proposal site for Whiterock landfill, in contrast, is not ideal in terms of geology as it is placed over moderately permeable underlying geology with short flow paths to

groundwater and surface water receptors. There is also the possibility of zones with high subgrade permeability due to fractures or erosion features (karst geology) which can compromise the effectiveness of the liner system. Natural containment cannot be relied upon to limit contaminant migration. However, he acknowledges that the proposal site offers some degree of basal containment due to the Berrydale Greensand layer. I highlight here that Dr Silver's evidence questions the permeability of this layer. While the applicant describes it as 'silty and massive', and implying that it forms a confining layer, the bore logs describe the unit as being 'calcareous sandstone'. This discrepancy warrants further questioning during the hearing.

377. Mr Kortegast considers that with effective control of the incoming waste streams and the proposed engineered mitigation (liner construction, minimisation of leachate head and leachate capture, stormwater management, capping, etc.) the site is suitable for disposal of what he considers mainly *low risk* materials, with a majority of deposited material consisting of Class 3 materials (managed fill) and relatively small proportions of contaminated soil meeting Type 1 landfill leachability criteria and otherwise Class 2 materials.

378. Dr Massey has taken a different interpretation based on the application and I note that this will need to be clarified with the applicant. He makes the argument that the site will likely be a receptor for contaminants on the higher end of the WAC, as facilities with Class 3 and 4 acceptance criteria are available closer to the target market. He considers that since much of the contamination that will be emplaced at the site is persistent and will not degrade over time (other than through the leaching of contaminants over an extended period), despite common misconceptions that it will, he considers that the hazard from discharges will not appreciably decrease over time, except perhaps as emplaced material is weathered on a geologic timescale (millions of years).

379. Therefore, aside from careful fit-for-purpose landfill site selection, selecting appropriate WAC, i.e. limiting what is placed at the site, is the primary mitigation measure to limit the environmental impacts of the proposed activity.

380. This is to be viewed in context of his statement that the engineered containment will not provide containment in perpetuity, and due to the proximity of sensitive receptors at the site, limiting what is placed at the site, is the primary mitigation measure to limit the short- and long-term environmental impacts of the proposed activity.

381. He also states that after filling ceases and the landfill is closed, he anticipates the actual or potential environmental effects of the proposed activity to continue in perpetuity, due to the persistent nature of many of the contaminants that will be emplaced at the site. He therefore has assessed the possibility of high probability effects (e.g. liner leakage and capture via site controls), as well as low probability, high consequence effects (e.g. discharges of highly contaminated material or leachate into the Karetu River).

382. In a concluding statement, Dr Massey notes that despite his recommendations regarding consent conditions, he considers that practically no amount of engineered mitigation or management via consent conditions could overcome the limitations of the site itself for the activities proposed. Substantially more protective WAC would alter this opinion. I note that the evidence of Mr Kortegast mirrors this, as the conclusion of his understanding that the site will be used predominantly for Class 3 waste stream with limited Class 1 material acceptance.

Submissions

383. A large number of submitters outlined the potential for the landfill design to fail and cause adverse effects on the surrounding environment including freshwater systems, soils and ecosystems in the catchment. This is particularly related to the lifetime of the engineered liner system and the degree of natural containment with reference to the underlying limestone geology. Submissions related to siting have been addressed by Dr Massey

and those related to landfill engineering and risk of failure are discussed in Mr Kortegast's evidence.

384. The submission of K J Young (SUB034383), WJ Averis (SUB034598), N Coughlan (SUB034639), J Hassall (SUB034678), J McCaleb (SUB034815), O Meijer (SUB034717), R Connelly (SUB034529) are but a few examples of those that record their opposition.

385. Several submissions (e.g. SUB034636, SUB034786. SUB034824) are in favour of the proposal, citing high disposal costs at alternative landfill sites and are in agreement that the site will meet engineering standards to ensure that environmental effects are avoided.

386. N Coughlan (SUB034639) has based his submission on his experience as an environmental remediation technologist, who has, as stated in his evidence, worked on some of the most contaminated sites in the world. In his evidence, he highlights references that discuss the eventual failure of an engineered liner system, leading to discharges into the environment.

387. The submission of White Rock Community Society Inc (SUB034741) cites that the applicant has used a 'pick and mix' approach to landfill design, which the submitter considers is not suitable. This is in relation to the proposed landfill class being a mix of classes, the lack of gas collection system and the consideration of siting constraints. I note that Dr Massey has also commented on the mixed class approach for the landfill, but has considered the proposal on the basis of the contaminants being emplaced at the site rather than classes within the WasteMINZ Guidelines (2023), that is to say, that as long as the engineered containment and siting matches the proposed WAC, the mitigation may be considered suitable.

388. Based on the Tonkin + Taylor review of the landfill design, I consider that an adequate design has been provided for the proposed waste types to be disposed of at the site. However, I concur with the submitters in that the adequate design relies on adequate installation and maintenance, and that the residual risks (i.e. those natural events that exceed the design parameters of the landfill) mean that the location of the landfill is not necessarily appropriate.

389. Dr Massey and Mr Kortegast have also commented on some deviations from the Class 1 landfill design, related to the unconventional sidewall design, using polyurea as a coating.

390. M Banks (SUB034475) and O Meijer (SUB034717) also raise concern regarding the mobilisation of leachate and the potential to erode/dissolve the underlying limestone, leading to groundwater pathways and development of sinkholes. These submissions indirectly raise the concern of adequate siting for the landfill. Ms Lochhead has addressed these concerns in her evidence (**Appendix 9**) and notes that the leachate is expected to be slightly alkaline and therefore, the development of new pathways in limestone from dissolution of limestone is unlikely to occur over the lifetime of the landfill. Other pathways for leachate to reach the surrounding environment are discussed in later sections of this report instead.

391. TransWaste Canterbury Ltd (SUB034870), in its submissions, has commented that careful site selection is necessary to protect the environment from potential adverse effects associated with the waste acceptance criteria for the site, as stated by Dr Massey in his review of the siting constraints. TransWaste Canterbury Ltd state that the applicant has not followed best practice site selection processes outlined in the WasteMINZ Guidelines.

392. For background, the applicant's AEE (Appendix T) contains information on the site selection process. I note that the financial viability of a site, incl. trucking distance to

Christchurch and size of the existing quarry and potential fill area were two of the five considerations. Therefore, site selection was restricted to existing quarries (the greater the size, the greater the points allocated). Further, of the five top results, two were discarded due to distance (financial viability) and two were discarded due to the current owners not wanting to pursue the proposal. While I cannot comment on the alignment of this site selection process with the WasteMINZ Guidelines, it appears that site selection was primarily based on economic considerations.

393. In addition to the general failure of the landfill, submitters have also raised concerns around the effects from natural hazards due to the location being adjacent to the river and within proximity to a fault line, as well as the likely increase of extreme weather events as a result of climate change. I note that these concerns are later addressed in my summary of the overall risk related to the landfill proposal.

394. Overall, the submitters have raised valid concerns, and I concur that even though the applicant has proposed mitigation measures in the form of engineering design, the location of the proposed landfill may not be entirely appropriate for the proposed waste acceptance criteria. This is addressed further in the next section of this report.

Summary and Recommendations

395. Overall, the technical review of the landfill design concluded that the applicant's proposed design is appropriate for a Class 3 landfill site. Aspects of the engineering design align with Class 1 landfill requirements, which potentially enables a limited range of waste not normally allowable for disposal at a Class 3 site.

396. Some recommendations have been included in the reviewer's report for amendments of conditions to ensure that the design is adequately reviewed and implemented and should the decision makers be of a mind to grant this application, inclusion of these recommendations should be required.

397. I note that Mr Kortegast has recommended that operational changes can be made to the design following peer review, for the aspects of the proposal that have not yet been described in detail. While I advocate for flexibility in consent conditions to allow adequate response to unforeseen circumstances, this flexibility has to be balanced with caution. I consider that the key aspects of the design have to be addressed during the hearing, particularly as they relate to environmental effects. A delegation of this review to the post-issue process (compliance driven reviews) incorporates uncertainty and unnecessary delay.

398. Mr Kortegast has outlined the expected performance of a well-constructed Class 1 engineered containment system and has also discussed the likely failure scenarios. I consider that in alignment with Mr Kortegast's report, the risk of failure from construction related issues, and inadequate design can be adequately mitigated with consideration of stringent design and review conditions. Recommendations to improve the currently proposed conditions have been touched on above and are further elaborated on in Mr Kortegast's report.

399. Landfill design also requires a thorough assessment of siting constraints with the goal of achieving a high level of containment, particularly because the engineered mitigation, as outlined by Dr Massey, is to be considered medium-term mitigation at best.

400. However, at the proposed site, a level of uncertainty will remain, which cannot be mitigated by the natural containment of the underlying geology. This uncertainty increases at longer timescales, due to the expected degradation of the landfill liner over time. There is also uncertainty regarding the proposed proportion of the waste streams, which in turn informs the scale and magnitude of potential adverse effects.

401. I consider that the location of the proposed fill includes a residual risk with potentially high consequence in case of a failure, either due to extreme events or unforeseen

events, or due to the inherent lifetime of the engineering solution in the landfill design, even if such a failure may have a low probability in the short term. The potential of a high consequence event can therefore not be avoided. In the absence of information on possible remediation options should such an event occur, I consider that the only available option is therefore mitigation in the form of selecting the appropriate waste acceptance criteria for the site, as highlighted by both, Dr Massey and Mr Kortegast.

Adverse Effects from Inadequate Management of Stormwater

402. Stormwater management will be required for the landfill establishment (construction works), and on an ongoing basis to manage sediment laden, and otherwise contaminated discharges from the site. I additionally note that the site currently lacks formal erosion and sediment control management and has had a history of unmanaged discharges to the Karetu River. The site needs substantial work to meet current regional plan stormwater requirements, even without the expansion and establishment of the landfill.

403. Construction related stormwater management will be required during the following activities:

    a. Construction of haul roads and access roads,

    b. Formation of the landfill base and installation of the liner system, leachate collection system and underdrainage system;

    c. Construction of stormwater ponds and other management infrastructure incl. the outfall; and

    d. Works within the riparian margin to establish bunding and vegetation establishment.

404. Ongoing operational management of stormwater will be from:

    a. Stockpile areas,

    b. Site facilities and buildings incl. the wheel wash;

    c. Permanent stormwater infrastructure, incl. the sediment retention ponds and decanting earth bunds;

    d. The haul road table drain to an existing grass lined channel; and

    e. Bunded and open stockpile areas.

405. Contaminants in stormwater will therefore consist of sediment, metals from roof runoff and other exposed metal surfaces, contaminants from roading, high pH from lime production, possibly elevated nitrogen from prior storage of urea, stormwater with higher temperatures due to storage in ponds, incl. low dissolved oxygen levels.

406. Tonkin + Taylor Ltd was engaged to review the stormwater management report (Appendix C) and proposed site operation. Peter Cochrane's expert evidence can be viewed in **Appendix 7** of this report.

407. In his evidence, Mr Cochrane acknowledges the applicant's intention to manage stormwater through the implementation of a range of measures as set out in the CRC's toolbox for erosion and sediment control. These measures have primarily been developed for earthwork construction sites and are normally temporary in nature. In the response to the s92 RFI, the applicant accepted that some elements of the design will require the use of more robust materials and construction techniques, and Mr Cochrane considers this to be a reasonable response. He also states that these elements will require specific design.

a. Regarding the design criteria, Mr Cochrane recommends that the operational phase of the landfill proposal should reference the design criteria as specified in the WasteMINZ Guidelines rather than those specified in the CRC Toolbox.

408. Mr Cochrane also comments that while little information is provided in the application and supporting documents, the proposed layout of key stormwater treatment and conveyance features seems reasonable given the site constraints.

409. I note that the applicant's Stormwater Management Report (Appendix C) includes several recommendations to improve stormwater management on site. Based on the description of the proposal in the application (Section 4.7.2), it appears that many of the recommended actions will only be implemented on an 'as needed', *ad hoc* basis in response to the Trigger and Action Response Plan (TARP). It appears as if the applicant acknowledges in advance that exceedances of trigger levels will occur, but implementation of the appropriate remediation action will only be considered when the action response plan demands it. In my opinion, this therefore acknowledges that the site does not currently operate and does not intend to operate in accordance with accepted stormwater management practices, until compliance action demands it.

a. Mr Cochrane also notes in his evidence that the proposed measures cover the main types of 'hygiene activities' that he expects for a site of this nature. In his experience, managing the quality of stormwater runoff from unsealed quarry processing areas is difficult without a high level of intervention and currently, no monitoring of stormwater is proposed that would demonstrate that the current activities are sufficient.

410. Instead, I consider it more appropriate and in accordance with acceptable practice to establish all necessary erosion and sediment control measures prior to any further development occurring on site, to provide assurance that sediment and stormwater is anticipated to be adequately managed, to acceptable requirements. The TARP can then be relied upon as an adaptive management tool to address unforeseen exceedances from the site relative to baseline monitoring. This should be clarified with the applicant during the hearing.

411. The applicant proposes the development of a Chemical Treatment Plan (CTP) in case water treatment chemicals are required. Mr Cochrane agrees with this approach. I note that the preparation of a chemical treatment pan post consent issue is standard practice on large scale construction developments, but they require prior certification by the CRC, as proposed by the applicant.

412. I note that the TARP suggests that the use of water treatment chemicals is not a default requirement but is only considered once trigger levels have been exceeded. I do not support this position. The risk of residual chemicals from the application of water treatment chemicals can be adequately managed, if dosing is undertaken correctly and therefore, the risk of a discharge of residual chemicals is lower than the risk from an unmanaged sediment discharge. The use of chemical treatment in case of exceedances of sediment loads should be implemented as soon as possible, and accordingly, the CTP should be required concurrently with the provision of the final Erosion and Sediment Control Plan (ESCP).

413. Some works are proposed to be undertaken within proximity to the wetlands, and the Karetu River, to enable the proposed remediation measures, such as the artificial wetland flow enhancement, or the discharge of the intercepted groundwater drainage. Details on the selection of the intended remediation option should be clarified and if earthworks are indeed required within 50 m of the wetland and the Karetu River, more information needs to be provided confirming how erosion and sediment controls will be installed in a manner that ensures suitable management.

414. In terms of the assessment of effects, Mr Cochrane notes that the applicant has provided little information regarding effects in the application. Instead, the applicant relies on standard stormwater control methods for earthworks sites, and controls on the generation of zinc, to achieve required stormwater quality parameters in the receiving environment. The identified gaps include:

    a. He notes that while the applicant has addressed which rule of the CLWRP may be breached, the rules deal with a wider range of effects that are not addressed in the application or supporting documents. Reliance on managing suspended sediment may thus not achieve other water quality outcomes.

    b. Specifically, the LWRP identifies temperature, pH, changes in visual clarity and colour, dissolved nitrogen and phosphorus concentrations and toxicant concentrations as relevant standards. Of those, the applicant has only addressed effects of suspended solids and zinc (as a toxicant).

    c. Mr Cochrane raises a concern with stormwater temperatures and dissolved oxygen concentrations (DO) after having been stored in the decanting earth bunds, and sediment retention ponds. The applicant has not addressed, nor provided any proposed mitigation in response to the s92 request for further information, that provides certainty that these adverse effects can be avoided.

    d. He also cites a concern about the potential for high pH level in the runoff from the quarry processing area as a result of the production and storage of lime. This material may result in very high pH levels (pH of 12.5) when discharged.

    e. Even with the removal of urea storage, it is likely that stormwater would still have elevated nitrogen levels in stormwater and these levels could warrant monitoring. Mr Cochrane notes that long-term monitoring may not be required once it can be sufficiently demonstrated that the residual effects of urea storage and handling have been sufficiently diminished.

    f. The applicant has identified the reasonable mixing zone in the Karetu River as 21.3 m from the point of discharge (section 4.3.2 of the application), but in the proposed conditions has cited 40 m for the Karetu River and the Eastern Boundary watercourse. Mr Cochrane recommends that this inconsistency is addressed at the hearing, and that the determination of a 40 m mixing zone is suitably justified by the applicant.

415. I note that due to the proximity of the site to the river and the topography of the site, there is a risk of inundation of part of the site with flood waters, resulting in the discharge of unmanaged and untreated sediment laden water. This needs to be appropriately factored into the design of the final erosion and sediment control plans.

    a. The applicant has indicated the repair of a bund on the true left of the river to prevent inundation within the Stormwater Management Report (**Appendix C** of the application). However, details on what these repairs would entail and the proposed level of service are not discussed.

    b. Mr Cochrane also highlights that the flood modelling is insufficient to assess whether access to the site would be restricted during periods of flooding either over the bridge site, or its approaches off-site at other points along Quarry Road. Mr Cochrane suggests further clarification on this matter. I also note that the applicant's proposed conditions, particularly those related to the TARP require access to the site during unfavourable conditions.

    c. Overall, Mr Cochrane concurs with the assessment of Mr Griffiths (**Appendix 10**), that inundation of the landfill itself would not be a risk as this part of the site is elevated. However, should it remain a concern, it is recommended to include

conditions that set minimum levels for construction of infrastructure to ensure that any vulnerable elements are above the modelled inundation levels.

416. In relation to the monitoring plan, he states the following:

    a. While the monitoring plan has trigger levels for pH, temperature and electrical conductivity, a range of other parameters are not proposed to be monitored. The applicant should set out reasons why these parameters have not been included.

    b. The monitoring plan only refers to discharges from Sediment Retention Ponds. However, there are also proposed discharges from decanting earth bunds and building roofs and these should be included in the monitoring plan.

    c. The monitoring plan is unclear on the frequency of stormwater monitoring.

    d. For the class of landfill proposed, the WasteMINZ Guidelines (2023) recommend continuous monitoring of the ponds prior to discharge. This is not proposed in the monitoring plan. The applicant should clarify whether it intends to undertake continuous monitoring or otherwise, why it has been discounted.

    e. With the proposed use of water treatment chemicals, monitoring should also include dissolved aluminium in treated stormwater, as some coagulants contain aluminium, and the specific type of treatment chemical to be used can only be determined after bench testing, in accordance with the standard requirements of a CTP, has been completed.

    f. Finally, the trigger action response plan does not appear to include an action to cease the discharge of stormwater when a trigger level is exceeded and remedial works or further investigations are being carried out. I also note that it is uncertain how long such investigation or remedial works may take, and therefore how long a discharge with exceedances above the trigger level would be permitted.

417. Mr Cochrane has reviewed the proposed consent conditions and has provided commentary on sections that require clarification in his report, including some that have already been raised above. Details are contained within Section 5 of his evidence. Additionally, I also note that:

    a. The proposed conditions (Appendix Y) include a condition that requires the preparation of the erosion and sediment control plan prior to commencement on site. This plan is due 10 working days prior to commencement of works. Given the uncertainties and discrepancies raised above, this review period should be extended to 20 working days to allow Council sufficient time for a thorough assessment.

    b. Noting the receiving environment, I consider that the implementation of correct and best practice erosion and sediment control measures to be critical. Therefore, the applicant's prepared erosion and sediment control plan should be certified by a Chartered Professional Engineer who has suitable experience with erosion and sediment control implementation and landfill design. The former is a common requirement on regional earthworks consents that are issued for sensitive receiving environments and the inclusion of experience in landfill design is a recommendation made by Mr Cochrane.

418. Overall, Mr Cochrane comments that the approach taken to stormwater management, and the level of design detail provided are reasonable for a site of this nature, but he expects that the detailed design of stormwater elements for the landfill would be subject to independent peer review prior to construction.

419. He also advises that it would be useful for the applicant to provide an explanation on how stormwater is to be managed, by addressing the matters outlined above and within

his evidence, to enable the Hearing Committee to satisfy itself that relevant surface water quality objectives set out in the CLWRP can indeed be met. This includes:

a. The effects of flooding on the limestone processing area, access to and from the site and potential effects of the repair of the site bund and construction of the bridge on upstream flood levels.

b. Confirmation of scope for each application, as it appears that the current wording of proposed conditions would exclude the management of stormwater from the landfill during its operational stage[10].

c. A review and alignment of the proposed consent conditions and the monitoring and response plan, which include the recommendations made in the evidence.

Submissions

420. Mr Cochrane addresses several submissions that have cited concerns with stormwater. The main concerns raised by submitters relates to the effects on surface water quality and the risk of flooding in combination with effects on surface water.

421. He agrees that several matters raised by submitters require further clarification at the hearing, including some that have already been outlined above. To address the concerns, he further recommends:

a. That a full design of stormwater management measures is submitted to an independent peer reviewer prior to being accepted by the CRC for construction and commencement of discharges. The current proposed conditions only seem to suggest a peer review of the haul road design and final capped surfaces and this requires clarification;

b. Submission of design details for the western boundary bund, incl. an assessment of effects of construction of the bund on flood levels and the proposed level of protection to address the flooding concerns;

c. Several submitters queried the risk of contamination of stormwater with landfill waste or leachate. The Stormwater Management Report (Appendix C) submitted by the applicant addresses measures to separate leachate water and stormwater, but it is recommended that specific performance standards on the capacity of the stormwater management system, and an improved level of testing of stormwater are incorporated into conditions. Mr Cochrane also recommends more certainty on actions to divert or halt the discharge of stormwater in the event of contamination.

Summary and Recommendations

422. I adopt Mr Cochrane's statements regarding the need to provide further information on the management of stormwater to achieve other water quality standards (temperature, pH, changes in visual clarity and colour, dissolved nitrogen and phosphorus concentrations and toxicant concentrations). Currently, the application and supporting documentation does not discuss measures and mitigation options to address the management of these contaminants.

423. Overall, the application has provided some indication of the management of stormwater on site. Mr Cochrane has highlighted some gaps in the provided information, which should be addressed during the hearing. I acknowledge that the intention to manage

[10] I note that this identified gap is likely due to the interpretation of the terms '*construction phase'* and '*operational phase*' stormwater. '*Construction phase stormwater'* within the CLWRP specifically addresses stormwater from exposed and unstabilised areas which arise from construction or demolition activities or the development of a building site. While '*stormwater*' means any runoff water that has been channelled, diverted, intensified or accelerated by human action. '*Operational phase'* is not a defined term but often used to separate construction phase from post-development stormwater.

erosion and sediment control via management plans that are submitted post-issue of a consent and while this is standard practice in many earthworks/ subdivision related proposals, deferring the details of the practices to a later date does not allow a full assessment of effects and the effectiveness of proposed mitigation. Therefore, the key components of the mitigation proposed, such as number and design of Sediment Retention Ponds and sizing of key infrastructure needs to be included as condition of consent. Smaller features, such as diversion drains, sediment fences and bunds can be adaptable and can be specified later via the certification of management plans.

424. I note that not all sediment will be contained, and this is not proposed by the applicant. The avoidance of sediment discharge is not feasible but minimisation to the greatest extent possible may be achieved with the implementation of best practice stormwater controls. However, at this stage, I cannot conclude on likely effects of stormwater discharges, as I am not certain on the mitigation proposed/ accepted by the applicant. The effects of this discharge on the receiving environment are further discussed in the evidence of Ms Tiernan **(Appendix 11),** in a later section of this report.

425. Equally, the effects of other contaminants contained within stormwater are discussed in Ms Tiernan's evidence.

426. If the decision makers are of a mind to grant this application, the following is recommended:

    a. Clarification of matters raised above and further detailed in the evidence of Mr Cochrane (**Appendix 7**); and

    b. The adoption of recommendations for the management of stormwater from the site as noted above and further detailed in the evidence of Mr Cochrane (**Appendix 7**); and

    c. Clear and concise consent conditions that require an acceptable and suitable stormwater system to be constructed *prior* to any earthworks commencing. Such a system must be designed to ensure bottom line water quantity and quality limits cannot be exceeded, even during large rainfall events.

    d. A focus on managing, monitoring and responding to stormwater practices on site, rather than implementing actions once exceedances have been observed in the receiving environment.

Adverse Effects during Landfill Post-Closure and Aftercare Period

Review of Proposed Landfill Post-Closure and Aftercare Period

427. In general terms, the applicant proposes capping the landfill post-closure to restrict rainfall infiltration into the landfill. The final landform will be revegetated to support final land uses such as light grazing or natural state vegetation.

428. The applicant states that contaminant concentrations are expected to generally decrease following capping and closure due to limited rainfall infiltration by the sealing of the landfill. In her s42A report, Ms Sally Lochhead (**Appendix 9**) countered this argument and stated that this may not be accurate. While the volume of leachate generation is expected to reduce due to the reduction of infiltration, the contaminant concentration of leachate may increase due to the reduced dilution factor. The effects on groundwater and surface water in relation to this are addressed later in this report.

429. I also note that the applicant has not provided a description on the expected leachate volumes post-closure. It is assumed that continued removal of leachate off site will be required in perpetuity, albeit at lower volumes if capping is undertaken appropriately.

However, this is not addressed. A review of the practicality of such continued management practices to mitigate environmental effects needs to be taken into account.

430. Dr Silver has also commented on post-capping leachate generation. He notes that while capping will reduce downward infiltration of water it will not eliminate it entirely. The sidewalls also lack the level of protection that the bottom of the landfill has, and cracks/ fractures may direct water into the landfill via the sidewalls. Additionally, it is unclear how the sub-base drainage system will function in the long-term. Flow obstructions could develop within the underdrainage, with a resulting higher water level within the landfill. The applicant has not addressed this specifically, and only stated that it is not believed that this will happen.

431. Mr Kortegast briefly addressed this in his evidence by describing the likely failure mechanisms and allocating a 50-100 year lifetime to the underdrainage and leachate collection system. Maintenance is therefore critical to ensure a prolonged service lifetime, but I note that the expected lifetime of the drainage systems is significantly shorter than that of the landfill liner in general (ca. 400-700 years).

432. As discussed in the *Description of the Proposed Activity* section, aftercare requirements are proposed to be incorporated into a Closure and Aftercare Plan (CAP), which will be submitted 5 years after commencement of the activity.

433. The request to view a draft version of this management plan was relayed as part of the s92 request for further information. However, the management plan was not submitted for assessment.

434. I consider that post-closure and after care should be considered as an integral part of this application, particularly considering that many of the contaminants emplaced at the site are considered to be 'forever chemicals'. That is, they will not biodegrade over time, and adequate management of the site is critical to ensure that the effects on the environment are suitably managed. The aftercare plan should also address aspects of the site, such as the maintenance of the underdrainage system and the maintenance of the leachate collection system, which are critical components of the engineered mitigation.

435. Regarding the practice of providing management plans to address potential effects at a later stage, I note that the Quality Planning website[11] states the following: "*critical actual or potential adverse effects need to be identified, appropriately avoided, remedied or mitigated with conditions before a decision to grant is made and not left to be addressed via a future management plan. Management plans should be limited to non-critical operational processes that lie behind a performance or operational standard*" and further: "*for subsequent management plans or some technical matter to be approved by a council representative after consent has been granted*" is "*unlawful because it leaves a decision to a subjective discretion*" after the consent is granted.

436. Mr Anderson (see **Appendix 8** of this report for more context) commented on the long-term capped landfill slope angles for assessing overall landfill stability. The applicant did not provide a response, other than stating that long term landfill sloped will be up to 3H:1V (approx. 18 degrees). Despite the request for stability analysis results for the landfill cap, a response was not provided. The reviewer therefore recommended that:

    a. The design of the final landfill cap will have to be such as to ensure that seepage water pressures are kept to a low level to prevent cap failures that could expose the underlying landfill materials. This will require consideration of the ability of the low permeability spoil proposed as the landfill cap to retain and hold water within it.

[11] Conditions Relating to Existing and Future Management Plans and Certification | Quality Planning

b. This will require incorporating specific drainage into the cap lining design.

437. Mr Anderson also stated that the landfill is assigned a nominal life of 100 years for the stability analyses and an importance level of 3, provided by the applicant (Appendix Q). The importance level 3 requires the use of ground motion parameters equivalent to a return period of 1000 years when assessing stability. During such design earthquake, the stability analysis indicates a movement of the landfill body of up to 180 mm along the leachate containment system. If that movement occurred, cracking of the containment system may occur and subsequent observations of the leachate and under lining drainage system for leachate flows would be required.

438. In general, Mr Kortegast, in his review, agrees that given the climate at the site, the proposed cap design is likely to be effective in managing long term infiltration and leachate generation rates can be expected to remain low over the long term.

439. Dr Massey has also recommended (**Appendix 4**) requiring a draft CAP for review as part of the consenting process, as aftercare is such an important aspect of mitigating medium-term to long-term environmental effects of the proposed activities. The above Tonkin + Taylor Ltd comments should therefore be addressed in advance of a substantive decision.

440. The proposed aftercare period by the applicant is ten years. Dr Massey considers this period to be inadequate. He cites problems with many of the closed landfills in Canterbury, which have ceased operation over the past 25-30 years, and which only just now present with problems. He considers that an aftercare period of 75-100 years is more reasonable, which allows time for problems to develop, for problems to be remedied and for the effectiveness of the remedies to be evaluated.

441. However, Dr Massey noted that irrespective of the specified aftercare period, the site will require aftercare in perpetuity and will likely become a public liability.

442. Overall, there is uncertainty around the appropriateness of the duration of the aftercare period, as noted in Dr Massey's evidence, and the ability to effectively manage the closed landfill for a prolonged period that may extend until the end of the century and beyond.

443. Further, there is a risk of post-closure and aftercare would be required at a much earlier point in time. Therefore, it may be appropriate to put more emphasis on these matters prior to the substantive decision on the application being made. I consider that it would be appropriate to require a draft post-closure and aftercare management plan prior to the substantive decision being made and, if the application is granted, require an updated plan to be submitted at 5-yearly intervals, taking into consideration the environment and state of the landfill at the time.

444. When asked about post closure in the s92 request, the applicant referred to the land use consent, which, in the application, is requested to have an enduring timeframe. Consequently, the applicant states that discharge permits will be renewed over time, to ensure that the CAP is given effect to.

445. I consider that this does not provide certainty that the landfill will not become a public liability in future. Dr Massey also states that the landfill will with certainty, at one point in time, will unavoidably become a public liability. Therefore, I consider it even more prudent that an assessment of the proposed CAP forms part of the consenting process, to ensure that appropriate measures are proposed and implemented.

446. In considering the above, the applicant has proposed entering into a bond agreement with both Councils to provide financial assurance to enable remediation and aftercare and in the event of default by the consent holder (addressed below).

447. As per the proposed bond conditions (Appendix Y of the application), the applicant states that the bond shall be released once the site is deemed to be closed by Council. This, however, does not address works in the event that the landfill operator or consent holder remains in charge of the site beyond the proposed aftercare period of 10 years.

Submissions

448. Many submissions cite a concern with post-closure management of the landfill, and the legacy that it will leave. Concerns include a default by the applicant (addressed separately below), and the potential of the site becoming a public liability at the end of the proposed aftercare period.

449. TransWaste Canterbury Ltd (SUB034870) agree that a consent duration of 20 years in alignment with the applicant's proposal is appropriate to provide certainty for the community. However, management plans, such as the proposed CAP, should be prepared and approved before commencement of the consent and not be used as a means in the future of 'amending' the activity as proposed.

450. N Coughlan (SUB034639) commented on the landfill economics and stated that '*landfills internalise short-term profits while externalising the long-term liabilities*' and since the primary model of waste management in New Zealand is still land based disposal, the adequate choice for such waste should be Kate Valley.

451. O Meijer (SUB034717) raised a concern over the bond release for the aftercare of the landfill, particularly in the event that a catastrophic failure occurs after the deemed closure of the site. He also considers that a bond amount needs to reflect the remediation costs in case of a significant liner rupture, among other things.

Summary and Recommendations

452. Overall, I consider that an assessment of the suitability of the aftercare programme, the proposed duration and aftercare monitoring cannot be made without siting the Closure and Aftercare Plan (CAP), as has been requested.

453. If the decision makers are of a mind to grant this application, the following is recommended:

    a. Provide a CAP prior to the substantive decision being made and, if the application is granted, require an updated plan to be submitted at 5-yearly intervals, taking into consideration the environment and state of the landfill at the time.

    b. A minimum aftercare period of 75-100 years post-closure, as recommended by Dr Massey.

    c. Bond conditions that reflect the above timeframes.

Adverse Effects from Default by the Consent Holder

454. It is worth considering that the landfill is managed by a private entity and therefore, default by the consent holder should be seen as a risk that the community will have to bear and therefore can be considered an effect that is within the jurisdiction of the Councils) under the RMA.

455. The applicant proposes a bond as part of the Proposed Conditions (Appendix Y). The bond is proposed to provide a financial assurance (bond) in favour of Council, to enable remediation and aftercare, in the event of default by the consent holder.

456. The bond would therefore address any remedial work required in the event of a default by the consent holder.

457. Dr Massey has recommended that a bond should be required to manage the first 100 years of the landfill operation. This timeframe will allow time for problems to develop, for problems to be remedied and for the effectiveness of the remedies to be evaluated.

458. Mr Kortegast notes that the applicant's proposed conditions related to the bond are consistent with conditions that have been issued to Kate Valley Landfill and current practice for private sector landfill developments in New Zealand and elsewhere. He supports the requirement for a bond.

Submissions

459. In its submission, the Rangiora Ashley Community Board (SUB034742) raised a concern about the facility being operated privately. Specifically, the submission raises that there is no guarantee that the current owners will ensure safe management and monitoring in times of economic stress, and unlike a public facility, there is no guarantee that the company will manage the environmental risks during and after the expiry of the consent.

460. In relation to the concern, many submissions, including the Rangiora Ashley Community Board (SUB034742) have noted that the Kate Valley Landfill has been developed and established in a cooperative model to ensure that the community has a state-of-the-art landfill at its disposal. They claim the landfill has another 100 years of capacity and therefore the submission considers that there is no need for a small landfill, which carries risk.

461. TransWaste Canterbury Ltd (SUB034870) in turn has commented that financial assurance in the form of a bond is deemed to be necessary in the event of default to provide security to the consent authority.

Summary and Recommendations

462. In summary, default by the consent holder should be carefully considered for the proposal. The complexity of the proposed mitigation as reflected by the proposed conditions, and the risks associated with not meeting it, would be carried by the surrounding and downstream environment, and likely by the general public.

463. If the decision makers are of a mind to grant this application, the following is recommended:

    a. An amended bond duration, which is reflective of the recommended aftercare period in order to address remedial works that extend beyond the date of official site closure, in case of default by the consent holder.

Summary and Overall Risk from Landfill Operation, incl. Containment Risk Failure;

464. The RMA recognises an assessment of 'risk' by virtue of the meaning of '*effect*' Section 3 of the RMA states that effects include future effects, and also, more importantly, *'any potential effects*' whether they are of high probability or of low probability but with a high potential impact. The above therefore references the common definition of risk, being a combination of probability of an event occurring and the consequence of the event.

465. What is not specifically addressed within the RMA is whether the risk, and therefore the combination of the probability and the consequence are tolerable to the community, but this has been subject to numerous submissions and the assessments provided above.

466. In considering the submissions and the tolerance for risk, and as such the potential risks of the proposal, it should be reviewed whether a risk has a low – moderate – or high probability of occurrence. The expert reviewers have noted the below on the natural hazard risks associated with the proposal:

a. Earthquakes: In his evidence (**Appendix 8**), Mr Anderson addresses the risk of failure from earthquakes at the site. He notes that movement of the small-scale faults within the quarry is unlikely during the lifetime of the landfill, and he therefore considers that a loss of contaminants caused by fault rupture of any containment is unlikely. However, he acknowledged that if local did occur on a fault that passes through the landfill, then damage could occur to the containment liner. Mr Anderson also assessed the applicant's assessment of earthquake risk and states, in summary, that information supports an acceptably low probability of direct fault rupture during the expected life of the landfill.

    i. Submitters have raised concerns with the potential of earthquake damage to the liner. Mr Anderson has addressed these concerns in his evidence, and concluded that "*the design of the liner will need to ensure that damage from downward movement on the steep quarry walls cannot occur*."

b. Flooding: In his memo (**Appendix 10)** Mr Griffiths confirms that the flood modelling presented by the applicant was suitable for identifying areas of the site that may be susceptible to flooding. In summary, while the processing areas may be subject to flooding in larger flood events (50-year recurrence interval or greater), with an additional elevation of 10 m, it is unlikely that the existing quarry and proposed landfill pit will be susceptible to flooding from the Karetu River. He further states that he raises no concerns regarding erosion of the landfill from the river, due to the underlying geology and its elevation relative to the river. I note that while numerous submissions (61 in total) have stated general concerns with flooding, incl. photographs of the Karetu River in flood (e.g. submission SUB034741 by the Rangiora Ashley Community Board), no specific evidence has been provided to suggest that the information and modelling undertaken by the applicant is inaccurate. The risk of flooding in combination with stormwater contamination has been addressed in an earlier section separately.

c. Fires: **Appendix 6** includes commentary from Mr Kortegast regarding the risk of fires on site. He notes that the two common sources of fire are due to waste acceptance criteria: hot waste (e.g. ashes), chemical reactions and battery shorts, or arson. Fires can usually be managed by conventional means and the risk of fire at this site will be lower as waste is proposed to be sorted.

d. Landslides and slope stability: **Appendix 8** includes the slope stability assessment review by Tonkin + Taylor. While it is primarily targeted to inform the District Council application, some sections are also relevant for the review of the landfill design and are therefore briefly addressed below:

    i. The impact of wedge failure mechanisms on the landfill design was a component of the s92 request for further information. The applicant states that wedge failures are relatively uncomment and of small volume, which will not significantly affect the overall stability of slopes. The wall liner detail can accommodate small-scale wedge failures. The expert review concurs with this view. It is also stated that unstable areas of limestone rock mass, if not removed, can be stabilised directly by using rock bolts and shotcrete to prevent post construction movements of the rock and damage to the liner, which addresses concerns raised by some submitters in relation to possible damage to the containment liner.

    ii. A further s92 question was in regard to the potential for existing landslides to move further and enter the quarry area. The reviewer agrees with the explanation provided by the applicant that this is

considered a low risk as the slope between the existing landslide and the quarry is '*considerably flatter*'.

iii. The applicant's proposed bench heights of 15 m max together with benches of 8 m minimum width are endorsed from a stability and safety perspective.

e. In summary, the proposed engineering solutions for the site (liner, underdrainage collection, leachate collection, post-closure, among others) were deemed suitable for the proposed waste acceptance criteria and class of landfill.

467. Overall, therefore, I consider that the risk of failure from natural hazards should be considered low, but could still lead to a high impact consequence, if for example, the landfill liner were to suffer catastrophic failure and release landfill leachate into the ground.

468. As noted earlier, an additional consideration should be given to timescales. The engineered mitigation is accepted to provide a reasonable level of mitigation for the operational phase of the landfill. These include the liner design, leachate collection system and groundwater underdrainage, and at a later stage, the proposed capping of the site. This has been confirmed in the landfill engineering review undertaken by Tonkin + Taylor Ltd.

469. However, the WasteMINZ Guidelines (2023) set out key criteria for siting a landfill. When considering a site's hydrogeological conditions for the type of landfill proposed, the conditions include:

a. Avoidance of high permeability underlying soil or fractured rock;

b. Avoidance of geothermal, karst areas of active faults;

c. Avoidance of effects on drinking water aquifers; and

d. Avoidance of water supply catchments, estuaries and wetlands.

470. As stated in the guidelines, the aim is to minimise the need for mitigation of impacts and ongoing management by selecting a site where, natural conditions protect environmental quality.

471. The Guidelines further state that "*Where an engineered liner system is used it should be recognised that this system will have a finite lifetime, so consideration needs to be made of the ability of the underlying geology to limit discharges from the site, so that significant adverse effects on the surrounding environment do not occur. Similarly, engineered management of surface water discharges will degrade over time*."

472. As summarised in earlier assessments, Dr Massey has referred to the engineered liner as a 'medium term' mitigation measure, and anticipates that sometime in the future, persistent contaminants will be released into the environment. Dr Silver has qualified those persistent contaminants in his evidence.

473. I therefore consider that this represents a high probability, potentially high impact scenario in the medium to long-term, which likely extends beyond the operational phase of the landfill. I note that the liner degradation on its own might not seem problematic, but in combination with the high groundwater table, and the reliance on underdrainage water management to prevent waste interception, the engineering mitigation cannot be relied upon in perpetuity.

474. A liner failure and degradation in the short term should conversely be seen as a low probability event, provided that suitably qualified persons implement, oversee and monitor the installation of the engineered mitigation measures.

475. The applicant has stated in the s92 RFI response that as the land use consent is sought for an indefinite period and has acknowledged that future consents will have to be sought

to manage the discharges from the site, and that appropriate measures are implemented for the aftercare of the site. I do not disagree with the applicant that discharges can be managed with future permissions sought by either the applicant or future landowner. However, as part of this argument, we should also consider the feasibility and practicality of remediating a potentially uncontained leachate discharge from a landfill. The applicant has not described any such remediation measures in the application.

476. Should the decision maker be of a mind to grant this proposal, several recommendations should be addressed regarding the landfill design and management of the site prior to a substantive decision. These have been listed in the earlier sections.

477. Finally, I consider that due to the location of the site in close proximity of the risk factors listed at the start of this section (water users, surface water, wetlands, high permeability underlying soil or fractured rock), when measured in the medium to long term, a high probability and potentially high consequence risk remains.

478. The nature and scale of the worst-case scenario effect are further outlined in the following sections of this report and therefore the above statements, related to risk tolerance, should be considered with the below information in mind.

Adverse Effects on the Groundwater Environment

479. In Appendix F, the applicant provides an assessment of the potential effects to the quantity and quality of groundwater and surface water associated with the groundwater take and discharge of leachate during the lifetime of the landfill (assumed as construction through to post closure). The Karetu River is identified as the ultimate receiving environment for groundwater that is not intercepted by the landfill underdrainage system at the site. Therefore, this section will commence with an assessment and review of the hydrogeological setting of the site, and the confirmed and assumed hydraulic connectivity between groundwater and surface water, and then consider the effects on groundwater quality. The next section of this report will then consider the resulting effects on surface water quality and ecology.

480. I also note again that the proposed landfill design includes the following:

    a. Collection of groundwater from the underdrainage system to drain towards a collection sump with water quality monitoring to allow discharge either to the Karetu River, to land and then into the Karetu River, or into the ground via a reinjection well, or alternatively to a leachate pond if quality is impacted; and

    b. Landfill leachate collection above the liner into a leachate pond, to be transported off site.

    c. Landfill capping: the applicant states that capping will contribute to a decrease in contaminant concentrations. This statement has been addressed elsewhere in this report.

<u>Hydrogeological Technical Review</u>

481. Due to the complex nature of the geological setting of the site, Tonkin + Taylor Ltd was engaged to review the hydrogeological setting and assumptions made of the site for the assessment of effects on groundwater. Ms Sally Lochhead's s24A report can be found in **Appendix 9** of this report.

482. In summary, Ms Lochhead states that the amount of data gathered on the groundwater levels provides a satisfactory level of understanding of the <u>groundwater environment and setting of the site</u>. She makes the following comments:

    a. The applicant's conclusion on the hydrology of the Karetu River follows a common understanding of the local hydrology based on publicly available data and the

assessment is a conservative approach in the absence of other published or field measurement data.

i. The hydrogeological conceptual model identifies that groundwater recharge is derived from rainfall and surface water (losing reaches of the Karetu River).

ii. The evidence of Ms Just (**Appendix 12**) provides further context on the hydrology of the river.

b. There are five hydrostratigraphic units at the site, as described in the evidence.

c. From a hydrogeological perspective, she considers that the proposed site has some technical constraints due to the underlying geology, as also highlighted by Mr Kortegast and Dr Massey.

483. In relation to the hydrogeological conceptual model presented in the application she states the following:

a. Groundwater levels in the lower Whiterock Limestone are shown to be similar to the upper Berrydale Greensand, which indicates a vertical downward flow, and a strong hydraulic gradient across the Berrydale Greensand.

b. While the Berrydale Greensand has been identified as the confining layer between the overlying more permeable Whiterock Limestone and the Kowai conglomerates and the underlying Karetu Silica Sands, no discussion has been provided on how groundwater moves between the overlying confining layer to the Karetu Silica Sand, despite the conceptual model indicating that the lower permeability Berrydale Greensand allows vertical groundwater flows through this stratus to reach the Karetu Silica Sands. This has also been raised by Dr Silver in his evidence (**Appendix 5**).

c. She considers that movement of groundwater through bedrock will occur through the primary porosity and secondary porosity (through defects such as fractures). Groundwater could flow preferentially through defects and travel time could be faster in those cases.

i. The application refers to a set of joints widely spaced at 30 – 40 m in the massive Whiterock Limestone but this has not been described in detail in Appendix F of the AEE. Ms Lochhead also describes her observations during the site visit of two vertical fractures in the exposed cut with the limestone in Stage 1 footprint, which she expects would extend into the underlying limestone formation.

ii. Overall, in her opinion, the limestone might not be extensively fractures but there is the potential for fractures to be present.

d. There is inference that synclinal hinge faults could form preferential pathways for groundwater flow and contribute to vertical anisotropy, i.e. non-uniformity of flow, falling towards the Karetu and Grey Rivers.

i. This was queried in the s92 request for further information. The applicant has stated, in response, that a groundwater divide is through to be present in the middle of the synclinal structure. The applicant stated that there is no evidence that groundwater flows to the east.

ii. Ms Lochhead noted that it is reasonable to infer that the groundwater flow is more or less parallel to the syncline but there remains uncertainty where the middle of the synclinal structure is located and whether some groundwater flows east in the same direction as the dip.

iii. Ms Lochhead has provided further context and notes that a review of the geological map indicates that the hinge of the syncline could be within 500 m to the east of the quarry, the general location of the Karetu catchment. She therefore agrees that it is reasonable to conclude that at the axis (hinge) of the syncline, groundwater likely flows along the dip of the syncline, towards the south.

484. Regarding the groundwater model presented in the application, Ms Lochhead states that:

a. The groundwater model was developed to assess the potential contaminant pathways. She states that, as also acknowledged by the applicant, the model is limited to the available geological and hydrogeological data from field investigations and literature.

i. The model uses single effective porosity values to represent each hydrostratigraphic unit. Particle tracking in Modpath has been used to demonstrate the potential contaminant flow direction, but the model could be overrepresenting groundwater travel times if fractures exist.

ii. Therefore, there could be leachate reaching the Karetu River earlier than modelled. However, it does not change the resulting leachate concentrations.

iii. The questions asked of the applicant as part of the s92 request for further information have been addressed.

b. The applicant assessed that a leachate breakout through a liner defect, not captured by the underdrainage system, would flow downwards and break through the Berrydale Greensand to flow into the Karetu Silica Sands after a period of 10 to 15 years, and ultimately into the Karetu River. Uncertainty analysis on the potential of contaminant flow paths has been completed by the applicant by adjusting the gradient of the groundwater flow and the model results show that the contaminant pathways remain toward the southwest and the Karetu River.

c. Ms Lochhead states that the answers to RFI question HYDRO-003 were incomplete, as the response provided by the applicant still raises questions regarding the fact that modelled groundwater in BH01 is 13-14 m higher than the recorded groundwater levels at BH01. Her assessment of this would be that higher groundwater levels mean a shorter contaminant pathway and a more conservative model. Further clarification is required to provide context on the implications of having a model based on elevated groundwater levels.

485. She has made the following comments in relation to the leachate leakage assessment provided by the applicant:

a. Movement of leachate would follow groundwater flow paths, through primary porosity and secondary porosity (fractures), if present. The presence of fractures would result in faster travel times of leachate into the receiving environment. Mobilisation through such defects cannot be discounted and the groundwater model has not specifically modelled fracture flow, but it does not change the calculated concentrations of expected leachate leakage in the receiving environment.

b. The applicant has provided an assessment of potential leakage based on scenarios, being a ‘good’ and ‘poor’ contact liner case. The assessment of the effects of leachate leakage discharge on the receiving environment has been based using existing Tonlyn landfill leachate quality data. This site is a Class 2 C+D waste landfill, similar to the current proposal. Ms Lochhead considers that

the use of this quality data is a reasonable approach in the absence of other available data.

c. She agrees that based on the design of the landfill and waste types, the assumed leakage volumes representing the three leakage scenarios are conservative leachate volumes, and references the assessment of Mr Kortegast. These are 474 L/day for Scenario 1, 776 L/day for Scenario 2 and 15 m^3/day for Scenario 3. Scenario 3 volumes are based on the daily average annual leachate volume.

486. Overall, she concludes that the amount of data gathered and reviewed provides a satisfactory level of understanding on the groundwater environment of the site. This is supported by a numerical model using a conservative approach to assess the effects of leachate leakage on the groundwater environment.

487. However, further clarification is sought on the hydrogeological model relating to:

a. Elevated groundwater levels around BH01 used in the numerical model.

b. Discrepancies in groundwater monitoring as stated in the TARP need to be clarified and addressed.

Review of Groundwater Effects

488. The evidence of Dr Matthew Silver, CRC, can be found in **Appendix 5** of this report. Dr Silver has first commented on the applicant's description of the environment, specifically the geology and aquifers at the site, which are an important consideration to determine likely effects from the proposal:

a. He agrees with the applicant that the rock at the site is likely to contain a 'double porosity', meaning that there are two possible pathways for water to travel through the limestone rock: through pore spaces, and through fractures and other macroscopic cavities. This is relevant, as water that some water that enters the subsurface will travel slowly through pore spaces and the remaining water could potentially move relatively quickly through fractures and other open spaces in rock.

b. The applicant describes fractures observed on site as 'hinge faulting' as part of synclinal structures present in the area. Dr Silver notes that vertical fractures could also be present at and below the level of the proposed landfill base, but this has not been investigated. Vertical fractures could form preferential flow paths for groundwater flow and contaminant transport.

c. He acknowledges that the applicant has referenced the presence of fractures but has not discussed it further within the application.

d. Dr Silver commented on the applicant's description on karst topography, which included, in Appendix F: "*Karst topography is evident, indicating subaerial exposure prior to the deposition of the overlying unit*." He also noted that karst features were visible during the site visit. The observations suggest that dissolution of the limestone has occurred to some degree, but the extent of it is unclear and has not been investigated further by the applicant. I do note however that Mr Anderson, in his geotechnical review (**Appendix 8**) concurs that there is no indication of further karstic features developing in the limestone rock around the quarry since it was tectonically uplifted from a shallow sea floor over the past approx. 2 million years.

e. There is inconsistency in the applicant's description of the Berrydale Greensand. While it is described as a confining layer based on findings in low permeability from slug tests in on-site wells, examination of the bore logs describes the unit as being a calcareous sandstone. This information is not consistent for assessing the potential of the layer to restrict water flow vertically and Dr Silver further notes that the Berrydale Greensand layer may also contain fractures with a potential for

forming preferential pathways for groundwater flow and thus contaminant transport.

489. Dr Silver notes that the groundwater flow model prepared by the applicant for evaluating the effects on groundwater assumes that the geologic material can be represented with a single porosity (i.e. groundwater flows through pore space only, no fractures are present). He queried this in the s92 request for further information, but the applicant stated that there was no intention to validate the model with monitoring results.

    a. Dr Silver has included the memorandum of Mark Trewartha, CRC, for the assessment of the groundwater flow model in the appendix of his evidence.

    b. Mr Trewartha states that the modelling has been taken as far as reasonably possible with existing limitations. He has not been able to review the model itself without access to the model files, but a full review of the model is not necessary, as the model is only considered a numerical representation of the hydrogeological setting based on existing (limited) data. He also noted that due to the lack of site data and model uncertainty, model results should not be used as stand-alone evidence in decision making.

    c. I note that the model was also used to generate the groundwater elevation contours and flow directions shown in Appendix F of the application.

    d. Dr Silver then states that in addition to the uncertainties already highlighted, the contours and flow directions also assume that the entire site is located west of a groundwater divide. He considers that uncertainties remain for the following reasons:

        i. There is a small chance that the groundwater divide is located under the site itself.

        ii. Single porosity is an assumption that makes it easier to conduct groundwater modelling but does not capture the full complexity of the site's groundwater flow system, which is likely to contain fractures in the limestone.

    e. Additionally, he reviewed the baseline groundwater monitoring, noting that the baseline results for the three monitoring wells screened within the Whiterock Limestone layer show alkaline pH levels and high concentrations of alkalinity (bicarbonate and carbonate anions) and calcium, which is indicative of some dissolution of limestone in deeper groundwater. This indicates a possibility of a dissolved channel existing along a (former) fracture, which could be a preferential flow path.

    f. The applicant has not conducted a tracer test, which would be considered best practice to identify and characterise preferential flow paths on site. The applicant has stated that transport times are likely too long at the site (multiple years) to undertake a meaningful tracer test. Dr Silver agrees with this statement but also notes that if preferential flow was present, transport times would be shorter. As no testing was conducted, the possibility of preferential flow paths remains and should be considered.

490. In terms of baseline groundwater quality, he states the following:

    a. Dr Silver commented on the lack of explanation provided for higher nitrate concentrations in one of the sampling bores. Possible explanations could include a localised source near the well, or fracture flow from offsite (fertiliser and/or urine on fields) towards the well.

    b. Baseline monitoring (two rounds) did not include BTEX compounds (benzene, toluene, ethylbenzene, total xylenes) or PFAS (per- and polyfluoroalkyl

substances). Low levels of these contaminants could be present in the area from atmospheric deposition, and it is in the best interest of the applicant to test for this with suitable detection limits.

491. Overall, Dr Silver states that he agrees with the applicant's general interpretation that groundwater likely flows to the Karetu River.

492. In terms of the assessment of effects, Dr Silver states the following:

Effects from Dewatering/ underdrainage system:

493. The proposed underdrainage system is a realistic way to lower groundwater levels at the site, given the hydrogeology. He considers that it is unlikely that the dewatering activity will deplete the Karetu River streamflow and it is unlikely that there will be an effect on the ability to take water from the closest registered offsite well, BW23/0559.

494. Ms Lochhead has made similar statements in her review of the water quantity effects.

Leachate contaminants

495. The applicant has used data (median concentrations) from the Tonlyn landfill site in Gisborne as a proxy for the current proposal. The used data shows that leachate should be expected in concentrations higher than the respective MAV in the Drinking Water Standards for: ammoniacal nitrogen, nitrate nitrogen (16 x MAV), arsenic (14 x MAV), chromium (3.5 x MAV), manganese (3.5 x MAV) and boron (2.5 x MAV).

496. Dr Silver notes that while these concentrations could be possible, waste streams may differ. The used concentrations are therefore only indications and a more accurate representation of the expected concentrations of leachate could be used, if the applicant clarified the expected proportion of waste streams to be accepted at the site.

497. This point has been raised in the evidence of Dr Massey and Mr Kortegast. If the site accepted high proportions of contaminated soils, there is a possibility that levels of heavy metals (particularly arsenic, chromium, lead and manganese) in leachate could be higher than those presented in Appendix F Table 5-3, which were used to estimate contaminant concentrations in the Karetu River under the presented leakage scenarios.

498. As the WAC does not include organic materials, the applicant considers that it is unlikely that the ammoniacal nitrogen level will occur. However, Dr Silver states that the proposed sidewall design, which includes spray-on polyurea releases ammoniacal nitrogen over time through degradation. Thus, potential for high ammoniacal nitrogen in leachate remains, and it is appropriate to therefore consider the concentrations in leachate from the Tonlyn landfill.

499. The only compound of the ones proposed that can chemically degrade is nitrate, under reducing conditions, which are not expected in the receiving environment. The remaining compounds are considered to be persistent, meaning that once the contaminants travel through the liner, they will never degrade.

500. The list of contaminants considered in Appendix F is incomplete. Dr Silver considers that additional contaminants that could be present in the leachate include per- and polyfluoroalkyl substances (PFAS); volatile organic compounds (VOCs) including benzene, toluene, ethylbenzene and xylenes (BTEX); pesticides; and polyaromatic hydrocarbons (PAHs). Of these, I consider that the combined concentrations of PFOS and PFHxS (both part of the PFAS chemical group) are likely to be present in leachate above the drinking water MAV, and possibly PFOA also. It is also likely that BTEX compounds will be present in leachate above the drinking water MAV, with the likely main source of BTEX compounds being contaminated soils.

501. The presence of these contaminants has been discussed in an earlier section of this report when considering the WAC for the site.

502. Dr Silver cites the levels found in Australian C+D landfill leachate as the following: PFOS 800 ng/L, PFHxS 1200 ng/L.

Leachate scenarios

503. I note that the applicant has made the assumption that there will be no dilution of contaminant concentrations in groundwater and thus Dr Silver has equally commented on the expected contaminant concentrations, as potentially encountered in the Karetu River, due to assumed direct hydrological connection between groundwater and the river.

504. Dr Silver agrees with the conclusions of the assessment of Scenarios 1 and 2 in Appendix F, which considered the liner leakage scenarios under normal operating conditions. The conclusion is that no exceedance of drinking water standards is to be expected (under the flow conditions for the Karetu River, assessed as 0.0246 m^3/s). This conclusion is limited to the contaminants that were considered in the assessment (Appendix F, Table 5-3), and has not considered the potential of PFAS being present in the discharge.

    a. Dr Silver indicates however that this conclusion is only valid if dilution is present, with the assumed mean annual low flow of 0.0246 m^3/s. During flow conditions that are lower than the flow used for the model input, exceedances may be expected with above-MAV levels of contaminants from the landfill.

    b. He also notes that based on the evidence of Mr Kortegast, the likely leachate rates are lower than calculated by the applicant. Adopting the lower rates, as proposed by Mr Kortegast would decrease the expected contaminant concentrations under Scenarios 1 and 2.

505. When assessing leakage Scenario 3, Dr Silver states that when using the calculation methodology described in Appendix F Section 5.2.4, and when adopting the PFAS concentrations from the Australian landfill site, he estimates that the combined PFOS and PFHxS concentrations in the Karetu River would be 14 ng/L (6 ng/L PFOS + 8 ng/L PFHxS), which is 20% of the MAV of 70 ng/L in the New Zealand Water Services Regulations 2022.

    a. The Australian National Health and Medical Research Council (NHMRC) has proposed a downward revision of the PFAS levels in the Australian Drinking Water Guidelines 2018, which were used for first including PFAS in the New Zealand Water Services Regulations in 2022. The same calculated Karetu River concentration for PFOS from the previous point (i.e., 6 ng/L) is above the draft guideline level of 4 ng/L recently proposed by the Australian NHMRC in consideration for revision of the Australian Drinking Water Guidelines. This would have implications if the New Zealand MAVs for PFAS were revised in the future.

    b. Dr Silver has also performed calculations similar to the applicant's calculations based on text descriptions in Appendix F. For arsenic, his result yields 1 µg/L, which is the same as the detection limit listed next to *Karetu River baseline concentrations*. The applicant did not calculate the likely arsenic concentrations within the application. Dr Silver considers it is more appropriate to list arsenic in Scenario 3 as approximately at the detection limit of 1 µg/L (i.e., 10% of the MAV of 10 µg/L).

    c. He raises a concern that the three scenarios for liner leakage do not address the potential impacts on the Karetu River after closure of the landfill, when leaks in the liner could become larger over time and thus pose a threat to water quality in the Karetu River for an indefinite amount of time post-closure. This mirrors the comments made by Ms Lochhead, stating that while leachate could be lower in

volume, it conversely may be higher in contaminant concentrations due to limited dilution from infiltration. The applicant has not addressed this in the assessments.

506. In summary, concentrations including (but not limited to) PFHxS, PFOS and arsenic could rise to within an order of magnitude of drinking water MAVs during a Scenario 3 leakage event. Risk factors for higher concentrations include the acceptance of high amounts of contaminated soils and/or C+D waste with high PFAS levels.

Post closure period

507. Dr Silver raises a concern that over time, there is a possibility that the underdrainage could become clogged with debris and/or chemical precipitates, diminishing the ability to prevent groundwater from rising into the waste. This has also been addressed by Mr Kortegast in his evidence.

508. If groundwater intercepts waste, even temporarily, additional leachate would be generated.

509. If the engineering control proposed for post-closure (i.e. capping) is not successful over the long term, leachate could migrate into groundwater and thus surface water. How much leachate would travel to the Karetu River will depend on the leakage mechanisms and the presence of preferential pathways.

510. Dr Silver highlights that the contaminants proposed for the site will either not chemically degrade (e.g. metals) or exhibit a range of chemical degradation behaviours. Nitrogen from the polyurea sidewall is likely to transform to ammonium and nitrate, which is persistent in the environment. BTEX compounds will also persist for a few decades post closure. Precursor PFAS (discussed in earlier sections of the report) will also be released over an extended period of time.

Submissions

511. As outlined in Dr Silver's evidence, numerous submitters have concerns regarding contamination of water from the placement of contaminated materials in the landfill. This also extends to the natural geology of the site, being limestone. Examples include the submissions of M Burridge (SUB034333), M Banks (SUB034475), J Armstrong (SUB034311), and L Knight (SUB034504).

512. He agrees with the statement made by N Coughlan (SUB034639) in his submission:

"*Aquifers themselves are so complex and difficult to accurately delineate that leachate contamination may only become apparent some distance from the source. Leachate does not necessarily migrate fan-like from a landfill, therefore even closely spaced monitoring wells may not enable detection of a narrow plume of leachate exiting the site.* "

513. Dr Silver considers that the above are valid concerns, especially the potential for flow both through fractures (in limestone, these can be enlarged over time by rainwater, which is acidic) and pore space (double porosity). Under the scenario of a large-scale failure of the landfill liner, an implication of the double porosity is that there could be one fraction of the leachate that reaches the Karetu River quickly (flow through fractures) and another fraction of the leachate that does not move quickly, remaining in the pore space within the limestone. This could potentially leave groundwater in the local area contaminated over a long, indefinite timeframe, in the scenario of large-scale liner failure.

514. Dr Silver addressed the submissions of M Fee (SUB034493) and O Meijer (SUB034717) showing pictures of what are reported to be calcite crystals at Whiterock Quarry. He considers that these are likely to be calcite that was redeposited after groundwater had

become oversaturated from dissolving limestone. This supports the view that there is limited evidence discussing limestone dissolution on site and if extensive, there is a risk of groundwater flow and contaminant transport along preferential pathways.

515. Dr Silver also comments on the submission made by N White (SUB034309) regarding the containment of 'forever chemicals' beyond the lifetime of the landfill liner and states that based on the assessments above, he considers this concern a reasonable and important one.

Summary and Recommendations

516. I adopt the overall conclusions reached by Dr Silver: Dr Silver considers that under normal operating conditions, the risk of impacts on the receiving groundwater environment is low. However, if there was a major failure of the liner, there is a high risk of contaminants travelling through groundwater to the Karetu River, potentially resulting in concentrations in the river above acceptable thresholds, incl. the New Zealand drinking water standards. The decision makers are referred to the next section of this report for further assessments of effects on the surface water environment, and later, the assessment on water users.

517. He reiterated in his summary that the applicant has acknowledged that some amount of leachate is expected to leak through the liner, so the overall question is not if but rather how much of the surrounding environment will be affected.

518. Dr Silver has included a list of recommendations in his evidence, incl. the reasoning for those.

519. In summary, recommendations include:

    a. Tracer testing to demonstrate monitoring well coverage and connectivity to the area where waste is proposed to be landfilled, if uncertainty is a key point in decision making.

    b. As proposed by the applicant, the installation of new groundwater monitoring wells outside the proposed landfill footprint, as detailed in Appendix M Revision B.

    c. He states that there is a gap in the monitoring well network to the east of the proposed landfill footprint. As there is the possibility of a flow path to the southeast, he recommends an additional monitoring well to the east of the footprint.

    d. Extensive monitoring of groundwater and surface water and at least a contingency for sampling of drinking water supplies;

    e. He recommends periodic review of the monitoring programme, e.g. once every three years, by a suitably qualified and experienced practitioner.

    f. He does not recommend the use of standard deviations and trends within the Trigger and Action Response Plan (TARP) framework, as proposed by the applicant. The applicant has not defined how trends would be calculated, which could allow for subjective application of criteria at a later time. He prefers the use of hard limits on all water quality measurements listed as 'Leachate Leakage Toxicants" as these would provide for unambiguous measures when determining compliance.

    g. He also states that trigger levels are based on human health drinking water guidance for compounds for which the MAVs are lower than ecological criteria (ANZG DGV ecological values).

    h. He does not recommend using the terms 'upgradient' and 'downgradient' for the monitoring wells, nor recommending any monitoring decisions on the basis of these designations, as these designations are educated guesses only based on limestone geology and there is potential for fracture flows.

i. He recommends a maintenance schedule, regular inspections and periodic evaluation of system performance of the underdrainage system. The main purpose is to consider any improvements that can be made to increase the longevity of the system after site closure to reduce the risk of the liner and waste becoming saturated.

520. In alignment with the evidence prepared by Dr Massey, he states the following:

a. He recommends that consent requirements for monitoring include a framework that maximises changes for early detection of leachate, but is also comprehensive enough to check for any effects of leachate that have slipped through the first monitoring points without being noticed. He recommends the following hierarchy (note details are to be viewed in **Appendix 5**):

i. Leachate and underdrainage sampling;

ii. Groundwater sampling;

iii. Surface water sampling; and

iv. Drinking water sampling

b. Further to leachate and groundwater sampling, he recommends operational standard sampling frequencies for the list of 'leachate leakage toxicants' in leachate monthly, and groundwater quarterly, rather than leachate quarterly and groundwater annually, as proposed in Appendix M.

c. He recommends lower reporting limits for PFAS of 10 ng/L for most compounds for leachate testing. However, he recommends that all testing of groundwater and surface water samples is done using best available detection limits for PFOA, PFHxS and PFOS, which are currently 0.1 – 1 ng/L.

521. If the decision makers are of a mind to grant this application, the above recommendations should be adopted as part of the mitigation package.

Adverse Effects on Surface Water Environment, incl. Ecology

522. SLR Consulting Ltd was engaged to review the proposal's effects on surface water quality and ecology on site. The report of Fleur Tiernan can be found in **Appendix 11** of this report.

523. Overall, Ms Tiernan has provided her assessment on the premise of an effectively operating landfill liner and leachate collection system. The assessment of the landfill design has been addressed earlier in this report.

Karetu River – Water Quality

524. Ms Tiernan states that the two occasions of water sampling carried out by the applicant are insufficient to characterise the water quality of the river.

525. Additionally, the upstream sample was not located sufficiently far upstream to represent background water quality. In Appendix G, the applicant acknowledges that the upstream water quality monitoring location was downstream of an unmanaged stormwater discharge from the existing quarry. Therefore, there is no true 'upstream' control site to enable comparison of the water quality against background water quality.

Karetu River – Ecological Value

526. Based on eDNA samples taken from two sites (upstream and downstream of the quarry site) on 17 January 2023, the applicant has identified five fish species from six replicate samples collected at each site. Ms Tiernan commented that six replicates are required

to identify 90% of the fish species present and sampling followed recommended best practice. The samples identified:

a. Longfin eel (*Anguilla dieffenbachii*) – at risk- declining
b. Shortfin eel (*Anguilla australis*) – not threatened
c. Upland bully (*Gobiomorphus breviceps*) – not threatened
d. Canterbury galaxias (*Galaxias vulgaris*) – at risk- declining
e. Brown trout (*Salmo trutta*) – introduced

527. She commented on the presence of the ford at the site: It is unlikely to be a barrier to eels, upland bullies and Canterbury galaxias populations.

528. Macroinvertebrate taxa were discerned from the eDNA sampling. Ms Tiernan notes that biotic indices were not reported in the Ecological Impact Assessment (Appendix G). The National Policy Statement for Freshwater Management 2020 stipulates the macroinvertebrate community index (MCI) and Quantitative MCI (QMCI) as biotic indices which categorise ecosystem health. Therefore, further information on macroinvertebrate communities was requested as part of the s92 request. However, this information was not provided. The response in the RFI states that no further samples were taken, as the river was not at baseflow during the winter months.

529. Ms Tiernan disagrees with this statement, as stable baseflow can occur year-round and are not limited to summer months. Further justification is provided in her evidence in **Appendix 11**.

530. Overall, she states that further information on the macroinvertebrate communities present in the Karetu River above and adjacent to the quarry would have been useful to allow further assessment of effects of the quarry and the proposal on aquatic communities.

531. Ms Tiernan used the taxon independent community index (TICI), which uses eDNA analyses, to characterise the ecological health of the river upstream and downstream of the site.

a. The average upstream TICI score is 104, which is classed as ‘good’ water quality.
b. The average downstream TICI score is 100, which is also classed as ‘good’ water quality.

532. These results, combined with the presence of four native fish species, are consistent with the applicant’s assessment of attributing an overall value of ‘very high’ to the Karetu River.

Eastern Boundary Watercourse – Water Quality

533. Ms Tiernan adopts the description of water quality made by the applicant and considers that the Eastern Watercourse likely reflects groundwater quality of the site.

Eastern Boundary Watercourse – Ecological Value

534. The applicant took a single replicate eDNA sample at two locations on 30 June 2023, and again in July 2024 following the request for further information issued by Council.

535. No fish were detected in either of the eDNA samples; but the fish parasite *Ichthyobodo* was detected. This is an obligate fish parasite, which must have a fish host or it will die within a short time period.

536. The original EcIA notes that the macroinvertebrate community is indicative of a degraded habitat, based on the single replicate eDNA sample taken in June 2023.

537. The results from the follow up eDNA, from July 2024, however, indicate a 'good' water quality and species detected included sensitive aquatic macroinvertebrates. A TICI score of 106 was calculated, indicating a 'good' water quality.

538. Therefore, the ecological values of the Eastern Boundary Watercourse are more accurately described as 'moderate'.

Assessment of Effects

539. The actual and potential effects of the proposal on surface water may arise from:

    a. Leachate leakage from under the landfill liner into the ground and subsequently into surface water;

    b. Uncontrolled sediment discharge from the site;

    c. Sediment discharge from erosion and sediment control infrastructure, such as the SRP; and

    d. Stream bank works and ford removal works.

540. Ms Tiernan has thus structured her report to address each of these potential sources of contamination in her assessment.

Leachate effects

541. Ms Tiernan has reviewed the applicant's modelled scenarios of liner leakage entering groundwater and subsequently surface water and has stated that:

    a. The model assumed no dilution or attenuation from groundwater prior to discharge to surface water. She considers that this is an appropriate assumption, due to the proximity of the river to the site and the due to the geology of the site.

    b. Background water quality data is essentially unknown as there is a lack of suitable upstream water quality data supplied with the application;

    c. The MALF used for the model (0.0246 m^3/s) has been estimated for the site but has not been verified with onsite gauging and measurements;

    d. Background concentrations of metals and metalloids are based on dissolved concentrations. However, she states that the ANZ guidelines recommend the use of total concentrations when applying the guidelines. As the ANZ guidelines are being used in the Trigger and Action Response Plan (TARP) in Appendix M to escalate between trigger levels, the guidelines should be followed.

    e. The applicant has chosen the right level of species protection (ANZ guidelines), being 95% for the Karetu River.

542. The modelled scenarios, as presented by the applicant, show that the leachate will not result in an exceedance of the 95% species protection guidelines for either the best-case or worst-case scenarios. However, in the event that 100% of the daily average annual leachate volumes were discharged to the river (catastrophic failure), the ammonia (NH4-N) and chromium ANZG 95% species protection guidelines would be exceeded. Boron and manganese are shown to have noticeable increases when compared with baseline Karetu River water quality.

543. The modelled Scenarios 1 and 2 show that ammonia concentrations will not exceed the 95%ile species protection guidelines. However, concentrations will increase nearly four-fold (<0.01 g/m^3 to 0.036 g/m^3) under Scenario 1 and more than six-fold (<0.01 g/m^3 to 0.065 g/m^3) under Scenario 2. She considers it probable that this increase, even under best case conditions, will persist for an extended period of time when river flows are at MALF or lower. This has not been modelled by the applicant. An increase in ammonia

concentrations for extended periods of time when flows are low (likely during summer) increases the risk of prolific algal growth in the river.

544. Arsenic concentrations have not been modelled downstream even though it is a contaminant of concern. Modelling should be carried out to determine the risk of exceeding both the ecological guidelines and the drinking water standards in the Karetu River. I note that Dr Silver has also addresses this in his evidence.

545. The complete liner failure scenario (Scenario 3) models the effects at a point in time but does not consider the effects of a continuous discharge of days, months or even years.

546. The complete failure scenario predicts ammonia and chromium concentrations to exceed their ANZG species protection guidelines by ca. 30%. The exceedance of a guideline value does not necessarily imply an effect, but the ANZG therefore recommends a 'multiple lines of evidence' approach when assessing risk. The DGV for both ammonia and chromium have a reliability of 'very high'. This reliability factor and the fact that the exceedances would likely persist for extended periods of time imply that adverse effects on aquatic ecology would be likely.

547. In relation to PFAS and related compounds, Ms Tiernan cites a literature review by PDP (2018) for the Ministry for the Environment (MfE) where concentrations of 1 – 10 µg/L were documented as having reproductive and developmental effects on fish species. Their review also reported that these chemicals bioaccumulate in organisms and bio-magnify up the food chain.

548. A draft guideline value (DGV) for PFOS in freshwaters was published in May 2023 (ANZG, 2023) and is currently under review following a draft consultation phase. Fish and invertebrates were found to be more sensitive than plants and algae. The draft DGVs for PFOS in freshwater are:

    a. 99% species protection = 0.0091 µg/L
    b. 95% species protection = 0.48 µg/L
    c. 90% a species protection = 2.7 µg/L
    d. 80% species protection = 17 µg/L

549. The guidelines state that as the DGVs do not account for the bioaccumulation of PFOS in aquatic food chains, the 99% species protection DGV should be used for slightly-to-moderately disturbed ecosystems.

550. Ms Tiernan states that the ANZG set guidelines for individual toxicants, but they do not consider cumulative effects from a mix of toxicants on the river and stream health. Therefore, the potential for cumulative effects from the operation of the landfill can be measured using stream health indices, such as the MCI, QMCI and TICI.

<u>Sediment effect</u>

551. The potential effects of sediment entering streams is presented in Ms Tiernan's evidence.

552. The applicant has not reported instream fine sediment in either Appendix G, nor in Appendix F of the application. The NPS-FM stipulates attribute bands according to the percentage of fine sediment cover on the stream bed. The Karetu River reach lies within the deposited sediment class 2 and the *National Bottom Line* for class 2 rivers for percentage of fine sediment cover is 29%.

553. The *National Bottom Line* for instream fine sediment is based on a monthly monitoring regime, regardless of weather and flow conditions.

554. Ms Tiernan notes that during the site visit in May 2024, visual observation of fine sediment cover at the ford crossing and up to 50 m downstream of the ford showed that the cover of fine sediment was close to 100%. Excessive sedimentation was also noted upstream.

555. Therefore, sedimentation is likely the contaminant of greatest concern with regard to adverse effects on the ecological health of the river. Effects of excessive sedimentation on water quality and ecology are described in her evidence.

556. The downstream extent of deposited fine sediment entering the river as a result of the site works is not known as no assessment has been undertaken nor is it possible to compare deposited fine sediment downstream of the site with deposited fine sediment upstream of the site.

557. Water clarity was not measured so it is not possible to quantify how the current operations are impacting water clarity, but fine sediment (<0.0625 mm) that remains in suspension will adversely impact water clarity. The site visit on 30 May 2024 showed that water clarity was adversely impacted due to site practices.

558. Suspended sediment is proposed to be discharged at a maximum concentration of 100g/m^3. In the FRI response, the applicant stated that modelled concentrations of total suspended solids in the Karetu River from the stormwater discharges when mass mixed with the Karetu River mean flow is 7.5g/m^3. In her evidence Ms Tiernan describes that when using the mass balance equation from *Warn and Brew* (1980), this is 12.08 g/m^3. This is four times the concentration upstream of the discharge.

    a. Clarification is therefore required to explain the difference in the downstream TSS concentration of 7.5 g/m^3 and the calculated TSS concentration of 12.08 g/m^3 as obtained from the equation.

    b. The calculation assumes that the river is at a mean flow in a 2mm/hr rainfall event, and that runoff is from a 3.98 ha catchment and the upstream TSS concentration is 3 g/m^3.

559. The above does not take into account any sensitivity analysis or worst-case scenarios during rainfall events and maximum rates of discharge from the site.

560. On this basis, in terms of river clarity, a four-fold increase in TSS concentrations as predicted for mean flow conditions, will result in a deterioration of visual clarity downstream. The proposed conditions by the applicant state that visual clarity shall not decrease by more than 20% 40 m downstream of the discharge point.

    a. Clarification is required to show how this will be achieved and why a distance of 40 m is proposed, rather than the mixing zone distance (i.e. 21.3 m).

561. The Stormwater Management Report (Appendix C) of the application includes the stormwater management report, which states that water treatment chemicals may be required within the SRP to achieve the proposed discharge limits for suspended solids. The details of the chemical treatment (type of chemical, application rates etc) have not been assessed.

562. Ms Tiernan also references sections of the application which describe the potential of flood waters (50-year ARI event or greater) to enter the site and transport fine sediment into the river. This has also not been further addressed by the application.

<u>Stream bank works and ford removal works</u>

563. The application included the proposal to reinstate a bund along the western boundary of the site to prevent flooding of the site. Some bunding is already present on site but is unstabilised and a source of sediment to the river.

564. Any works should ensure that no sediment laden water from the site is discharged directly into the river without prior treatment.

565. While planting the river bund will provide shading to the river, it should be considered remediation of the current situation as opposed to mitigation for future activities.

566. Ms Tiernan states that the removal of the ford and installation of the bridge will have long-term benefits on water quality and aquatic fauna. However, short term effects are to be expected, and she recommends that an ESCP, alongside a Freshwater Fauna Management Plan should be developed by a suitably qualified ecologist to ensure that effects are adequately managed.

567. I additionally note that while the applicant described that the removal of the ford would have little effect on instream biota and the concentration of total suspended solids, this statement was made in the context of the works being managed in the dry. The application (section 8.4.3) describes construction methodologies incl. works being undertaken outside of flowing water once temporary instream diversions have been established. No further detail is offered on the construction methodology in the AEE, nor the proposed conditions and I also note that the applicant did not apply for resource consent to undertake the diversions. In the absence of such application and resulting permissions, the works will have to be undertaken during the dry period, when the Karetu River also runs dry.

Discharge of Underdrainage Water

568. If clean ambient water collected by the drainage system is discharged to the Karetu River via a direct outfall or via a planted area of wetland species, the discharge is not anticipated to have an adverse effect on the water quality of the river.

Monitoring

569. In terms of monitoring, Ms Tiernan states that:

    a. While the applicant has proposed the use of the MCI and QMCI for monitoring purposes, Ms Tiernan also recommends the TICI, as it encompasses a wider range of aquatic taxa and is therefore potentially more sensitive in detecting adverse effects.

    b. She also recommends that baseline monitoring is undertaken at SW2 (40 m downstream of the proposed SRP outfall), in addition to the sites currently proposed by the applicant.

    c. For operational monitoring, she also recommends that monitoring is carried out twice a year, as proposed for baseline monitoring, and that SW2 is included.

    d. The proposed trigger level for MCI and QMCI in Appendix M is considered high, as it allows for a 20% decrease (downstream, and/or baseline) of MCI and QMCI scores. A 20% decrease would indicate a deterioration in stream health and habitat quality. Instead, a change of 10 points (for MCI) is considered within a range for normal variation. Based on the TICI results, an MCI score of 110 could be attributed to stream health upstream. A reduction of 20% at the downstream location would result in a MCI score of 88, which puts it below the national bottom line, as described by the NPS-FM (bottom line being 90).

    e. The proposed quorer method (SAM4) is a suitable method to measure instream deposited fine sediment.

    f. Ms Tiernan recommends that sample location SW2 is included for both baseline and operational monitoring. The frequency of twice yearly is an appropriate frequency.

g. She recommends that the total fraction of trace metals and metalloids in the river samples should be measured and reported on, to reflect the ANZ guidelines.

h. The applicant proposes bi-monthly baseline monitoring for 12 months prior to landfilling commencing. Ms Tiernan notes that monthly monitoring is more appropriate to characterise water quality of the river, due to the short duration of sample collection (12 months) and the importance of the baseline data. Additionally, all leachate leakage indicators, nutrients and trace metals and metalloids should be included. Quarterly monitoring of organics is considered appropriate.

i. PFAS and PFOS should be added to the parameters being sampled for baseline monitoring, recommended as monthly monitoring, and for operational monitoring, proposed as quarterly monitoring.

j. Water clarity should be added to the parameters being monitored for the baseline monitoring (recommended monthly) and the operational monitoring (quarterly).

k. For the proposed dry weather event sampling (two events annually), total suspended solids and turbidity should be included in the suite of parameters being analysed.

570. Ms Tiernan has the following comments to make about the proposed mitigation measures:

a. She agrees with the mitigation and monitoring proposed in section 6.5 of Appendix G.

b. She does not consider that the presence of the ford has a negative impact currently but states that its remediation as part of the proposal will be of benefit to stream health by enhancing connectivity between upstream and downstream and reducing sediment input from vehicle movements at this location.

c. Mitigation also references planting along the left bank of the Karetu River. However, it is noted in the application that "*Where a genuine conflict arises between the location of the site security fence and the requirement to achieve an average of 2-3m, the security of the site shall take precedence*." She considers that this section of the river is most at risk from adverse effects from the site due to the proximity of the quarry site and therefore this statement is problematic.

d. While the proposal includes planting a 10 m width on the left bank of the Karetu River, and this will have positive effects on bank stability, instream ecology and habitat, consideration should be given to planting a wider margin in lieu of the fact that planting on only one bank is proposed.

e. The proposed planting of both sides of the Eastern Boundary Watercourse with indigenous vegetation is considered to be appropriate to buffer the stream from effects of the proposal and to enhance the existing values of the watercourse into the future.

f. Whilst the planting, as proposed, will have positive benefits, input of fine sediment to the river from the site is still considered a high risk to the aquatic environment, and as such any benefits may be negated if sediment input from the site is not adequately managed and sediment loading to the river reduced. Stormwater management on site has been discussed separately in an earlier section of this report.

g. Ms Tiernan recommends that details regarding how the proposed riparian planting of the Karetu River and Eastern Boundary Watercourse will be protected into perpetuity should be provided.

571. Overall, she states, that river monitoring as proposed with the additional recommendations made above, should be adequate to detect and quantify any potential adverse effects on surface water quality and ecology from landfill liner leakage. However, the Tier 1 responses for surface water quality in dry weather need to be further reviewed.

Submissions

572. Many submitters have raised concerns regarding the proposal affecting the Karetu River due to liner leakage, liner failure, stormwater discharges, and from flood waters transporting sediment and contaminants into the river. Concerns also include effects on amenity values arising from degraded water quality. The most commonly cited concern were related to the following key words: aquatic ecology, surface water quality, water use and hydrology, general water quality, and stormwater.

573. Ms Tiernan addressed submissions that state that the assessment of effects from stormwater discharges was insufficient. Ms Tiernan agrees with those concerns and considers that the application does not contain sufficient information regarding how the SRP discharge, and the background TSS concentrations in different rainfall events and during discharge events will be managed. The submission and response mirrors earlier statements I made regarding the lack of commitment to the implementation of best practice measures as identified in the Stormwater Management Report, and a need for certification of final ESC measures by a Chartered Professional Engineer, as also recommended by Mr Cochrane.

574. Other submitters raise concerns regarding the risk of contaminants entering the river from the quarry during flood events. While the quarry and landfill pit are not at immediate risk of flooding, the processing areas will be inundated in sufficiently large flood events, as shown by the modelling presented by the applicant. There is also insufficient detail to demonstrate that the reinstatement of the bund along the river will perform across design storm events of concern. This concern has also been raised by Mr Cochrane.

Summary and Recommendations

575. In her summary, Ms Tiernan states that the potential adverse effects from landfill leachate are contingent on the landfill liner and leachate collection system operating as designed.

576. Effects are also contingent on preferential flow paths and whether these would direct leachate to the river in case of a liner breach. Dr Silver addressed this in his evidence and recommended tracer testing to rule out preferential pathways that could lead from the landfill base into hydraulically connected groundwater and thus surface water.

577. The modelled effects as presented in the application rely on the accuracy of estimating river flows and volumes of leachate from the site. Therefore, there is a possibility that modelled effects have been underestimated. Ms Just in her memo specifically states that the numbers used by the applicant to account for the flows in the Karetu River (NIWA estimates) are overestimates of the actual flow regime of the Karetu River.

578. However, the proposed river monitoring, together with the recommendations made, should be adequate to detect and quantify any potential adverse effects from leachate discharge from the site on water quality and ecology.

579. The adverse effects associated with sediment discharges are contingent on stormwater being managed adequately and concerns remain about this aspect of the proposal. The proximity of the river poses a challenge and flood flows will potentially inundate the lower area of the site, transporting fine sediment into the river. A bund has already been built to protect the site, however, there are no details as to the effectiveness of this bund in

dealing with a storm event. Recommendation to address stormwater management have been addressed in a separate section of this report and are presented by Mr Cochrane.

580. Monitoring of deposited fine sediment, as proposed in the TARP (Appendix M of the application) together with additional recommendations, should be adequate to measure potential effects on deposited instream sediment. The management of stormwater and sediment-laden water and the remaining uncertainties have been addressed separately in an earlier section of the report. I consider that in theory, the site could be adequately engineered and set up to manage sediment laden discharges appropriately.

581. In relation to leachate discharge, overall, I conclude that provided that the recommendations are adopted, and the activity is undertaken in accordance with the measures proposed, the effects of the proposal on the surface water environment, in the short term, meaning during the operational phase of the landfill under best practice conditions, are acceptable.

582. As highlighted by Ms Tiernan, this assessment is contingent on the engineered mitigation and the accuracy of the leakage modelling. Neither of those two factors can be addressed with certainty as the engineered liner has a limited lifetime (i.e. it is not a question if but rather when leakage will occur) and there is insufficient information available to accurately describe and thus model the hydrology of the Karetu River.

583. Therefore, uncertainty remains about the effects on the surface water environment either in the long term (with high probability) or in the short term (with low probability).

Adverse Effects on Water Quantity and Allocation

584. The adverse effects of the proposed activities on surface water quantity and the allocation status of the catchment are assessed due to the proposed water take from the infiltration gallery adjacent to the weighbridge on the site.

585. The applicant also proposes the take of groundwater from beneath the landfill liner via subdrainage design. However, as this is proposed to be undertaken as a permitted activity, and as volumes meet the permitted activity requirements, this is not further addressed in terms of the total water allocation within the catchment.

586. I note that the water take is still relevant in terms of the effects on the wetlands on site, and this has been separately addressed under a later section of this report.

587. The applicant has assessed that up to $2m^3$ of water will be abstracted from an existing gallery per day, in accordance with the CLWRP permitted activity Rule 5.111 volume. The permitted rate of abstraction is 0.5 L/s.

588. As stated in an earlier section of this report, the gallery is located adjacent to the weighbridge and as stated in communication from the applicant, has a horizontal perforated pipework buried below the riverbed.

589. In accordance with the CLWRP definitions, the take is therefore assessed as a groundwater take under Rule 5.114, with direct hydraulic connection to surface water. The rule breach and requirement for consent results out of the location of the take, which is <20 m from the surface water body. For completeness, I have therefore assessed the activity as follows:

590. As stated above, the CLWRP (Rule 5.111) provides for a permitted activity pathway for surface water takes. I consider that the application of a permitted baseline is appropriate in this instance, as the water take will effectively be from the Karetu River.

591. As such, I consider that a review of the conditions related to a surface water take is appropriate. A water take up to 2 m^3 as proposed by the applicant would therefore also be required to:

a. Prevent fish from entering the gallery; and

b. Adhere to minimum flow conditions; incl. a cease of take other than for a person's reasonable domestic need and stockwater during low flow conditions;

592. The applicant has summarised that water from the infiltration gallery will be for:

a. Onsite water supply for toilets, hand basins and drinking water;

b. Rural stock water supply to a neighbouring property;

c. Supply to plant and operation buildings;

d. Supplementation of dust suppression water.

593. The low flow trigger point for the Karetu River is managed via the Ashley River/ Rakahuri allocation zone and the minimum flow site is located at the Ashley Gorge.

594. In her evidence, Ms Lucy Just (**Appendix 12**) has outlined the allocation status of the Ashley/Rakahuri River as of September 2024 as follows:

Table 4. Allocation status of Ashley/ Rakahuri as of September 2024

Ashley River/Rakahuri	Current allocation status	Allocation limit (L/s) as per LWRP	Minimum flow at Gorge (L/s)
A Block	No A block allocation water available	700	seasonally variable with changes over years
B Block	117 L/s available in May to August only	135	3200 L/s Jan – Jul 4700 L/s Aug – Nov 3700 L/s Dec
C Block	403 L/s available September to April 478 l/s available May to August only	494	6000 L/s

595. In accordance with the above, B Block water is available between May and August only. Otherwise, C Block water is accessible and the only available water during the summer months.

596. Water in the C block will only be available when flows are greater than 6 m^3/s and therefore is less reliable than A or B block water.

597. Therefore, in order to apply the permitted baseline, the take of water from the infiltration gallery for activities other than domestic and stockwater purposes must cease when minimum flow conditions are not being met. The activities that must cease are therefore use of water for processing and operational buildings, water for dust suppression or any other ancillary industrial activity. The take and use of water for these activities is possible once the C Block minimum flow is recorded at the Ashley Gorge. I consider that the water take for wash basins, toilets and drinking water is covered by the exclusion stipulated in Rule 5.111, being 'reasonable domestic use'.

598. Ms Just has provided comments regarding the proposed water take by the applicant, in particular for dust control management during the summer season. She notes that for a 10 hour workday, and a requirement for 200 m^3 of water (based on 1 L/m^2/hour, and a dust cart with a 20 m^3 capacity per hour, therefore treating 2 ha), the Karetu catchment

area and its permitted activity water take (up to 2 m^3/day) would not be sufficient on its own to support this type of operation during hot and dry periods. However, I acknowledge that the applicant does not propose to source water exclusively from the river for dust suppression.

599. I note that the applicant has not provided installation and design details related to the infiltration gallery due to the age of the gallery. As a result, I am unable to comment on the effectiveness of any fish screening, particularly as required in accordance with CLWRP Schedule 2. It is assumed that a buried gallery with substrate on top of the screen provides some measure of fish exclusion.

600. I also note that the relevant rule of the plan for the water take (5.114) restricts the water take to a max. of 100 m^3 per day per property. This volume is therefore made up of the anticipated sub-liner drainage water (up to 32 m^3/day) and the water take via the infiltration gallery (up to 2 m^3 per day), which leaves sufficient volumes for other takes on the property.

601. Accordingly, the applicant has to pay attention to the rate of take per property, which may not exceed 5 L/s. The proposed permitted activity drainage water take, on average would equate to 0.37 L/s, which leaves sufficient allowances for the take from the gallery, and other takes.

602. Overall, I consider that as long as the applicant ceases water takes other than for domestic or stock water purposes during low flow conditions, any adverse effects on surface water quantity and allocation are managed adequately. The proposed volume and rate of take is in accordance with the permitted activity threshold anticipated in the plan and therefore the effects are considered less than minor.

Adverse Effects on Groundwater Users and Surface Water Users

603. There are at least 122 submissions that oppose the proposal that mentioned the key words ‘drinking water’. Of those, several submitters confirmed abstraction of water from the Karetu River for domestic and stock water supply, downstream of the proposed fill site.

604. As described in an earlier section of this report, there is currently no available reticulated drinking water supply, or stock water supply in the Whiterock area. Water is sourced from rivers, groundwater or rainwater within the local community. However, only very few abstraction points are registered in the CRC’s database.

605. The potential adverse effects of the proposal on groundwater and ultimately surface water users are twofold. An adverse effect may arise due to adverse effects on water quality, which in turn may render freshwater unsuitable for human or animal consumption. Additionally, the applicant proposes the use of water from the river for the purposes of dust mitigation, among other uses, which therefore may reduce the availability of water for other purposes, if not managed adequately.

Water quality

606. The assessments of adverse effects on surface water quality and groundwater quality undertaken by SLR Consulting (**Appendix 11**) and the CRC (**Appendix 5**) are adopted in this section.

607. Overall, the expert reviews agreed with the applicant’s interpretation that groundwater beneath the site likely drains towards the Karetu River, being the ultimate receiving environment of any potential leachate discharges.

608. The applicant's assessment concluded that the adverse effects on water quality from the proposal are less than minor and therefore, the adverse effects on water users are also less than minor.

609. The applicant also concluded that based on modelling of worst-case scenario leachate loss through a liner fault, in combination with dilution in the Karetu River, would not lead to any exceedances of the New Zealand Drinking Water Standards 2022.

610. I note that Ms Just (**Appendix 12**) disagrees with the assumptions made by the applicant regarding the flows of the Karetu River, incl. conclusions reached regarding the MALF, and described reaches with gains and losses of water from the river. She also described a trend in low flow records, showing a decreasing trend for the annual mean and median stream flow, and likely, the annual low flow for the 50-year record. These factors are important for the applicant's modelled concentrations of contaminants in the Karetu River.

611. Dr Silver has identified that BW23/0559, located about 300 m downstream of the proposed landfill site and less than 30 m from the Karetu River is likely to draw river water due to its shallow depths and likely hydraulic connection to the Karetu River.

612. There are three additional wells: BW23/0549 (3.1 km), BW23/0677 (3.9 km) and BW23/0783 (4.2 km), screened in gravels based on bore logs. Those gravels could either be the Kowai Formation or younger river gravels. If there were a component of groundwater flow to the south-southeast, under a scenario of major liner failure, there could be a very low risk to these domestic wells.

613. Dr Silver, in his evidence, made comments regarding the modelled concentrations of contaminants in the Karetu River, as a function of expected concentrations in groundwater, for Scenarios 1 and 2. He agrees that under these two scenarios, no exceedance of the Water Services Regulations 2022 drinking water standards (Maximum Acceptable Values) is to be expected. However, this includes a possibility of above-MAV levels of contaminants from the landfill, at times when flow in the river is critically low, also subject to amount of leachate leakage and offsite migration pathway.

614. For Scenario 3, his calculations show elevated concentrations of PFAS concentrations. If New Zealand follows the recommendations by the Australian National Health and Medical Research Council (NHMRC) for a downward revision of the PFAS levels in the Australian Drinking Water Guidelines 2018, the concentrations of PFAS would be above the MAV guidance level.

    a. Dr Silver has included supplementary information on per-and polyfluoroalkyl substances (PFSA), incl. the development of drinking water guideline levels in the appendix of his evidence (**Appendix 5**).

615. Arsenic is also expected to be present at 10 % of the MAV (10 µg/L).

616. Ms Tiernan notes, in agreement with Dr Silver, Mr Kortegast and Dr Massey, that effects will be highly dependent on the waste acceptance criteria, contaminants present and operational controls, which will in turn determine the toxicity and volume of leachate. Uncertainty around the potential contaminants present and their persistence in the environment needs to be addressed by the applicant to ensure the long-term security of drinking water supplies downstream of the site.

Water quantity

617. I have provided a description of the water flows within the Karetu River in the prior section of this report.

618. As noted earlier, the Ashley River/ Rakahuri surface water allocation block is fully allocated within the 'A' Block and only limited water is available for a 'B' block take.

619. While the CLWRP provides for a permitted activity pathway for water abstraction from the Karetu River. The gallery is considered under the groundwater take rules of the CLWRP and since the location of the gallery is <20 m of the Karetu River, a resource consent is required for the take and use of water.

620. Ms Just has concluded that the proposed water take will likely reduce the availability of supply for downstream water users. However, I consider that the effects of the proposed water take (up to 2 m^3/d and at a rate not exceeding 0.5 L/s) are sufficiently accounted for in the permitted activity rules of the CLWRP, provided that the applicant ceases industrial/ commercial water takes during low flow conditions.

Submissions

621. The submission of White Rock Community Incorporated (SUB034741) notes that at least 13 local families use the Karetu River, or water from shallow bores and groundwater, as shown in Figure 16 below. This has been confirmed with the submissions of some of those families, as listed below.

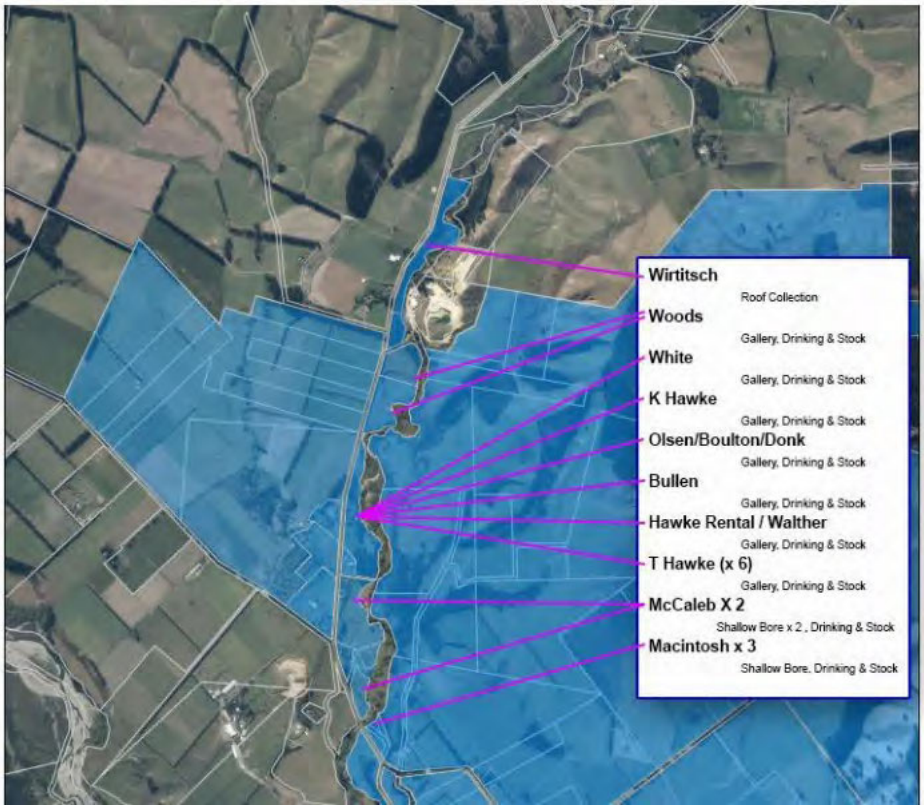


Figure 16: Land owners who use river water or shallow groundwater for domestic and stock supply, as presented in SUB034741

622. For example, D Hawke (SUB034462), T Hawke (SUB034463), K Hawke (SUB034624) and M Hawke (SUB034811), mention that the domestic water take for 4 households, the 200 ha farm, and stock water for 2800 stock units is sourced from the Karetu River, 900 m downstream of the proposed fill site. They have expressed concern with the proposal, citing a risk of contamination of the water source. The family has historically sourced water from the river and the grandchildren on the property are the 6th generation of the family.

623. Equally, residents CJ Olson (SUB034685) and J Olson (SUB034691), 4th generation residents, source their household and drinking water from the Karetu River. They equally express a concern with contamination of the water source, in light of the life expectancy of the proposed liner.

624. The Mackintosh family, incl. DS Mackintosh (SUB034805) and T Mackintosh (SUB034800), 5th generation residents, also source domestic and stock water from the Karetu River. It is noted in the submission that this is indeed the only source of water for the family. Water has been sourced from the river within the LINZ land parcel since the 1970ies.

625. R Wirtitsch (SUB034412), directly adjacent to the proposal site, uses rain and river water from the Karetu as a domestic source of water. The McCaleb family (submission of B McCaleb SUB034669) also mentions the Karetu River as a source for domestic and stock use.

626. I consider that Ms Tiernan and Dr Silver have sufficiently addressed the above in their evidence. There is agreement that the long-term security of the drinking water supply is subject to uncertainty as the composition of wastes to be accepted on site is currently not clear.

627. Several submissions expressed concerns regarding the water allocation status of the Karetu River and the proposed abstraction of water for dust suppression purposes and other purposes. Examples include DS Mackintosh (SUB034805), T Hawke (SUB034463), A Mackenzie (SUB), N White (SUB034309) and N & J Watherston (SUB034577). I note that the LWRP provides for a permitted activity pathway for water abstraction from the Karetu River, as stated earlier and therefore, I cannot consider the effects of the permitted activity take.

Recommendations and Summary

628. I consider that the concerns raised by the local residents who utilise water from the Karetu River, or shallow groundwater which is likely hydraulically connected to the Karetu River, are valid concerns that require thorough consideration.

629. This assessment requires consideration across multiple timeframes; likely effects in the short and medium term and likely effects in the longer term.

630. As outlined in an earlier section of this report, the engineered containment of the waste to be emplaced at the site should be considered with its limitations. While the proposed design is a suitable design to mitigate the adverse effects in the short term (as assessed by Mr Kortegast, **Appendix 6**), the engineered containment system, over time, will with certainty not provide the same level of mitigation in the medium and long term. The geological and geographic setting of the site does not benefit this assessment. Therefore, liner leakage and discharges of contaminants into the environment, and into the drinking and stock water source of residents has to be assumed.

631. The proposed waste acceptance criteria include contaminants that are considered to be ‘forever chemicals’. Those chemicals will not biodegrade at the same rate (over millennia) as the engineered containment system (decades to centuries). While the current generation of residents may not be subjected to this discharge, future generations, with certainty, will.

632. I therefore consider that in the short term, meaning the operational lifetime of the landfill, provided that the applicant implements the proposed containment, monitors its efficiency, maintains ideal operating procedures, and adheres to the proposed WAC, the adverse effects on water users may be adequately mitigated. However, as outlined within the assessments of earlier sections, I consider that a residual risk (e.g. from inadequate containment installation, from inadequate operation or abandonment of the site) with high consequences to water users remain for the short-term duration, even if the probability of such could be considered low.

633. However, over the medium term and long term, this residual risk to water users is to be considered high, with higher consequences and a high probability of occurrence (i.e. the liner will degrade and/or fail eventually).

634. Should the decision makers be of a mind to grant this proposal, the following recommendations should be considered, as proposed by Dr Silver:

a. In Appendix M, trigger levels for toxicants are based on ANZG DGV ecological values. However, considering that the Karetu River is used for drinking water supply downstream of the landfill, he recommends that trigger levels are set based on human health drinking water guidance, for compounds for which the MAVs are lower than ecological criteria.

b. For setting trigger levels for PFAS, he recommends that the consent reference the drinking water guideline values in the most currently available (non-draft) version of the Australia New Zealand *PFAS National Environmental Management Plan* (NEMP)[26]. This is currently NEMP version 2.0, with guideline values of 70 ng/L for PFHxS + PFOS and 560 ng/L for PFOA. However, in the context of the October 2024 release in Australia of revised draft guideline levels (4 ng/L for PFOS, 30 ng/L for PFHxS and 200 ng/L for PFOA), he recommends explicitly stating that the PFAS NEMP drinking water guideline values in any future released (non-draft) version of the PFAS NEMP supersede the current drinking water guidelines for all consent monitoring and trigger-response action purposes.

c. He recommends 25% of the MAV for early warning trigger values (groundwater and Karetu River samples) that result in increased monitoring (locations and frequency). At 50% MAV or higher, he recommends that consent conditions require specific actions to avoid MAV exceedance.

d. Due to the possibility of preferential flow along a path that may not be detected in groundwater monitoring wells, along with the Karetu River being used for drinking water supply, Dr Silver has recommended setting explicit early warning trigger values that indicate if *any* effect is observed in groundwater or the Karetu River.

e. He also recommends that the consent holder provide quarterly monitoring of domestic drinking and stock water sources from shallow private wells (and, potentially, surface water intakes) within 500 m of the Karetu River, if any contaminants are detected in groundwater monitoring wells or the Karetu River above 20% of the applicable limit (MAV or ecological guideline).

Adverse Effects on Terrestrial Ecology and Wetlands

635. In the AEE, and within Appendix G of the application, the effect on terrestrial ecology is described on the following fauna, with the following conclusions reached (Table 5):

Table 5: Summary of effects on terrestrial ecology, as presented by the applicant.

Feature	Value	Magnitude of effect	Pre-mitigated level of effect	Post-mitigated magnitude of effect	Residual level of effect
Bats	Nil	-	-	-	-
Birds	Low	Negligible	Very Low	Positive	Net Gain
Lizards	High	Negligible	Very Low	Positive	Net Gain
Mammalian pests	Negative				

636. SLR Consulting Ltd and LizardExpertNZ were engaged to review the assessment methodology presented by the applicant and audit the applicant's conclusions in relation to terrestrial effects expected to arise from the proposal. The s42A reports of Dr Mandy Tochter (herpetology) can be found in **Appendix 13** of this report.

637. Hamish Dean of SLR Consulting Ltd has addressed terrestrial ecology, incl. bats, birds and mammalian pests but this is further discussed in the report by Planner Tim Johnston of Waimakariri District Council, as the effects of the proposal are in relation to birds and pests is primarily related to vegetation clearance and earthworks addressed in the s9 component of the activity.

638. The effects on herpetofauna are addressed in this report, and within the report of Tim Johnston. Herpetofauna in this report primarily focuses on the effects of vegetation clearance and earthworks in riparian areas, which are matters of discretion for the regional council.

639. Additionally, SLR Consulting was engaged to review the proposal's effects on two natural inland wetlands on site. The s42A report of Dr Stephen Rate can be found in **Appendix 14** of this report.

Herpetofauna

640. The evidence of Dr Mandy Tochter is attached in **Appendix 13** of this report. The evidence addressed matters relevant for both, Regional Council and District Council, but as noted above, the below assessment focuses on the effects on herpetofauna of earthworks and vegetation clearance in riparian areas.

641. The provision of the Lizard Management Plan (LMP) was proposed within the supporting documentation of the original application, while the main application document suggested that the LMP was available and submitted to DOC for the purposes of the application for salvage permits under the Wildlife Act. The applicant considers that managing the effects of the proposed activities via the LMP should be delegated to the Wildlife Act 1953. Subsequently, the LMP and DOC permit were submitted to Council on 5 February 2025.

642. In relation to the description of the environment, I note that the applicant has not described, nor surveyed the riparian margins of the Karetu River, the wetland or the Eastern Boundary Watercourse, which potentially form the habitat of herpetofauna and are subject to regional council's discretion.

    a. The application also did not address the vegetation clearance and earthworks that have already been undertaken on site for the purpose of installing the Karetu River bund. This was however covered in the applicant's submitted EcIA (page 53 of Appendix G of the AEE) but not carried through to the submitted LMP.

    b. All of these areas may be considered 'significant fauna habitat' under the Canterbury Regional Policy Statement, requiring protection through the application of the effects management hierarchy.

643. Dr Tochter agrees with the applicant's assessment on potential lizard values present at the site but notes that a description of the herpetological context of species would have been helpful for the assessment.

    a. She notes that the lizard species affected by the proposal are not entirely known, as the EcIA did not follow best practice. This would have required a DOC handling permit to enable handling and more accurate identification of lizards on site. The survey undertaken for the purpose of the EcIA was a 'passive survey' only, and Dr Tochter identified errors in identification made by the applicant in the EcIA.

    b. The applicant has therefore suggested adopting a conservative approach and assuming that At Risk Declining species are present, and thus designing mitigation appropriately. Dr Tochter comments that it is not sufficient to simply guess at which of the likely species are present.

c. She concludes that for the assessment of lizard values, a more robust assessment needs to be undertaken in order to accurately determine effects and suitably mitigation.

d. However, she agrees with the applicant on the overall conclusion that lizard values are 'high' when considering at the Ecological District (eD) level and she agrees that the site represents Section 6c RMA 'significant fauna habitat' under the Canterbury Regional Policy Statement.

644. Lizard habitat affected: Dr Tochter defines 'lesser' disturbed habitat as land that has been disturbed in the past, and lists the wetlands, the riparian margins of the Karetu River and the Karetu riverbed as potential areas.

a. She states that the extent and location of this habitat was not provided in the AEE, nor the LMP and the applicant has only provided imprecise information on where activities may impact on lizard habitat. The description suggests that all development will be restricted to the quarry footprint, which is not the case.

b. She states that the lizard habitats and lizard populations affected by the overall proposed activities have been underestimated and therefore the effects assessment and mitigation package has also been underestimated.

c. In addition to the 4 ha of habitat that will be affected by the proposal, a further 0.5 ha have already been affected in relation to the bunding work along the Karetu River.

645. Dr Tochter therefore recommends that an additional supplementary lizard survey is undertaken for the purpose of processing this application as:

a. Best practice lizard surveys need to be robust enough to determine which species are present and the extent and quality of their habitat needs to be sufficiently described. This is to inform which avoidance measures are appropriate.

b. The number of lizards potentially affected per species has not been provided, and would only be possible through a DOC handling permit, which would allow more accurate identification.

c. The effects assessment, and scale and significance of effects can therefore only be meaningful once the above information is available.

d. A flawed effects assessment cannot be used to design appropriate mitigation measures, which includes avoidance measures for *significant fauna habitat*. Dr Tochter also notes that no legitimate habitat avoidance action has been proposed by the EcIA, nor the LMP.

646. In relation to the assessment of effects, she therefore states the following:

a. The inadequate survey, as described above, has likely led to an underestimation of lizard habitat and populations. Additionally, the location and size of some of the proposed activities have not been provided.

b. She notes that for the EIANZ approach adopted by the applicant, the level and magnitude of effects on 'lizards' has been lumped into a single entity, i.e. not each species was assessed, which likely leads to an underestimation of effect.

c. Overall, she considers that an assessment on the significance of effects is not possible ahead of a supplementary survey.

d. She also states that the applicant's assessment of post-mitigation magnitude of effects being positive cannot be concluded on the basis of the provided information and this assessment should be disregarded.

647. I note that as there is no detail provided in relation to the riparian areas, or otherwise 'lesser' disturbed areas, I cannot conclude what the effects on lizard values may be.

648. However, the below summary of the remaining components of Dr Tochter evidence, while more relevant for the District Council's assessment at this stage, provides important context on the applicant's approach towards the assessment of effects on lizard values:

649. Dr Tochter describes that while the application acknowledges the need to avoid, remedy or mitigate adverse effects on lizard values, the notion is lost in the LMP. In her assessment of the effects management hierarchy, she states the following:

    a. There are no legitimate avoidance actions described in the application.

        i. While the applicant references some 'precautionary' actions incl. salvage, Dr Tochter considers that a more appropriate precautionary approach would be to avoid areas that are significant fauna habitat.

        ii. The avoidance of the SNA is not a legitimate lizard management action as the SNA is required by rules in the WDC Plan and the NPS-IB to be avoided.

        iii. Overall, she cannot determine if all avoidance options have been exhausted.

    b. The LMP covers remediation actions, listed as riparian plantings of the Eastern Boundary Watercourse and wetlands, 0.7 ha of ground hydroseeded with exotic grass species and at landfill closure, 8 ha of exotic grassland and tussock planting.

        i. The first two components are aimed at offsetting effects of proposed activities on other project components and will only be of incidental benefit to lizards. While positive, benefits cannot be known as the riparian areas and wetlands were not surveyed for lizards.

        ii. The landfill closure component should only be weighted against remediation, if the site will be left ungrazed, free from afforestation and with some protective covenant applied to it to ensure that no further development occurs.

        iii. Overall, she cannot determine if all remediation options have been exhausted.

    c. For mitigation, the applicant proposed avoiding winter months when developing areas of the site that have an exotic grass cover and lizard salvage from 1.9 ha of the project area for release into the SNA.

        i. Dr Tochter states that the winter months avoidance measure was mentioned in the ECIA but not in the LMP. She has doubts that the applicant would (be able to) cease works over the winter months, from a business perspective.

        ii. Regarding the salvage proposal Dr Tochter has raised significant concerns with the salvage proposal, which also aligns with concerns raised by submitters. She is therefore unable to comment whether salvage is the best option for lizards of the site. If salvage is adopted as mitigation, the proposal requires a substantive overhaul, in addition to a review of the issued DOC Wildlife Permit (see below).

650. Regarding the delegation of effects on lizards to the Wildlife Act 1953, Dr Tochter states the following in her evidence:

    a. She disagrees with the applicant that the management of effects on lizards should be delegated to the Wildlife Act 1953 (WLA) and states:

"Managing effects over indigenous lizard habitats are very clearly within the mandate of the RMA (1991) and its planning tools. This is especially so for significant fauna habitats occupied by grass skinks that are addressed in the RMA as a Part II matter (Section 6c), and feature prominently in the NPS-IB. I strongly disagree, therefore, that the RMA (1991) devolves responsibility for 'effects management' to the Wildlife Act (1953) permitting process as the applicant proposes."

b. She also comments that stakeholders have not been able to fully engage on the topic of lizards without sighting the LMP, and once provided, the LMP "*fell short of the mark*".

c. Irrespective of the debate, recent caselaw[12] has rendered the issued salvage component of the Wildlife Act permit 107310-FAU potentially unlawful as it requires 'incidental kill'. This is a necessary part of lizard salvage, as no salvage operation can or does capture all affected lizards.

d. Additionally, the Wildlife Act permit includes a clause which relies on the issue of RMA consents before the permit can be used, which supports the equivalency of both statutes in relation to lizard management.

651. Compensation is therefore the most suitable pathway for addressing any adverse effects and Dr Tochter recommends:

a. A species-by-species residual effects assessment is required to determine the level of compensation needed to address residual effects. The NPS-IB only requires that significant residual effects require compensation and based on the information supplied Dr Tochter states that significant residual effects will likely be ensured.

b. Dr Tochter also states that compensation is only appropriate when the effects management hierarchy has been exhaustively applied, which she stated, the applicant has not undertaken.

c. The applicant has provided compensation action in the submitted LMP (Section 5.4.2). Dr Tochter states that compensation does not need to be lizard-centric but cannot be considered compensation unless proposed measures are additional. Actions that balance other effects on biodiversity are not additional, but rather represent 'double-dipping'.

d. She comments on the proposal to apply a Reserves Act (1977) Covenant to the 4 ha lizard release site but states that this requires full collaboration with a third party. Some detail is provided in the issued Wildlife Act permit, which is now considered unlawful. The LMP does not mention the covenant. She also has concerns about the enduring commitment to the covenant by the applicant, and the ongoing management of the covenant. She also questions whether the covenant is truly additional given it is already offered for the site under the WDC Plan and the NPS-IB.

Wetlands

652. Potential adverse effects on wetlands can occur primarily from altering hydrological flows (i.e., water previously flowing into a wetland no longer flowing to that wetland, or drainage of a wetland area) and discharges of water or contaminants into the wetland.

653. The applicant also states in the AEE that the Ecological Assessment anticipated that there will be no adverse effects on the ecological integrity or function of the wetland resulting from either the quarry or landfill operations, as the potential effects of the

[12] Environmental Law Initiative v Director-General of the Department of Conservation & Ors [2025] NZHC 391.

activity will be appropriately mitigated to ensure that there is no net loss in value. The applicant uses this argument to state that the resulting baseline effect of the proposal is therefore '*not noticeable'*. Consequently, as discussed in the *Legal and Planning* section of this report earlier, the applicant has not provided an assessment of effects on wetlands as such, but has instead addressed relevant matters in the description of the proposal and Appendix F of the application.

654. In summary, the works will result in changes to groundwater that will have an effect on the lower wetland through a reduction in groundwater recharge. Additionally, the liner will restrict the volume of infiltration of water. The applicant has stated that there is a balance between maintaining sufficient groundwater separation distances between the base on the landfill and minimising the drawdown effects on the wetlands.

655. In his review of the application and s92 documents, Dr Rate makes the following comments in relation to the description and significance assessment for the wetlands:

    a. The assessment methodology was generally adequate but lacking in detail. For example, Dr Rate observed several plant species not listed in the applicant's species list. On this basis, it is unclear whether important species may have been overlooked. He states that due to the high levels of modification on site, the probability of important plant species present outside of the SNA is likely to be low.

    b. The wetland delineation assessment was undertaken in accordance with the NPS-FM and the wetland extent is accurately demarcated at the sites. The description of the wetlands is generally sufficient. He agrees with the applicant that both wetlands meet the definition of 'natural inland wetlands' under the National Policy Statement for Freshwater Management.

    c. He considers that the significance assessments undertaken for the wetlands are problematic, for the following reasons:

        i. The applicant has determined the outcome of the significance assessments on the basis that no indigenous vegetation is present and therefore criteria 1-8 and 10 from the Canterbury Regional Policy Statement (CRPS) do not apply.

        ii. This determination that no indigenous vegetation is present was based on the cover of indigenous species in two wetland delineation plots in each wetland, then averaged for each wetland.

        iii. This is problematic because, two of the plots (one in each wetland) indicate the presence of indigenous vegetation and additionally, mosaics of indigenous vegetation and exotic vegetation are typically observed in wetlands and the entire wetland does not need to contain indigenous vegetation for indigenous vegetation to be present.

    d. Therefore, based on observations during the site visit and a review of the wetland delineation plot data, Dr Rate considers that the criteria in the CRPS have not been assessed correctly and that indeed, the wetlands meet Rarity/Distinctiveness criterion 3 of the CRPS.

    e. However, he states that the overall conclusions of the Ecological Impact Assessment are accurate, in that the highest values on site lie in the SNA, the wetlands and the watercourses.

656. Regarding the actual and potential effects of the proposal on the wetlands, he provides the following assessment:

    a. The assessment of effects on wetlands provided is considered to be generally accurate.

b. Dr Rate considers that the proposal could ultimately impact the size and extent of the lower wetland, in particular, and the pre-mitigation potential effects are relevant to CLWRP rules related to wetlands.

c. He also notes that the proposed condition in the water permit (Condition 5) proffered by the applicant is in direct contradiction to the ecology and hydrology report attached to the AEE. In particular, the condition requires that the groundwater take shall not cause a permanent reduction of the extent of the lower wetland.

d. He also states that there is no disagreement that without mitigation, there will be an adverse effect on the wetland hydrology.

e. The level of adverse effects on the lower wetland are considered by the applicant to be low, based on low wetland values and moderate magnitude of effect of long-term groundwater drawdown of up to 0.2 m at the wetland and up to 0.4 m upgradient of the wetland.

f. However, if the lower wetland is considered to be ecologically significant due to the Rarity criterion, and assigned a *moderate* ecological value, then the level of adverse effect would be *moderate*, based on the EIANZ guidelines for ecological impact assessment. This has implications for the level of mitigation required.

657. Regarding the proposed mitigation for the above, Dr Rate states the following:

a. Table 1 of Dr Rate's evidence includes an assessment of the effects management hierarchy.

b. He states that avoidance is not proposed. Avoidance measures would likely require a significant change to the proposal, and may not be possible due to the site's space constraints. He disagrees with the assessment that effects on the wetland are avoided altogether (by providing the remediation) and that the National Standards for Freshwater are irrelevant, particularly because the justification provided for that argument includes examples of remediation (such as enhancing seepage flows, planting indigenous species to retain surface water).

c. He considers that the proposed mitigation outlined by the applicant in Appendix F of the application, being the enhancing of seepage flows and planting of indigenous species to retain surface water should be considered as remediation, not minimisation of effect (when assessing the pre-proposal effect as stated in the Ecological Impact Assessment, Appendix G), as these measures will be implemented after the effect on wetland hydrology has occurred. Minimisation likely would also require significant changes to the proposal.

d. Consequently, he notes that there is uncertainty with what is mitigation (by the applicant). The enhancement of seepage flows and planting of indigenous species to help retain surface water are considered remediation, as stated above.

658. Appendix M (Revision B) is proposed to include additional baseline monitoring before works commence, twice yearly monitoring, monitoring of groundwater levels at proposed shallow monitoring wells, monitoring of wetland extent and inclusion of the Trigger and Action Response Plan (TARP). Dr Rate supports those measures to ensure that adverse effects are identified and addressed through review and adjustment of mitigation actions.

659. He states that there is uncertainty in the success rate of the proposed remediation and therefore residual effects cannot be properly assessed. The applicant has referenced that the choice of the remediation option (one of two proposed) will be governed by space constraints and land stability and therefore the most effective solution to managing wetland effects may not be available. Planting of wetland margins could also reduce water flow to the wetland, increasing the level of required remediation.

660. He further points out that while planting to retain surface water/ the formation of an artificial wetland is proposed in the Ecological Impact Assessment (Appendix G of the AEE), it is not mentioned in the TARP and therefore it is uncertain when this action may be undertaken. No option is provided should the proposed mitigation actions prove unsuccessful.

661. This is also reflected in the proposal to manage the lower wetland with a Wetland Management Plan (WMP), which has not been provided for review. There is also no detail on the proposed content of the WMP. I note that the applicant has stated in the s92 response that the WMP is not intended to form part of the mitigation as it is not considered to be required.

662. I note that Ms Lochhead, in her review, has also commented on the applicant's presented models in relation to the likely baseflow reduction of the wetlands and the proposed remediation. She noted that the proposed remediation, which includes the supplementation of flows into the natural inland wetland by way of engineering an artificial wetland, or by drainage pipe, will likely have to be completed within 10 m of the existing wetland boundary and therefore contradict the applicant's proposed conditions, which states that appropriate setback boundaries will be observed as to not trigger the need for consents under the NES-F regulations. She therefore seeks clarification on the design and implementation of the remediation measures described to remedy the reduction of the baseflow to the wetland.

663. She further queries the conclusion reached by the applicant, which is that the supplementation of flow into the wetland will lead to a net gain of flow into the wetland when compared to the modelled loss of baseflow. She states that it is not entirely clear how the taking of groundwater upgradient of the wetland will not have a negative effect on the wetland itself (i.e. the construction around the wetland may further reduce the residual groundwater flows into the wetland). Dr Rate mirrors that assessment in his evidence.

664. Overall, he considers that without further details on the remediation options for the lower wetland, and the information on the limitations outlined above, the residual effects cannot be appropriately assessed.

665. Dr Rate additionally makes the following recommendations in relation to the applicant's proposed conditions:

    a. CRC243699, Condition 2: The NES relevant buffer for earthworks, being 10 m, should be clearly delineated, or even temporarily fenced on site prior to commencement to avoid accidental encroachment of machinery or spoil into the wetland.

    b. CRC243700, Condition 47: the timescale specified is inappropriate and requirements for infill planting following original planting should be based on monitoring. Infill planting should be undertaken yearly.

    c. CRC243700, Condition 48: The 75% survival rate is low, with best practice typically being 90%. Justification for this low figure is warranted and should be presented by the applicant.

    d. The development and implementation of a WMP has not been included in the proposed conditions by the applicant. In the s92 response, the applicant stated that this was not required as it is not part of the proposed mitigation and wetland monitoring is covered by the Monitoring Programme and TARP. Any proposed plan should be included in the conditions of consent.

    e. Proposed conditions (Rev1), Wetland Margin Enhancement: It is recommended that the objectives of each proposed activity regarding wetlands be included in the schedule.

666. Ms Lochhead has also made the following recommendation in her report (**Appendix 9**):

    a. Clarification is sought on the design and implementation of the measures to remedy the reduction of baseflow to the southern wetland, and how the construction works can be completed in accordance with the relevant rules of the NES-F.

Submissions

667. Submitters, particularly those living locally within the Whiterock area, have relayed a concern regarding the effect of the proposal on terrestrial ecology. Overall, relatively few submissions have mentioned terrestrial vegetation or wetlands. Twenty-two submissions have referenced indigenous lizards, skins or geckos.

668. Many submitters used general terms to express concerns for potential effects on terrestrial values, citing 'flora', 'local ecosystems', 'biodiversity' concerns.

Lizards

669. I note that the submitters have not had an opportunity to view the LMP prior to the submission closing period. Therefore, I have also included Dr Tochter's original responses and discussion of lizard related submissions.

670. Dr Tochter addressed relevant submissions in her report **(Appendix 13).** She has identified two main topics raised by submitters: effects of the proposal on lizard values and proposed management of lizards.

671. Twenty submitters raised concerns with potential effects of the proposal on lizard populations and values, citing 'disruption', 'impact', 'contamination', 'potential threat', 'health', 'short and long-term effects' of and to indigenous lizards. None of the submissions cited positive effects associated with the proposal on lizard values.

672. White Rock Community Incorporated (SUB034741) shares Dr Tochter's concern that effects may have been underestimated by the applicant.

673. Four submitters [White Rock Community Incorporated (SUB034741), L Pettigrew (SUB034405), R Connelly (SUB034529) and A Webb (SUB034380)] have expressed a more general concern for wetland habitat and biodiversity within. Dr Tochter agrees that wetlands habitats could be significant fauna habitats but have not been surveyed for indigenous lizards. She has recommended additional surveys to be undertaken prior to continuing this consents process.

674. Four submitters [S Barber (SUB034396), D Swift (SUB034571), M Ledgerwood (SUB034415), and F Robinson (SUB034518)] commented on the proposed lizard relocation from the proposed footprint of the landfill to the SNA.

675. KJ and GE Young (SUB034383 and SUB034384) raise a concern with native lizards in the area, the application to DOC to relocate lizards and effects on the nesting sites of karearea. S Barber (SUB034396) further states that the relocation of the lizards will further affect the food source of avifauna.

676. EM McCaleb (SUB034767) considers that lizards should not be rehomed, and that relocating them will cause a risk of death and abnormalities by high exposure to forever chemicals.

677. Other submissions mirroring this sentiment are e.g. SUB034326, SUB034361, SUB034848, among others.

678. Dr Tochter addresses the submissions raised in relation to lizards in her evidence. Overall, she shares their concern. More specifically she notes:

a. She has recommended a further supplementary survey, which should also address the degree to which onsite wetlands support indigenous lizards to address the concerns regarding the impact of the proposal on wetlands.

b. She acknowledges the concerns regarding lizard translocation and incidental kills. She also notes that the applicant should address the nine salvage principles (DOC, 2019) to satisfy submitters' concerns.

Wetlands

679. R Connelly (SUB034529) raises concerns regarding the effects on wetlands arising from this proposal, particularly as only 10% of New Zealand's original wetlands are left. Effects cited as those related to contamination of the wetlands, rarity of wetlands, and the water take within 100 m of wetlands.

680. White Rock Community Incorporated Society (SUB034741) highlights the fact that the applicant has not only neglected to assess the proposed effects on wetlands against the provisions of the NES-F, but the submitter also disagrees with the applicant's assessment of wetland ecological values, incl. the description of the vegetation types, and the ecological value being described as 'low'. This was also addressed by Dr Rate in his expert evidence, found in **Appendix 14** and I consider that the concerns raised have merit.

681. Submissions of J McCaleb (SUB034815) and S Fitzjohn (SUB034818) also relay a concern regarding the wetlands on the property. The Rangiora Ashley Community Board (SUB034742) raises a concern regarding the ability to quantify the effect of the water take within 100 m of the wetland when it is unknown if the water monitoring sites can be used for such quantification. This was addressed by the applicant in the s92 response and Dr Rate considers this component of the concern to be addressed.

682. Regarding the effects on wetlands, Dr Rate considers that the concerns raised by submitters have been adequately addressed by the applicant when considering the proposed avoidance (such as setback distances to avoid direct disturbance or contamination) and mitigation (such as baseflow supplementation), if implemented adequately.

Summary and Recommendations

683. I am unable to reach a conclusion regarding the likely effects on herpetofauna within riparian margins of the wetlands, Karetu River and Eastern Boundary Watercourse as the applicant has not surveyed or assessed lizard values in these areas specifically.

684. I adopt Dr Tochter's conclusions that the habitat on site is 'significant fauna habitat' and that overall, without a supplementary survey, the provided effects assessment, as it pertains to the remainder of the site, is flawed, and so is the mitigation required to balance effects.

685. I therefore adopt Dr Tochter's recommendation that processing should be stalled until the supplementary lizard survey is completed and her recommendations are addressed.

686. I adopt the statements made by Dr Rate, notably that the effects on the lower wetland are considered Moderate and not Low as assessed in the applicant's ECIA. However, as there is much uncertainty in the likelihood of the proposed remediation for the baseflow loss to the lower wetland, the effects cannot be properly assessed.

687. In addition, I note that it is the CRC's assertion that the requirements of the NES-F remain, particularly Regulation 45B.

Adverse Effects on Air Quality

Overview

688. Air contaminants come from a variety of sources (both natural and man-made) and have varying physical and chemical characteristics.

689. Most adverse effects on air quality are associated with effects on people's health and wellbeing, including cultural wellbeing. However, some contaminants have the potential to adversely affect air quality in general, which can then have flow on effects on peoples' health and wellbeing. This includes particulate matter, which can reduce the overall air quality due to presence of fine particles in the wider environment. Further, there are other harmful chemicals discharged from industrial activities, which are generally present as gases and to which air quality standards and guidelines are usually applicable.

690. Human health-related effects from asbestos exposure are dose-responsive, meaning that longer exposures and higher concentrations will result in a higher risk of adverse health impacts.

691. Tonkin + Taylor Ltd has been engaged to review the air quality aspects of this proposal. Richard Chilton's expert evidence can be found in **Appendix 15** of this report. As part of his report, he has assessed the operation of the existing limestone quarry and its lime processing plant and the operation of the proposed landfill, which includes the receipt and deposition of asbestos containing wastes and asbestos containing soils.

692. The applicant describes two sensitive receptors within 250 m of the site and no other sensitive receptors within 500 of the site. Mr Chilton agrees with this assessment. He also agrees that dwellings beyond 500 m of the site are not expected to be adversely affected. However, he also identifies the tiny house located directly adjacent to the site, at 144 Quarry Road as a potential sensitive receptor, within 250 m of the proposal site, which was not mentioned in the applicant's assessment.

Continued quarry and proposed landfill operation

693. Mr Chilton agrees that the key discharges from the air from the continued limestone quarry operation and the managed fill are dust (particulate matter), including fine fractions that are comprised of particles less than ten microns (PM_{10}) and 2.5 microns ($PM_{2.5}$).

694. He agrees with the description of emission sources and mechanisms that can give rise to dust emissions, being extraction, haulage of excavated materials, open areas (due to wind erosion) and filling when material is being deposited is dusty.

695. The assessment of asbestos emissions is addressed later in this section of the report.

696. He agrees that based on the description of WAC at the site, odour should not be a problem for the site, particularly as the s92 RFI confirmed that gypsum wallboard material will not be accepted.

697. In terms of the assessment approach, he considers that the qualitative assessment using the FIDOL factors (frequency, intensity, duration, offensiveness and location) is appropriate given the scale and nature of the quarry and managed fill operation. The assessment is consistent with the recommendations set out in Schedule 2 of the Canterbury Air Regional Plan and the MfE Good Practice Guidelines for the Management of Dust.

    a. He states that the assessment approach uses published separation distance criteria as a basis for an initial screening assessment of sensitivity to discharges. Sensitive locations are then the focus for a more detailed FIDOL assessment,

which in turn is informed by the analysis of wind conditions that could transport dust from the quarry and landfill operation towards the sensitive locations.

b. He agrees with the use of the Environmental Protection Agency of Victoria (EPA Victoria) guidelines to determine separation distances when considering sensitive receptors. These guidelines are widely referred to within New Zealand. However, he notes that the applicant has used the 2013 guidelines and not referred to the replacement publication dated 2024, with consultation draft guidelines published in 2021. The separation distance recommended for quarries that operate without using blasting has been revised from 250 m to 500 m in the 2024 document.

c. At the same time, the revision to assess a 500 m distance does not change the findings of the air quality assessment, as there are only two sensitive receptors within 500 m of the site (three if including the tiny house on 144 Quarry Road).

698. When reviewing the assessment results, Mr Chilton notes the following:

a. Frequency: He agrees with the air quality assessment results provided by the applicant in that the two sensitive receptors identified by the applicant have a very low frequency of exposure to strong, dry winds (classified as above 5-7 m/s as an hourly average). These conditions are generally the worst case for the propagation of dust in the absence of mitigation. The two receptors would be downwind of the quarry/fill site during strong wind conditions approx. 0.14% of the year (12 hours in total).

    i. According to the UK Institute of Air Quality Management (IAQM), this would be considered 'infrequent' exposure.

b. Intensity: In terms of the intensity of the dust impact on those two sensitive receptors, he agrees with the assessment that the closer receptor (75 m closer) has a higher potential intensity of impact when compared to the other sensitive receptor. According to the IAQM, both are considered as 'intermediate' receptors being within 100 m and 200 m of the site.

c. Duration: He agrees with the applicant's assessment that the duration of dust events is largely short in duration, reflecting the low frequency of winds blowing from the site towards the two receptors.

d. Offensiveness: Regarding the offensiveness or character of the emitted dust, he agrees with the assessment that the type of dust would be considered to have a low offensiveness. Conversely, asbestos-derived dust would be considered highly offensive due to its classification as a known human carcinogen.

e. In summary, Mr Chilton agrees with the conclusions reached that the potential effects of dust emissions from the continued operation of the quarry and the proposed operation of the managed fill will be low, largely due to the very low frequency of exposure of winds that blow from the site towards the two sensitive receptors.

f. In response to the submission of the residents of 144 Quarry Road, the third receptor not identified by the applicant, he states that while the residence is within 250 m of the proposal site, the site is not downwind of the processing plant or landfill under prevailing winds or strong winds that can occur from the northwest. The site is also set back further than the receptor identified by the applicant as Receptor 1 and therefore likely to experience lower potential impacts than those described in the air quality assessment for Receptor 1.

699. Mr Chilton assessed the proposed mitigation measures as following:

Asbestos mitigation measures

700. The proposed mitigation measures for asbestos dust include:

a. Avoidance of delivery, handling, disturbance or filling of asbestos waste during strong winds (> 5 m/s as hourly average and/or 7 m/s as a 10-minute average);

b. Ambient asbestos monitoring to be undertaken at least monthly when asbestos materials are being received, tipped and deposited;

c. Compliance with a site management plan that sets out methods for handling asbestos waste;

d. Monitoring of asbestos.

e. Conditions that are set out in the WAC for receiving and depositing material, including:

i. Material must be appropriately contained to prevent airborne release of asbestos fibres, incl. at a minimum wrapped in 200 µm gauge polythene/plastic;

ii. Soil containing asbestos fibres and/or fragments do not exceed 5% by mass;

iii. Loads of asbestos in soils shall be lined with 200 µm gauge polythene/plastic and wetted during loading so the moisture content is at least 15%. All liners are to be taped and then covered prior to transport.

f. The Site Management Plan (Appendix L of the application) additionally states that:

i. Asbestos or ACM must not be accepted after 4 pm Mon- Sun;

ii. Water sprays will be used at the tip face;

iii. The tip face will be progressively covered with dust suppressant polymer, plastic sheeting or a minimum of 100 mm of cleanfill;

iv. Deposited material must be covered within 2 h of being deposited;

v. Independent ambient monitoring of asbestos is to be undertaken monthly at four locations on the boundary of the disposal area when asbestos fill material is received, tipped and deposited on site to check the effectiveness of the control measures;

vi. Trigger actions responses in relation to exceedances of asbestos monitoring when 0.01 fibres per ml of air sampled is exceeded.

701. Mr Chilton notes that with the above measures implemented, he agrees with the conclusions of the applicant's air quality assessment regarding asbestos.

<u>General dust mitigation measures</u>

702. The proposed mitigation measures for general dust discharges include:

a. Adherence to a Site Management Plan (SMP). Mr Chilton considers that the dust mitigation proposed within the draft plan submitted as part of the application (Appendix L) is appropriate and reflective of industry good practice, considering the scale and nature of activities and the receiving environment. These include, among others:

i. Wind monitoring and corresponding actions to be undertaken in the event that specified wind speed thresholds are exceeded, which include restricting the receipt and placement of materials into the landfill; and

ii. Measures that include routine application of water onto frequently trafficked surfaces using a water cart and the restriction of vehicle speeds to avoid generating dust from driving over unpaved surfaces on site.

Lime processing plant

703. As noted in earlier sections of this report, the applicant has amended the proposal and now intends to heat the rotary dyer via two 154 kW diesel fired furnaces to replace the coal fired furnace. Details of this change, incl. changes to the original assessment, have not yet been provided by the applicant and the applicant wishes to defer the details and assessments to the hearing.

704. Particulate emissions: As part of the change, the applicant noted that the proposed upgrade to the new multicyclone system will no longer be pursued as the emissions of "*particulate matter from the plant would be negligible with the removal of coal*". The existing set up includes a simple cyclone system. Mr Chilton disagrees with this statement as it appears to ignore the component of particulate emission associated with handling and drying limestone. He considers that while the effects associated with the particulate discharge from the combustion of diesel will be lower than from coal combustion, the particulate matter emissions from limestone processing will be carried over from the plant and therefore are still of concern.

705. The original proposal and the s92 response included a replacement stack at 11m (instead of the current 6 m stack) and configurations to avoid obstructions to vertical flow. It is unclear if the revised proposal intends to include this change.

706. Overall, Mr Chilton states that without details of the proposal he cannot conclude that the potential effects of particulate matters discharges from the operation of the lime processing plant would be acceptable.

707. In relation to sulphur dioxide (SO_2) emissions, he notes that the removal of coal from the proposal means that SO_2 impacts are no longer a concern and agrees with the applicant's assessment on this matter.

708. The air quality assessment in the s92 response notes that the processing plant will only be operated for a maximum of 4 hours per day between 11am and 3 pm, in order to limit operations to times when conditions are most conducive to good dispersion and dilution of emissions from the stack. The applicant needs to address whether the revised proposal intends to retain this limitation. I note a discrepancy with the proposed output capacity limit, which implies a 15 hour/ day operation at peak output of 20 tonnes/hour.

709. Mr Chilton also clarifies that the production of '*quick lime'*, as stated in the original version of the application, gives rise to more significant emissions of carbon dioxide. As part of the s92 response, the applicant clarified that the lime processing plant will only be used for the production of '*ag-lime'*. He therefore recommends a conditions of consent restricting the plant to the drying of limestone to produce ag-lime and not allowing calcination of limestone to produce quick-lime.

710. In terms of the applicant's assessment, Mr Chilton notes the following:

    a. He agrees that the dispersion modelling used by the applicant is appropriate and in-line with industry good practice. The dispersion model predicts off-site concentrations of contaminants emitted from the lime processing stack, which are then added to estimated background contaminant concentrations to give predicted cumulative concentrations.

    b. These are then assessed against published air quality assessment criteria.

    c. He agrees with the background concentrations used for the assessment. These are published information from the Ministry for the Environment and the New

Zealand Transport Agency due to a lack of publicly available background monitoring data at the site.

d. He agrees with the applicant's selection of air quality criteria used in the assessment.

711. In terms of the dispersion modelling results he states that:

a. The presented dispersion modelling assessment in the s92 response is based on mitigation proposed for the plant using a coal fired furnace, including modifications to the stack, upgraded particulate emissions control and restricted hours of operation. No updated modelling has been provided at the time of writing this report and therefore there are uncertainties whether the latest amendments would give rise to unacceptable or off-site effects relative to the assessment criteria.

712. In terms of the proposed emissions testing frequency, Mr Chilton states the following:

a. He agrees with the amended proposal that requires emissions testing once every two years given the scale and nature of the lime-processing plant and its remote location.

b. He accepts that testing for SO_2 can be excluded from the testing requirements, given the proposal to replace coal with diesel. However, testing of PM10 should occur due to the likelihood for non-combustion related particulate matter (residual limestone particles) to be emitted from the stack.

Water availability

713. A key mitigation to control dust from the quarry, haul roads and general dust generating activities, incl. asbestos acceptance, includes the use of water as a suppressant.

714. Mr Chilton has highlighted some discrepancies in the application and s92 responses related to the availability of water, storage volumes and likely volumes needed on site:

a. The original application advised that 90 m^3 of water would be available via storage for dust suppression. Mr Chilton notes that this volume would not be sufficient for small quarry operations during prolonged periods of dry weather in summer and has requested clarification on the matter in the s92 question.

b. The RFI response in relation to air discharge questions notes that on site storage would enable a supply of at least 400 m^3/day. The applicant has determined that up to 185 m^3/day would be required for dust suppression, without depleting water storage, to control an area of 1.4 ha.

c. A different section of the RFI response stated that 200 m^3 of storage would be available on site and Mr Chilton also notes that the applicant expressed the amount of water storage when describing the inputs to its water balance model as being in units of m^3/day rather than m^3.

715. Mr Chilton agrees with the approach of the 185 m^3/day requirement based on the water balance model approach. However, he notes that the applicant needs to clarify the amount of water in storage that will be provided in order to supply up to 400 m^3/day and further recommends that this should be imposed as a condition of consent.

716. The applicant should also clarify how this amount of water will be sourced on site. I note that prior reference has been made in the application to the following:

a. Supplementation from the Karetu River under permitted activity thresholds. I note that the water take from the Karetu River will be subject to low flow conditions for those takes that are not for domestic purposes. Low flow conditions likely coincide with the time of the year when dust suppressants are most needed and therefore the Karetu River will not be a reliable source of water;

b. The applicant has referenced importing water in 25 m^3 capacity truck and trailer units from District Council supply points. If depleted, this would mean an additional 16 truck and trailer transport runs to refill storage of 400 m^3, or alternatively 8 transport runs to account for the modelled 185 m^3/ day water requirements.

c. In the RFI response, the applicant references the permitted activity groundwater takes, which are up to 100 m^3/ day for the size of the property. However, the 100 m^3 limit applies to all water takes on this property combined and therefore must account for the volumes intercepted with the underdrainage system (32 m^3/day), and the proposed take from the Karetu River gallery (2 m^3/day). The rate of take cannot exceed 5 L/s combined. The drainage water take is modelled as a 0.37 L/s take and the take from the gallery cannot exceed 0.5 L/s. This leaves 4.13 L/s available under the permitted activity threshold.

d. I note that that the intercepted subdrainage water may be able to be used as dust suppression water, if it is not contaminated with leakage water. The applicant should clarify if this is the intention and how water will be tested prior to use. The current monitoring regime indicates that the GWUD (Groundwater Underdrainage Collection Sump) monitoring point is only monitored on a quarterly basis once landfilling commences.

Submissions

717. About 25% of submissions have referenced a concern with air quality arising from the proposal. Mr Chilton has addressed the concerns in detail in his report. In summary, the concerns relate to:

a. The location of the site being in a high wind environment with extreme wind events occurring locally;

b. Concerns regarding the meteorological data used for the assessments;

c. Dust impacts on human health, particularly dust discharges;

d. Concerns regarding the exposure to asbestos and human health concerns;

e. Exposure to landfill gas;

f. Concerns regarding water availability to manage dust emissions.

718. Mr Chilton has addressed each of the above concerns throughout his report, and in summary when addressing the submissions. He considers that apart from the lack of information regarding the discharges from the lime processing activity, the applicant has addressed the concerns and mitigation proposed is suitable and adequate for the operation.

Summary and Recommendations

719. In regard to the quarry and proposed landfill operation, I adopt Mr Chilton's assessment, and I consider that actual and potential adverse effects on air quality beyond the boundary of the site are likely to be less than minor subject to appropriate management (all contaminants) and water availability (for dust suppression).

720. I note my reservations about the availability of water at the site, which may have implications on the management and deposition of asbestos, and the mitigation of dust discharges.

721. I adopt Mr Chilton's recommendations, which are:

a. A requirement to clarify on site water storage and sources of water for dust suppression;

b. Imposing a condition that requires a volume of water storage required to be held on site for dust suppression;

c. Requiring water sprays/mists to be operated at the tip head for asbestos disposal at all times when asbestos is being received and deposited;

d. A condition that requires compliance with asbestos waste acceptance criteria, receipt and disposal, mitigation and monitoring measures and trigger responses as outlined in the Site Management Plan (Appendix L of the AEE).

e. Consideration to require a real-time dust monitor as a pro-active dust management tool for the operation within 500 m of sensitive receptors.

722. Regarding the lime processing operation, I also adopt Mr Chilton's conclusions. While the proposed changes are likely to significantly reduce SO_2 emissions, a full assessment has not been provided and therefore conclusions cannot be reached in relation to particulate emissions from the lime processing operation.

Adverse Effects on Cultural Values

723. Actual and potential adverse effects on cultural values have been assessed in the applicant's application (see section 8.12 of the AEE). In summary, the applicant states that:

a. It is acknowledged that the site, and Karetu River in particular, is an area of significance to Māori due to mahinga kai values, and habitat of taonga species.

b. The level of effects on cultural values is therefore stated to be strongly associated with effects on the Karetu River and its water quality, and consequently effects on mahinga kai.

c. The applicant references an attempt to engage with Te Ngāi Tūāhuriri Runanga, but in the absence of a response has deferred its assessment to the consents process, incl. consultation undertaken by the CRC.

724. In the absence of an assessment of effects on cultural values, the applicant has provided an assessment of the proposal against the Mahaanui Iwi Management Plan 2013 (Mahaanui IMP) and the Ngāi Tahu Freshwater Policy (NTFWP) in section 10.9, and Appendix X of the AEE.

725. In summary, the applicant considers that the proposal is not inconsistent with the NTFWP, nor with the Mahaanui IMP.

726. The applicant referenced the possibility of including Cultural Health Monitoring in the proposed monitoring programme (Appendix M).

727. An accidental discovery protocol is suggested in the Proposed Conditions (Appendix Y) for the event of any disturbance of Kōiwi Tangata (human bones) or taonga (treasured artefacts).

728. The CRC sought the advice on the potential effects of the proposed activity on cultural values via PREE advice lodged to Mahaanui Kurataiao Limited.

729. A response was received, dated 16 July 2024, which provides a position on behalf of Te Ngāi Tūāhuriri Rūnanga following presentation of the proposal to Kaitiaki representatives of the Rūnanga.

730. The response includes an assessment of relevant objectives and policies and an outline of the values that are associated with the project site area. Runanga have declined to provide specific comment and have instead chosen to address concerns via a submission. These are addressed in the next section.

Submissions

731. Following the notification of the proposal, Te Ngāi Tūāhuriri Rūnanga provided a submission (SUB034552) outlining the following:

    a. The proposed site is located between both the Ōkūkū and Rakahuri rivers, both of these awa and their surrounding environment are of significant cultural value to Ngai Tūāhuriri.

    b. This ongoing connection with the Rakahuri River, and its tributaries, continues into the modern day, where the Ngāi Tahu Claims Settlement Act 1998 provides for two customary fishing entitlement areas, being the Taerutu Reserve (schedule 113(b)) and Te Aka Aka Reserve (schedule 113(c)).

732. Te Ngāi Tūāhuriri Rūnanga therefore request the application be declined and state that the potential for significant long-lasting harm to the cultural heritage and customary food gathering practices has not been avoided, remedied or mitigated.

733. Opposition is on the following grounds:

    a. The Karetu River is a significant cultural landscape which would be adversely affected. The proposal is inappropriate at the head of the catchment and would diminish the mauri of the waterway.

    b. The applicant failed to engage with Ngai Tūāhuriri during the site selection process and has therefore failed to abide by industry best practice, represented by the WasteMINZ Guidelines (2023). Ngai Tūāhuriri Runanga were approached following site selection, at which stage the options for meaningful input were reduced to a level that are described as pointless.

    c. Overall, the proposal:

        i. poses an unacceptable risk of contaminant discharge;

        ii. has an unacceptable cumulative impact on the lower wetland;

        iii. creates an unacceptable construction phase impact on the river and biota;

        iv. uses an unacceptable assessment of the magnitude of effects;

        v. fails to provide relevant information; and

        vi. suffers from a lack of clarity about the degree of impact from the current unmitigated impacts on the receiving environment.

    d. Each of the above positions is further elaborated on in the submission.

Summary

734. Based on submission by mana whenua, who are the cultural experts, I consider that there is a potential for significant effects on mana whenua from the proposal as currently sought. However, an evaluation of these effects can only be undertaken once the matters have been presented by Mana Whenua to the decision makers at the hearing and discussed further.

Adverse Effects on Amenity and Recreation Values

735. The recreation values at this site and the surrounding environment arise from the use of the river for recreation, and the use of the general environment for recreation.

736. The applicant identified amenity values in section 3.12 of the application as: angling, waster-based activities such as canoeing and kayaking and swimming.

737. I note that the Canterbury Maps layers do not identify any registered bathing sites in the vicinity of the site, or within the Karetu River in general.

738. Other amenity uses in the area include horse riding, walking and running.

739. Amenity values arise from the rural, isolated nature of the local community.

740. The applicant has assessed that the proposal will have a less than minor effect on amenity and recreation values as the effects on surface water quality have been assessed as less than minor, and as there is no public access to the river at the site, or within 2 km of the site. The nearest access is 2 km downstream at the Loburn Whiterock Road bridge.

741. I note that a large number of submissions have raised concerns about a potential effect on recreation values, particularly local residents who have a long history and an established connection with the use of the Karetu river for recreation and amenity. In total, I have counted 86 references raising concerns with amenity and recreation, and 120 submission references that cite amenity but are more related to community identity and way of life, which includes the general setting of the local community as an amenity value. Note that the natural character of the environment and proposed changes to the natural character are assessed by Waimakariri District Council for the processing of **RC245076**.

742. Many submissions also raise concerns with increased traffic (144 mentions) and road safety (148 mentions) in relation to transport and use of roads for amenity, but this is addressed in the Waimakariri District Council's s42A report, related to application **RC245076.**

Submissions

743. A few examples of submissions related to amenity and recreation include:

a. P Wood (SUB034580) – lives directly next door to the proposed landfill site and the Karetu River runs through her property. She notes that her grandchildren play in the river, and she is concerned about protecting the river for future generations. She bought the property to provide a 'natural playground' for her grandchildren and to pass it on to future generations.

b. Z Brock (SUB034310) – her family lives in the Whiterock community and the Karetu River runs through her family's property. She spends a lot of time there in the summer, swimming with her children, picnicking on the banks of the river, watching the local birdlife or camping out in summer. She is concerned about contaminants in the Karetu River and permanent changes to the community identify by allowing this industrial activity.

c. E Hawke (SUB034391) – is a local resident and swims in the Karetu River, takes friends and their children to the river to explore and swim, and forages next to the river. Has expressed a concern that this proposal will therefore be harmful to health if contaminants leach into the river.

d. Rangiora Ahsley Community Board (SUB034742) – this submission notes that the area is a unique, quiet, rural and isolated part of the Waimakariri District and people move here to provide their families with a place where children can swim in the pristine water of the Karetu River, listen to birds in the bush, search for lizards or ride their ponies in the quiet countryside.

e. F Mackenzie (SUB034821) and OM Robinson (SUB034631)- are two submissions of minors that live in the local area. These submissions raise concerns with the local use of the river for fishing, swimming and motorbiking along the river.

744. Ms Tiernan, in her evidence (**Appendix 11**), also addresses the submissions made in relation to amenity values and considers that the risk of pathogens present in leachate or stormwater discharge is low. Pathogens are generally the number one concern when assessing swimming water quality.

745. She considers that the deterioration of water clarity due to sediment discharges however may impact the amenity quality of the river.

746. I also note that the knowledge of leachate leakage discharging into the river can affect the peace of mind of users of the river, even when exposure may not lead to a direct health effect.

Summary

747. I acknowledge the concerns raised by the above submissions, and others like it. In doing so, I adopt the conclusions made under the assessment of effects on the surface water environment for the purpose of this assessment. The potential effects on the surface water environment will, to a large degree, also impact the use of the river for amenity and recreation, particularly when the use of the river is related to direct contact with the river, such as swimming, or consumption of kai gathered from the river (angling, foraging).

748. Other uses, such as walking along the river, kayaking and canoeing, might not be affected to the same degree.

749. I disagree with the statement made by the applicant regarding access to the river. Many of the local residents have direct access to the river from their properties, and these residents may also have their amenity and recreational values affected by the proposal.

750. Additionally, the road off Quarry Road, leading into the quarry over the Karetu River (or via the current ford) is not a private road and therefore, in theory, can be used by the public to gain access to the river. The applicant has placed restrictions across this road (in the form of roadblocks and gates) and therefore has restricted the access of the public to the river in the past. I am not aware of any agreements made with Waimakariri District Council of the exclusive use of this road by the applicant.

Positive Effects

751. The applicant has identified several positive effects throughout the individual assessments in section 8 of the AEE. This includes an indication that the proposal has a positive net effect (post implementation of proposed remediation, mitigation or compensation) on terrestrial ecology, on landscape values and on the wider community.

752. In terms of water quality, the applicant cites a positive long-term effect on surface water quality through a reduction of zinc and sediment in surface water and a permanent positive effect on freshwater fauna within the Karetu River through removing vehicle movement through the waterway by way of providing a bridge. Further, it is stated that the new outfall structure will provide broader improvements when compared to previously uncontrolled stormwater discharges.

753. It is stated that the inclusion of stock fencing around the SNA, and proposed enhancement planting around riparian margins with indigenous planting will result in a positive effect due to net gain in terms of terrestrial ecology effects.

754. In section 8.15, and Appendix T, the applicant described the positive effects on the wider community:

    a. A contribution to the longevity of Kate Valley landfill, by diverting inert construction and demolition waste to an alternative deposition site;

b. A reduction of cost for depositors, particularly for contaminated soils, which will provide a roll-on effect and economic benefit to end users;

c. A reduction of roadside and riverbank dumping by providing competitive pricing for deposition of material;

d. Reduction in greenhouse gas emissions due to shorter cartage distances from waste source.

Submissions

755. Submissions in support of the proposal also cite the following positive effects:

a. Burnside Contractors Ltd (SUB034390) for example state that the establishment of the managed fill operation will lead to more efficient and effective waste management. The proposed fill site will save cost for land development or site remediation projects.

b. Several submitters have cited similar or identical reason in support of the proposal, incl. Knowles Group Construction (SUB034406), JK Roberts (SUB034429), M Miskell (SUB034432), New Zealand Independent Cement (SUB034435), Forest Developments (SUB034437), Mike Greer Homes Canterbury Ltd (SUB034636), among others.

c. Mr James Lowden (SUB034433) supports the proposal as a local ratepayer and considers that the proposal will provide an economic benefit and a cost-effective solution for community and council core infrastructure projects. Mr Lowden considers that this proposal, and lower cost waste disposal options could help stabilise rates increases for local community.

d. T Uren (SUB034438), SA Templeton (SUM034452), McMillan Drilling Ltd (SUB034453), A Harris (SUB034467), B Screen (SUB034551) and L Peters (SUB034828), among others, have provided similar submissions.

Assessment

756. I do not consider that the matters raised in relation to stormwater management and water quality effects should be considered as positive effects. The adverse effects currently observed on site are a direct result of unauthorised stormwater discharges, in breach of section 15 of the RMA. Remedying this effect, and obtaining authorisation for the ongoing stormwater discharge, is a requirement under the CLWRP and the RMA.

757. Positive effects cited in relation to the bridge construction, planting and terrestrial effects are better addressed in the next section under Section 104(1)(ab) of the RMA.

758. I agree with the statements made by the applicant in relation to 372 (a), (b) and (d). A purpose-built deposition site for soil and inert construction and demolition waste materials, in principle, could provide benefit for the industry. However, I do not consider that the proposal will definitively contribute towards a reduction of the effect cited in (c).

Overall Effects Summary and Conclusion

759. A key limitation regarding this proposal is the effect of the engineered landfill mitigation (liner installation, post-closure capping, and underdrainage piping) on the natural inland wetland, particularly the lower wetland. Despite proposed remediation of the modelled loss of baseflow, the NES-F directs the decision maker to not grant consent due to the effects that the water take will have on the wetland. Despite this, I have come to the overall conclusion that:

760. In respect to the actual effects on the environment, in most respects, they indicate that given the engineered mitigation proposed, the effects will largely remain no more than minor. I consider this conclusion is only valid for the relative short timescale that the

engineered mitigation is intact and maintained, therefore for the duration of the operational lifetime of the landfill, and only upon addressing the reviewer's comments:

a. The landfill design, which is largely consistent with Class 1 requirements, is considered to be appropriate for the proposed waste acceptance criteria. The construction of the landfill liner and leachate collection and disposal system will ensure that generated landfill leachate will be unlikely to leak into the surrounding environment at volumes that are of concern. Any leakage is proposed to be monitored and redirected to offsite disposal until such time that leakage can be remedied or contained. The feasibility of such remediation or containment needs to be further explored at the hearing. The availability for offsite disposal of leachate should also not be assumed.

b. Adverse effects on air quality and sensitive receptors are acceptable and are suitably addressed with proposed mitigation. However, uncertainty remains regarding sources of water for dust suppression purposes.

c. Adverse effects on groundwater and surface water (quality and ecology) from the landfilling activity will be no more than minor but are a direct function of the adequacy of the engineered mitigation, and the waste acceptance criteria and the efficiency of the early detection and trigger action protocol. This assessment is a conclusion for the leachate Scenario 1 and 2 as modelled by the applicant;

d. Adverse effects on groundwater and surface water users will therefore be acceptable when considering surface water and groundwater quality effects arising from landfilling;

e. Works within the bed and within riparian margins of the Karetu River and the Eastern Watercourse can be appropriately managed to ensure that adverse effects are no more than minor in relation to sediment discharges;

f. The proposed water take from the Karetu River can be managed within permitted activity limits and is therefore deemed to be less than minor.

g. Adverse effects on amenity values will be no more than minor and therefore will be acceptable. I not that the use and restrictions on the use of the public road will have to be addressed by the District Council.

761. However, adverse effects on terrestrial ecology, herpetofauna in particular, may be significant. In respect of the terrestrial ecology effects, the proposed avoidance/ remediation/ mitigation and compensation measures are unable to be assessed at this stage, as the proposed measures are based on flawed site surveys. The surveys also did not include the riparian margins of the site. Dr Tochter's conclusion stated that significant residual effects will likely ensue on lizard habitat and populations as a result of this proposal.

762. Adverse effects from the management of stormwater on site during construction and the operational phase are currently uncertain, as the applicant has referred to generic management plans with an indication of what may be adopted on site via indicative plans. In theory, stormwater management can be designed to ensure that adverse effects on the receiving environment (the Karetu River and the Eastern Watercourse) can be adequately managed. The CRC's expert reviewer has highlighted some aspects that need to be resolved. Stormwater management will also have to address legacy issues on site. I also note that the management of stormwater, as proposed, relies on the detection of effects within the river, when effects have already occurred, to trigger the need for improvement actions. In this respect it is largely too late.

763. Adverse effects on the natural inland wetlands cannot be adequately assessed. Remediation has been proposed to counteract the loss of baseflow to the wetland. However, the success of such measure is uncertain, and the applicant proposes to base

the decision on which remediation option to choose on site constraints and stability considerations. Therefore, the most successful remediation option may not be chosen and there is no certainty.

764. There are also cultural values to consider, an evaluation of which can only be undertaken once the decision makers have heard from Mana Whenua and matters are discussed in detail. The direct submission of Te Ngāi Tūāhuriri Runanga states that the proposal is unacceptable.

765. A key consideration is that of the Waste Acceptance Criteria proposed for the site. Expert evidence states that the proposed acceptance criteria will include persistent chemicals that will not naturally degrade at the same rate as the proposed engineered containment, despite adherence to the WAC. The difference in degradation is decades/ centuries vs. millennia. While the landfill design is in general accordance with the requirements stipulated by WasteMINZ for the proposed WAC, the geology of the site does not naturally provide attenuation, nor containment of the generated leachate, should, and when leakages occur. This constraint is also recognised by the WasteMINZ Guidelines, which highlight a need to consider underlying geology due to the finite lifetime of engineered mitigation. This conclusion considers that a relatively large proportion of the more contaminated material listed in the WAC will be disposed of at the site, as cheaper alternatives exist for the disposal of 'clean' material. I note that a significant degree of uncertainty remains regarding the actual composition and proportion of waste streams to be accepted, and this in turn influences the below conclusions;

766. The application included modelling of the groundwater hydrology and thus the likely leachate plume and subsequent Scenario calculations for leachate discharge.

    a. The CRC's experts state that the modelling has underlying limitations, which have not been accounted for, such as the potential for preferential flow paths and thus accounting for double porosity of the site. This would only affect the time it takes for leachate to travel to the receiving environment.

    b. The effects assessment presented by the application for the leakage scenarios also includes an assumption of the hydrology of the Karetu River, which is not supported by baseline monitoring. The CRC's expert review concluded that the assumptions made by the applicant are overrepresentations and therefore, the dilution factor applied to contaminant concentrations may be much lower.

    c. There are also some limitations within the Scenario 1 and 2 modelling (such as not accounting for contaminants persisting under prolonged MALF condition) which could indicate noticeable effects, such as algal blooms, even for Scenario 1 and 2.

    d. Leachate Scenario 3 shows that concentrations including (but not limited to) PFHxS, PFOS and arsenic could rise to within an order of magnitude of drinking water MAVs.

    e. If 100% of the daily average leachate volumes are discharge to the river, ammonia and chromium guidelines would be exceeded, with effects on aquatic ecology likely to occur.

    f. Arsenic concentrations have not been modelled downstream even though it is a contaminant of concern. This could have implications for ecological guidelines values and drinking water standards.

    g. The leachate scenarios do not address the potential impacts on the Karetu River after closure of the landfill, when leaks in the liner could become larger over time and thus pose a threat to water quality in the Karetu River for an indefinite amount of time post-closure. While the applicant has referenced the potential for

remediation, no details have been provided what this would entail and whether remediation is realistic.

h. Further, the deposition of PFAS, an unavoidable contaminant in the C+D waste industry, could pose a long-term risk to aquatic ecology and human health and this has not been quantified.

767. This also highlights uncertainties around the performance of the leachate collection system and the underdrainage system, which prevents groundwater coming into contact with the liner, which could promote degradation and waste, which will cause additional leachate to be generated.

768. The location chosen for the proposed fill site is not considered entirely appropriate. Once the liner and the remaining engineered mitigation degrades or fails, a discharge of persistent contaminants into the surrounding environment will occur. The site's geology will not assist in assimilating the leakage and may in fact favour preferential flow paths into groundwater, and ultimately surface water. I have addressed this in an earlier section and described that this matter requires careful consideration of tolerance for high probability for risk of adverse effects in the future vs. benefit gained from this proposal in the shorter term.

769. In summary, the CRC's groundwater expert and surface water expert have stated that when assessing the worst-case scenario, adverse effects will likely occur to groundwater quality, surface water quality, surface water ecology and potentially water users downstream of the landfill site to varying degrees. These are effects that will manifest in the future over longer timescales, once the engineered mitigation loses its effectiveness.

770. A risk also remains that these effects manifest themselves at an earlier stage, due to inadequate construction of the landfill, natural hazards or abandonment of the site and operational requirements. I consider that this can be quantified with a lower probability, as these aspects can be managed with conditions, or are generally deemed to pose a low risk (natural hazards).

771. A question remains regarding the post-close management of the site, appropriate durations and bond requirements. While experts agree that these are all necessary aspects for this proposal, a suitable timescale is subject to debate, particularly considering the proposed WAC, the eventual discharge from the landfill once mitigation fails, and the permanent nature of the proposal, which will at some point in time, became a public liability.

772. There are also several other matters that may result in changes to the risk profile of the proposed landfilling activity, including inadequate receiving environment monitoring and uncertainty about the response to monitoring, as well as the management of stormwater. The application has also suggested the provision of management plans that are important for an overall review of the proposal, but these are to be submitted once/if consent is granted.

773. I therefore consider that the residual adverse effects will be more than minor and unacceptable. The appropriateness of the landfill design in all other aspects does not reduce the scale of the effects to a minor level, compensate for the siting constraints or allow for an overall conclusion to be considered acceptable.

774. However, if the decision makers are of a mind to grant this application, the following is recommended:

a. The proposed conditions by the applicant require a significant overhaul and need to address issues that have been identified above; and

b. The conditions should set clear and enforceable performance criteria rather than leaving important design matters and decisions on significant technical matters to be considered after the granting of the application (if granted).

Off-setting of, or Compensation for, Actual and Potential Adverse Effects to Ensure Positive Effects on the Environment (Section 104(1)(ab))

775. I have put my mind to Section 104(1)(ab) and a possible offset and compensation from the proposal. The application has referenced measures with the appendices in relation to drinking water, such as:

    a. The provision of an alternative water supply to affected properties who supply domestic water from the river or hydraulically connected water table. This could be through the following measures:

        i. A new and deeper well could be drilled to target a deeper aquifer;

        ii. A surface water take from a different stream with onsite storage could be implemented;

        iii. An extension to the nearby Ashley rural water supply scheme could be installed;

        iv. Long-term water carting with onsite storage solutions could be considered.

776. The applicant has also proposed to plant a 10 m width on the left bank of the Karetu River. I concur with Ms Tiernan that this will have positive effects on bank stability and instream habitat, although it is not specifically linked to offset or compensate for an identified effect.

777. The supplied Lizard Management Plan contains measures (Section 5.4.2) that relate to pest control. Dr Tochter notes that compensation doesn't need to be lizard centric but should only be counted if measures are additional. Actions proposed to balance other effects on biodiversity are not additional, which is the case for the proposed actions in Section 5.4.2.

778. She states that the other measures listed by the applicant as avoidance/ remediation or mitigation should be considered compensation, but these measures were not listed as compensation measures by the applicant as such.

779. Overall, Dr Tochter raised that compensation may be the only remaining suitable option since the applicant could not demonstrate adequate avoidance/ mitigation or remedy options for the effects on lizards. She also noted that compensation success is uncertain.

780. No other specific mention of 'offset' or 'compensation' measures were included within the application.

781. The CRC's reviewers have commented on the suitability of off-setting or compensation and stated the following:

    a. Dr Massey noted that since much of the material emplaced at this site will not degrade over time, offsetting or compensation measures should account for the effectively permanent hazard the proposed activity would create. Therefore, he considers that the short-term (years to decades) offsetting or compensation does not account for the timescale of potential environmental impacts from the activities, which will persist for thousands of years.

Relevant Statutory Provisions (Section 104(1)(b))

782. Section 104(1)(b) requires the decision maker to have regard to the relevant provisions of the following documents:

    a. A national environmental standard;

    b. Other regulations;

    c. A national policy statement;

    d. A New Zealand coastal policy statement;

    e. A regional policy statement or proposed regional policy statement;

    f. A plan or proposed plan;

783. Of relevance to this application are the following documents and provisions:

    a. National Environmental Standards Freshwater (discussed in the rules section).

    b. Resource Management (Measurement and Reporting of Water Takes) Regulations 2010

    c. National Policy Statement for Freshwater Management (2020)

    d. National Environmental Standard for Sources of Human Drinking Water Regulations 2007

    e. National Policy Statement for Greenhouse Gas Emissions from Industrial Process Heat (2023)

    f. National Policy Statement for Indigenous Biodiversity (2023)

    g. Canterbury Regional Policy Statement

    h. Canterbury Land and Water Regional Plan

    i. Canterbury Air Regional Plan

Resource Management (Measurement and Reporting of Water Takes) Regulations 2010

784. The water take will result in a combined take that is less than the minimum take requirements of 5 L/s that applies under these regulations. Accordingly, they are not applicable.

National Policy Statement for Freshwater Management 2020 (NPS-FM 2020)

785. The NPS-FM 2020 came into force on September 2020, and was amended by the Resource Management (Freshwater and Other Matters) Amendment Bill on 22 October 2024.

786. The applicant provided an assessment of the NPS-FM 2020 which concluded that the outcomes sought by the NPS-FM 2020 will be achieved by the proposal. In particular, the applicant states that the health and well-being of water bodies in the area will be at least maintained, the health needs of people, and in particular drinking water quality will not be adversely impacted, and the proposal will not undermine the ability of people and communities to provide for their social, economic, and cultural wellbeing, now and in the future.

787. I note that the applicant's assessment of the NPS was made prior to the amendments made in October 2024. The changes mean that we must not have regard to the Hierarchy of Obligations in Te Mana o te Wai (i.e. clause 1.3(5)) or the sole objective of the NPS. However, the amendments did not remove the need to '*have regard*' to the policies in the NPS, including Policy 1.

788. Particular objectives and policies that are relevant to the proposed landfill therefore are:

Assessment of the NPS-FM 2020	
Provision	**Comments**
Policy 1: Freshwater is managed in a way that gives effect to Te Mana o te Wai.	First: the health and well-being of the water and freshwater ecosystems The applicant references abandoning another location as a possible alternative on the basis of a stream depleting effect that would have been contrary to the first priority for freshwater ecosystems. I do not consider that this is a valid statement to demonstrate that the current proposal has had regard to the first priority of Te Mana o te Wai. I am also of the understanding, based on expert reviews, that the applicant has not conducted site selection in accordance with WasteMINZ Guidelines (2023). The applicant then further discusses reasons, why the proposal is not contrary to the policy, incl. referencing infrastructure upgrades, control of stormwater, engineered mitigation measures, incl. containment and leachate collection, monitoring to maintain water quality, possibility of rectifying a worst-case scenario leakage, no effects on drinking water and monitoring incl. action response. As stated in an earlier section of my report, I agree with the applicant when stating that the risks posed to water and aquatic ecosystems in the short term, provided that the engineered mitigation is implemented, is acceptable. The landfill design review concluded that natural hazards are unlikely to affect the liner system and assured that with adequate quality control, a sufficiently protective liner can be installed on site to ensure that effects on freshwater ecosystems are unlikely and acceptable. However, the engineered mitigation is expected to degrade over time and therefore, given that the landfill will form a permanent part of the landscape, sufficient weight has to be given to future scenarios. There is therefore uncertainty which cannot be mitigated, and which may have a moderate or high consequence to water quality and freshwater ecosystems. Some of the referenced mitigation, such as roading upgrades and stormwater management are expected of the applicant regardless of this proposal being implemented and therefore I disregard such measures to demonstrate consistency with the policy. Equally, monitoring on its own is not considered mitigation when not coupled with a certain action response. This is not provided in the application,

	as discussed in my assessments. Not only is the response to smaller level exceedances uncertain, but I am also unable to determine how the applicant proposes to 'rectify' a worst case, total leachate loss scenario once discharged into the freshwater environment. <u>Second: the health needs of people</u> The applicant states that the modelled scenarios, incl. the worst-case leachate scenario does not affect human drinking water standards. My assessment discussed the limitations of this assertion and also highlighted the potential for persistent chemicals, such as PFAS to enter the waterway which is being used for drinking water purposes. Therefore, I consider that significant uncertainties remain regarding the application's assertion, particularly when considering the eventual degradation of the liner. I also acknowledge that there is a benefit in providing a managed landfill for contaminated material in relation to the general health needs of people, by ensuring that contaminated soils do not end up in unmanaged sites. <u>Third: ability of people and communities to provide for their social, economic and cultural well-being, now and in the future.</u> On the topic of cultural well-being, I consider the submission and advice received from Rūnanga, which raises significant concerns with the proposal. I acknowledge that the proposal may provide an economic benefit to a select few, and will provide for a number of employment opportunities. However, this is balanced with the potential of economic losses associated with a degradation of water quality and economic activities that rely on a safe supply of water (farming, beekeeping etc. within the local community). Given the large number of submissions in opposition of this proposal, and possible effects on amenity, I do not consider that the third tier of Te Mana o te Wai can be provided for.
Policy 2: Tangata whenua are actively involved in freshwater management (including decision making processes), and Māori freshwater values are identified and provided for.	I note that the applicant considers that as feedback was sought from Runanga, and with the proposed ecosystem and cultural health monitoring, the proposal is consistent with this policy.

	Tangata Whenua have provided advice on the proposal for the purpose of the notification assessment and Rūnanga lodged a submission in opposition to the proposal, stating that engagement was not sought by the applicant, specifically, Rūnanga were not asked to part-take in the site selection process, among other things. After undertaking a review of the advice and submission, I consider that the freshwater values have not been identified and provided for by this proposal.
Policy 3: Freshwater is managed in an integrated way that considers the effects of the use and development of land on a whole-of-catchment basis, including the effects on receiving environments.	The land use activities proposed have the potential to adversely affect freshwater and this potential risk has been assessed by the applicant and in this report.
Policy 4: Freshwater is managed as part of New Zealand's integrated response to climate change	The main components of the proposal that may be impacted by climate change are, due to increased severity of rain events; stormwater discharges, possibly higher a groundwater table and leachate generation and increased flooding of the site, and associated effects on freshwater. Effects from the opposite, drought conditions, could exacerbate effects associated with dust generating activities on site, and thus increase the demand on water for dust suppression. The applicant has addressed these scenarios within the application by accounting for climate change scenarios in modelling. Leachate pond capacity has been based on the inaccessibility of the site for 14 days or peak daily flows during the open stage, (incl. climate change scenario RPC8.5 for the second scenario). Flood modelling includes a climate change scenario. Stormwater sizing, to the best of my knowledge, has been based on annual average rainfall for the site, incl. the RPC 8.5 scenario for 2081-2100. The applicant has not specifically addressed the availability of water from the Karetu River, the possibility of increased sub-liner drainage water due to higher groundwater tables, or higher average daily leachate rates through the landfill. Thus, some effects remain uncertain.
Policy 5: Freshwater is managed (including through a National	The ecological value of the Karetu River has been assessed as very high by the applicant and the

Objectives Framework) to ensure that the health and well-being of degraded water bodies and freshwater ecosystems is improved, and the health and well-being of all other water bodies and freshwater ecosystems is maintained and (if communities choose) improved.	CRC expert reviewer. The applicant considers that the proposal will at least maintain the health and wellbeing of the Karetu River. Given the finite lifetime of the proposed landfill design, and remaining uncertainties regarding hydrogeology and the underlying geology of the site, there is a potential for adverse effects in the downstream freshwater environment. The applicant has acknowledged these effects but maintains that monitoring will detect discharges that have the potential to impact on the health of the river. The tiered actions and responses will ensure that water quality is maintained. I agree with the above statements regarding the ability to recognise effects on the river with a robust monitoring programme. However, the tiered action response plan does not give certainty that effects will be managed adequately. Additionally, adverse effects become more probable in the medium to longer term, when it is expected that the engineered mitigation will no longer function to its full extent and the applicant is no longer actively managing the site. In summary, while in the short term the water quality will be potentially maintained (certainly not improved), this is not a certainty in the future, once the engineered mitigation fails. A level of uncertainty therefore remains.
Policy 6: There is no further loss of extent of natural inland wetlands, their values are protected, and their restoration is promoted.	The applicant has not addressed this policy in the provided assessment. I note that the proposal includes the reduction of baseflow from one of the natural inland wetlands on site, which may impact on the reduction of the area of the wetland, and thus also values. The applicant has provided two options for remedying the loss of baseflow. The details of the implementation and likelihood of success of these remedial actions are not yet known and the applicant has not provided a preference for either of the options but has stated that the chosen option will be guided by site constraints, rather than likely success. Overall, if successful, the remedial option may be able to prevent the further loss of the extent of the wetland, but it will not aid in its restoration. Given the uncertainty in the success of the remedial option, I consider that the proposed activity is not entirely consistent with this policy.

Policy: The loss of river extent and values is avoided to the extent practicable.	As discussed earlier, the engineered mitigation has a finite lifetime. The emplaced waste will include persistent contaminants which will not biodegrade and thus will be released into the environment at some point in the future. The river values are therefore compromised.
Policy 9: The habitats of indigenous freshwater species are protected.	The applicant considers that proposed upgrades will generate improvements for the health and wellbeing of the Karetu River. I presume that the applicant means the improved erosion and sediment control on site, referenced in earlier assessments. I do not consider this part of my assessment, as the improvements in stormwater discharges are a requirement for the site regardless of this proposal being authorised, under the CLWRP and the RMA. The applicant further mentions ecological health monitoring as a measure towards consistency with this policy. I consider that monitoring in itself is not a measure that will contribute towards protection of indigenous freshwater species. The proposal could potentially have effects on the wider catchments water quality, when the design of the landfill eventually fails. I consider that there is high risk for this to occur in the long term, therefore, potentially being detrimental to the freshwater species in the surrounding area over time.
Policy 11: Freshwater is allocated and used efficiently, all existing over-allocation is phased out, and future over-allocation is avoided.	The applicant has proposed the take of water from the Karetu River within permitted activity volumes. Therefore, I consider that this proposal is consistent with the policy.
Policy 13: The condition of water bodies and freshwater ecosystems is systematically monitored over time, and action is taken where freshwater is degraded, and to reverse deteriorating trends.	Based on expert advice received, I consider the current monitoring proposed is inadequate. Therefore, it is unclear when and if action is taken to reverse any adverse effects observed in receiving environments (should they occur), and it is not clear how and if reversing the effects would be possible. The proposed TARP includes uncertain actions that should be undertaken when practicable, while permitting discharges of contaminants above limits for uncertain period of time until remediation can be undertaken.
Policy 15: Communities are enabled to provide for their social, economic, and cultural wellbeing in a way that	Given the submission from Tangata Whenua, community groups and members of the public, I consider the proposal will not provide for the social

is consistent with this National Policy Statement.	and cultural wellbeing of the local community, although it is acknowledged that the landfill may create jobs. Economic wellbeing of surrounding property owners may be adversely impacted if the adverse effects were significant enough to cause flow-on adverse effects on the rural activities surrounding the proposed site.

789. Overall, while it is acknowledged that the applicant intends to provide for a high level of engineered protections to avoid adverse effects on the downgradient freshwater environment (including the underlying aquifer), I consider that the current proposal will not achieve the objective of the NPS-FM 2020 due to several inconsistencies with policies. It is again highlighted that while the engineered mitigation is considered suitable mitigation for the proposal in the short term and throughout the lifetime of the operation (if implemented properly), the geology of the site is not entirely suitable to contain leachate containing persistent contaminants over the long term. The discharge of those persistent contaminants in the future may cause a moderate to significant adverse effect, that will be borne by future generations, or if failure of the engineered liner and mitigation occurs, in shorter timescales. This will impact the social and cultural wellbeing of the local community.

790. Accordingly, while I consider that consistency with some of the NPS-FM policies will be achieved, there will also be some notable level inconsistency with other policies, and therefore on balance the proposal is inconsistent with the NPS-FM.

National Environmental Standards for Sources of Human Drinking Water Regulations 2007

791. The NES for sources of drinking water was gazetted in June 2008. The purpose of the standard is to reduce the risk of human drinking water becoming contaminated. Under the NES for sources of human drinking water, regional councils are specifically required to "*place conditions on relevant resource consents that require notification of drinking water suppliers if significant unintended events occur that may adversely affect human drinking water*."

792. Regulations 7 and 8 apply to drinking water supplies that provide no fewer than 501 people with drinking water for not less than 60 days each calendar year. The WDC community supply well is located not directly in the vicinity of the site but is downstream.

793. According to the publicly available database on Taumata Arowai's website. The nearest registered drinking water supply is some 20 km downstream of the site. The CRC's record also does not register a closer drinking water supply.

794. Regulation 7 states:

"A regional council must not grant a water permit or discharge permit for an activity that will occur upstream of an abstraction point where the drinking water concerned meets the health quality criteria if the activity is likely to—

(a) introduce or increase the concentration of any determinands in the drinking water, so that, after existing treatment, it no longer meets the health quality criteria; or

(b) introduce or increase the concentration of any aesthetic determinands in the drinking water so that, after existing treatment, it contains aesthetic determinands at values exceeding the guideline values."

795. Based on the above, the advice received from experts and the location of the site to the closest community drinking water supply, I consider it unlikely that the proposed

discharge, even in the worst-case scenario will increase the concertation above the values exceeding the current guideline values.

National Policy Statement for Greenhouse Gas Emissions from Industrial Process Heat 2023 (NPS-GHG 2023)

796. The NES-GHG came into effect on 27 July 2023 and relates to the discharge of greenhouse gases from certain combustion appliances used for generating process hear.

797. The applicant provided the original assessment in Appendix X of the AEE. I note that this assessment has since been revised due to the change from coal fired kiln dryers to diesel fired kiln dryers.

798. The sole objective of the NPS-GHG is:

"The objective of this NPS is to reduce emissions of greenhouse gases by managing the discharges to air of greenhouse gases from the production of industrial process heat, in order to mitigate climate change and its current and future adverse effects on the environment and the wellbeing of people and communities."

799. This is informed by three policies which provide direction on how this objective is to be met. I have provided an assessment of the policies I consider relevant below:

Assessment of NPS-GHG	
Policy	**Comment**
Policy 1: Discharges to air of greenhouse gases from heat devices are reduced or eliminated by: (a) avoiding discharges from new heat devices that burn coal and deliver heat at or above 300 °C, unless there is no technically feasible and financially viable lower emissions alternative; (b) avoiding discharges from new heat devices that burn coal and deliver heat below 300 °C; (c) restricting discharges from existing heat devices that burn coal and deliver heat at or above 300 °C; (d) restricting and phasing out discharges from existing heat devices that burn coal and deliver heat below 300 °C; (e) avoiding discharges from new heat devices that burn any fossil fuel other than coal, unless there is no technically feasible and financially viable lower emissions alternative;	With the amended proposal, which replaced the use of coal with diesel, (a) to (d) is no longer applicable.

(f) restricting discharges from existing heat devices that burn any fossil fuel other than coal	
Policy 2: Regional councils consider the cumulative effects of discharges of greenhouse gases when considering resource consent applications for discharges from heat devices.	I agree with the applicant's original proposal that the only source of GHG discharge is associated with the site is the heating device and that in consideration of the broader environment, cumulative effects are not anticipated. The proposal will be consistent with this policy.
Policy 3: Holders of resource consents for discharges to air of greenhouse gases from heat devices update relevant emissions plans to reflect technological developments and best practice	The applicant has amended the proposal to replace coal with diesel. The use of diesel will also cease once limestone extraction has ceased, at the formation of landfill Stage 2. I agree with the applicant that the proposal will be consistent with this policy.

National Policy Statement for Indigenous Biodiversity 2023 (NPS-IB)

800. The NPS-IB came into force on the 4 August 2023. It is applicable to the management of indigenous biodiversity in the terrestrial environment of Aotearoa New Zealand and prioritises its mauri and intrinsic value. This recognises that the health and wellbeing of people and communities is dependent on the health and wellbeing of indigenous biodiversity and that people have a responsibility to care for it in return.

801. The Canterbury Regional Policy Statement (CRPS) 2013 (revised 2017) made territorial authorities:

> *"solely responsible for specifying the objectives, policies and methods for the control of the use of land for the maintenance of indigenous biodiversity on all land outside of wetlands, the coastal marine area, and beds of lakes and rivers"*

802. Given this, the CRC's current plans, except where they deal with wetlands, the beds of lakes and rivers, or the coastal marine area, are largely silent on matters relating to terrestrial indigenous biodiversity. The NPS-IB, however, post-dates both the CRPS and CRC plans, and provides new national policy direction for local government.

803. While this new national policy direction must be "given effect" to through the future development of regional policy statements, regional plans, and district plans, consent decision-makers must "have regard" to the relevant provisions of the NPS-IB as soon as it took effect on 4 August 2023.

804. This means that, where activities requiring consent under one of the CRC's plans have effects on terrestrial indigenous biodiversity, and those effects are within the discretion of consent decision makers, the policy direction of the NPS-IB is relevant to those decisions, needs to be 'weighed' against other matters in Section 104 of the RMA and carries significant weight (as it post-dates the CRPS and all CRC plans).

805. The proposal also affects a SNA, terrestrial ecology and habitat relevant for the District Plan assessment. As such, I adopt the assessment of the NPS-IB from the District Plan assessment.

Canterbury Regional Policy Statement

806. Under Section 104(1)(b)(v) of the RMA, the consent authority shall have regard to the relevant provisions of a regional policy statement. The Canterbury Regional Policy Statement (RPS) became operative on 15 January 2013 and provides an overview of the significant resource management issues facing the Canterbury Region, including issues of resource management and Ngāi Tahu.

807. However, I note that the CRPS is somewhat dated, as it does not give effect to the NPS-FM, the NPS-IB and it does not include objectives and policies related to issues of significance to Ngai Tahu.

808. An assessment of the objectives and policies which are considered relevant to the proposed activity are detailed below:

Assessment of the CRPS	
Chapter 7 Freshwater	
Objective 7.2.1: The region's freshwater resources are sustainably managed to enable people and communities to provide for their economic and social well-being through abstracting and/or using water for irrigation, hydro-electricity generation and other economic activities, and for recreational and amenity values, and any economic and social activities associated with those values, providing: 1. the life-supporting capacity ecosystem processes, and indigenous species and their associated freshwater ecosystems and mauri of the fresh water is safeguarded. 2. the natural character values of wetlands, lakes and rivers and their margins are preserved and these areas are protected from inappropriate subdivision, use and development and where appropriate restored or enhanced; and 3. any actual or reasonably foreseeable requirements for community and stockwater supplies and customary uses, are provided for	As has been discussed in relation to the NPS-FM, the proposal will not provide for the sustainable management of freshwater. As such, I do not consider that the proposal is consistent with, and may even be contrary to, Objective 7.2.1 of the CRPS. Uncertainty remains regarding the general location of the landfill in terms of siting, which means that adverse effects on the freshwater environment may be unable to be adequately avoided, remedied or mitigated should they occur. I also note in more details that: - The consent of mauri incorporates more than just the biophysical aspects of water. Spiritual consideration must also be included in the assessment and given the submission of Runanga, I consider that the proposal is inconsistent with (1). - The proposal includes, in the first instance, the reduction of the baseflow of a wetland with likely effects on areal extent if not appropriately remedied. The application does not provide sufficient information to conclude that values can be 'appropriately restored', or that any 'enhancement' will result from the proposal.

	I acknowledge that this objective also speaks to the water quantity on site. I agree with the applicant that provided that the subdrainage water taken from groundwater is clean, and can be discharged in its entirety, the quantity of freshwater can be sustainably managed. However, should groundwater in the subdrainage layer become contaminated with leachate, water will have to be removed off site (or alternatively treated). The applicant proposed that this will meet permitted activity water takes of the CLWRP.
Objective 7.2.3: The overall quality of freshwater in the region is maintained or improved, and the life supporting capacity, ecosystem processes and indigenous species and their associated freshwater ecosystems are safeguarded	As noted above, uncertainty remains whether the proposal will appropriately mitigate any potential effects on the quality of freshwaters within the region, particularly when viewed in the longer term. The natural geology of the site is not conducive to containment and thus, contaminants may be discharged at rates and concentrations that will adversely affect freshwater. The proposal will certainly not improve overall quality of freshwater in the region. Therefore, I consider that the proposal is contrary to this objective to some degree.
Objective 7.2.4: Fresh water is sustainably managed in an integrated way within and across catchments, between activities, and between agencies and people with interests in water management in the community, considering: a) the Ngāi Tahu ethic of Ki Uta Ki Tai (from the mountains to the sea); b) the interconnectivity of surface water and groundwater; c) the effects of land uses and intensification of land uses on demand for water and on water quality; and d) kaitiakitanga and the ethic of stewardship; and e) any net benefits of using water, and water infrastructure, and the significance of those benefits to the Canterbury region.	The relationship between the uncertainty of land use activities and water quality has been the key consideration throughout the audit of the application. The CRC's experts have provided a review of water quality effects within the proposed catchment and have included consideration for several of the issues raised in this objective, incl. the interconnectedness between surface and groundwater, the effects of the land use activity on water downstream of the site. The conclusion is that while mitigation can be provided to ensure adequate management of the effects in the short term, uncertainties remain about long term effects of the proposal, contingency and the adequacy and mechanisms of remediation, should the proposed mitigation fail. Further, Runanga consider, through their submission (SUB034552), that the proposal is inappropriate as the '*proposal*

	is inappropriate at the head of a catchment and would further diminish the mauri of the waterway.'
Policy 7.3.3: To promote and where appropriate require the protection, restoration and improvement of lakes, rivers, wetlands and their riparian zones and associated Ngai Tahu values.	I agree with the applicant that the proposal includes aspects that will enhance the Karetu River values, such as removal of the existing ford crossing and replacement with a more suitable alternative. I do not consider that stormwater improvements, which should already occur to authorise the existing activity, should be used to demonstrate that values will be improved. A critical aspect to consider is the effect of the groundwater take on the wetland. While the reduction of the baseflow is proposed to be remedied, the success of such remediation is uncertain and while two options are proposed, the applicant leaves the selection to a later date, driven by site constrains primarily. The wetlands in this instance are not protected. I do not consider that the remediation proposal constituted 'restoration' in this instance as the applicant proposed the adverse effect to begin with. Runanga have directly spoken to this aspect within their submission and consider the proposal inappropriate in this context. The proposal is therefore inconsistent with this policy.
Policy 7.3.5: To avoid, remedy or mitigate adverse effects of land uses on the flow of water in surface water bodies or the recharge of groundwater	Based on the hydrogeological assessment and the review of the application by the CRC's technical expert, it was determined that the proposed groundwater water take is unlikely to affect the flow of water in the Karetu River significantly. However, as noted above, the wetland will be adversely impacted. Avoidance of this effect is unlikely due to space constraints and the engineered mitigation of the landfill. I consider that on this basis, the proposal is partly inconsistent with this policy.
Policy 7.3.12: To take a precautionary approach to the allocation of water for abstraction, the damming or diversion of water, or the intensification of land uses or discharge of contaminants, in circumstances where the effects of these activities on freshwater bodies,	I do not consider that the proposal includes a precautionary approach for the discharge of contaminants. This not only includes the discharge of leachate from the landfilling activity, but also extends to the management of stormwater on site,

singularly or cumulatively, are unknown or uncertain.	which is proposed to be reactive and ad hoc. As outlined by the CRC's experts, modelling of the leakage rates and effects is contingent on a number of assumptions, which have not been adequately explored (e.g. hydrology of the Karetu to provide for dilution, preferential flow paths). This introduces an uncertainty which is not consistent with a precautionary approach. The abstraction of water is intended to meet permitted activity volumes but the volume of water to be abstracted by the underdrainage system is not certain. The proposal is in part inconsistent with the policy.
Chapter 9 Ecosystems and Biodiversity	
Objective 9.2.1: Halting the decline of Canterbury's ecosystems and indigenous biodiversity Objective 9.2.3: Protection of significant indigenous vegetation and habitats.	The proposed site includes a SNA, wetlands and lizard habitat. District Council will address the SNA in further detail. The wetlands and the lizard habitat are ecologically significant under the CRPS. The areas of the site that provide habitat for Canterbury grass skinks represent '*significant fauna habitat'* and having an *At Risk Declining* status is enough to trigger significance. Additionally, according to the review by Dr Tochter, several other areas of the site, some of which have not been surveyed, may be considered '*significant fauna habitat*' requiring protection through application of the effects management hierarchy. This also includes the riparian margins which have not been assessed by the applicant in relation to lizard values. The proposal includes the disturbance and removal of lizard habitat, and the reduction of the baseflow to the lower wetland. The herpetologist's advice includes a conclusion of significant residual effects arising from the proposal. The wetland ecologist's conclusion states that the applicant's assessment of significance was incorrect, and Dr Rate

	considers that the wetlands should be considered significant indigenous vegetation. The applicant's proposal includes effects on the wetlands which may or may not be remedied. The remediation proposed by the applicant is uncertain and therefore, I am unable to conclude that the applicant will adequately 'protect' the habitat. I therefore consider that the proposal is contrary to both of these objectives, by perpetuation the decline of indigenous biodiversity and by directly impacting on significant indigenous vegetation and habitats.
Chapter 10: Beds of Rivers and their Riparian Margins	
Objective 10.2.1: Enable subdivision, use and development of river and lake beds and their riparian zones while protecting all significant values of those areas, and enhancing those values in appropriate locations	The proposal includes works within the riparian margin of the Karetu River and within the Karetu riverbed itself, by removing a ford and installing an access bridge, and by bunding the site. I consider that with the proposed mitigation, the proposal is consistent with the objective. I agree with the applicant that the removal of the ford will enhance the values within the Karetu River. The proposed bund along the riparian margin does not in itself enhance values, but is required for 'enabling' the use of land, while protecting the values of the river, if managed appropriately.
Objective 10.2.4: Maintenance and enhancement of public and Ngāi Tahu access to and along rivers and lakes.	The proposal does not include the enhancement of public access along the river, and I note it further proposes restrictions on access due to the placement of a locked gate. I am uncertain whether this locked gate will be placed at the entry to the legal road between Quarry Road and the river or directly at the commencement of the proposed bridge. The proposal includes the occupation of LINZ managed riverbed and the best of my knowledge, the applicant does not possess license agreements with LINZ for the existing and proposed activities. I note that the processing portion of the site is such an example, which occupies a legal riverbed title, although, this is likely due to inaccuracies in early mapping of titles and/or changes in river morphology.

	Currently, the access to the riverbed is therefore compromised and the proposal does not include any maintenance, nor enhancement of access. In my view, the proposal will encourage further distancing of the public and Ngai Tahu from this area and the riverbed, due to the nature and intensity of the proposed activity. Therefore, the proposal is contrary to this objective.
Policy 10.3.1 To provide for activities in river and lake beds and their riparian zones, including the planting and removal of vegetation and the removal of bed material, while: 1. recognising the implications of the activity on the whole catchment; 2. ensuring that significant bed and riparian zone values are maintained or enhanced; or 3. avoiding significant adverse effects on the values of those beds and their riparian zones, unless they are necessary for the maintenance, operation, upgrade, and repair of essential structures, or for the prevention of losses from floods, in which case significant adverse effects should be mitigated or remedied.	I have addressed this policy above under comments made for objective 10.2.1. Overall, I consider that the proposal is consistent with this policy.
Policy 10.3.5: To promote the maintenance and enhancement of public and Ngāi Tahu access to and along the beds of rivers and lakes, and to ensure that subdivision use and development does not result in inappropriate loss of existing access, subject to: 1. protecting public health and safety, and avoiding conflict between different types of access; 2. avoiding adverse effects on the values of the beds, or stability of banks; 3. protecting Ngāi Tahu cultural values and sites of significance from inappropriate public access; 4. protecting the stability, performance and operation of essential structures in, on, under or over the beds; 5. ensuring the integrity of flood-protection vegetation is maintained; 6. avoiding conflicts with the legal rights	I have addressed this policy under the assessment for objective 10.2.4. Overall, I consider that the proposal is inconsistent with this policy and contrary to some of the provisions, such as (1), (3), (6) and (7).

and lawful activities of owners/occupiers of river or lake beds and adjacent land, or of the owners/operators of infrastructure in, on, under or over the bed; and 7. engaging with the Walking Access Commission to identify and negotiate issues around public access	
Chapter 11 Natural Hazards	
Objective 11.2.1: Avoid new subdivision, use and development of land that increases risks associated with natural hazards.	The use of the word 'avoid' in this instance is a directive provision and therefore I have carefully considered whether the proposal meets this requirement. While the site is located in areas with identified fault lines, the assessment of the geotechnical expert noted that the overall risk passed by seismic activities should be considered low. Equally, flooding hazards are not or relevance to the landfill footprint, due to the elevation of the quarry area. Other hazards, such as fire hazards, can be avoided or managed adequately through conditions. I consider that the proposal is consistent with this policy.
Chapter 14 Air Quality	
Objective 14.2.1: Maintain or improve ambient air quality so that it is not a danger to people's health and safety, and reduce the nuisance effects of low ambient air quality Objective 14.2.2: Enable the discharges of contaminants into air provided there are no significant localised adverse effects on social, cultural and amenity values, flora and fauna, and other natural and physical resources. Policy 14.3.5: In relation to the proximity of discharges to air and sensitive land-uses: 1. To avoid encroachment of new development on existing activities discharging to air where the new development is sensitive to those discharges, unless any reverse sensitivity effects of the new development can be avoided or mitigated. 2. Existing activities that require resource consents to discharge contaminants into air, particularly where reverse sensitivity is an issue, are to adopt the best practicable option to prevent or minimise any actual or likely adverse effect on the environment. 3. New activities which require resource consents to discharge contaminants into air	The assessment of effects and the advice by the CRC air quality expert conclude that the overall impacts of dust discharges will be no more than minor and no sensitive receptors will likely be affected, subject to compliance with proposed avoidance and mitigation measures. Based on the above I consider that the dust discharges will not contribute to a decline in ambient air quality, nor are they likely to pose a threat to people's health and safety. The proposal is therefore consistent with the air quality objectives and policies of the CRPS.

are to locate away from sensitive land uses and receiving environments unless adverse effects of the discharge can be avoided or mitigated.	
Chapter 19 Waste Minimisation and Management	
Objective 19.2.2: Adverse effects on the environment caused by residual waste and its management are avoided, remedied or mitigated.	The proposal is contrary to the objective. Waste placement at this site can be avoided and is not a necessity, with suitably alternatives within the region and the district. Due to the underlying geology of the site, it is not considered entirely suitable for the type of waste to be accepted. When discharges occur, it is uncertain whether the effects can be remedied or mitigated. If viewed more broadly, the proposal provides a specifically designed facility for this waste stream. However, as noted, there are other available, consented facilities within the region and even within the adjacent district that are able to take the proposed waste stream. I consider the proposal is contrary to these provisions.
Policy 19.3.3: Promote an integrated approach to waste management in the region.	I agree with the applicant that this proposal takes an integrated approach to waste management in the region. However, it does not implement the objective as stated above.

809. Overall, I consider the proposal in its current form cannot achieve the objectives and policies of the CRPS relating to freshwater management, and ecosystems and biodiversity. The proposal cannot achieve the objectives related to public and Ngai Tahu access to riverbed. The proposal, by its nature, is also contrary to the objective related to waste management, as despite the engineering mitigation, it is recognised that a discharge into the environment will occur and therefore adverse effects on the environmental are not avoided, and it is uncertain whether effects can be remedied or mitigation, when they do occur. However, the proposal is not entirely inconsistent with the provisions relating to air quality and natural hazards.

Canterbury Land and Water Regional Plan

810. The CLWRP is the operative regional plan that seeks to manage land and water resources in the Canterbury Region. The CLWRP is intended to operate at two-levels. There is a region-wide section, which contains the objectives and policies which apply across the whole region and ten sub-regional sections which apply to individual regions.

811. While it is noted in the CLWRP that the objectives and policies are intended to be read and applied together as a comprehensive suite, I consider the following are most relevant to the proposal.

Assessment of the CLWRP objectives and policies	
Provision	**Comments**
National Direction	
Policy 2A.1: 1. When considering any application for a discharge the consent authority must have regard to the following matters: (a) the extent to which the discharge would avoid contamination that will have an adverse effect on the life-supporting capacity of fresh water including on any ecosystem associated with fresh water; and (b) the extent to which it is feasible and dependable that any more than minor adverse effect on fresh water, and on any ecosystem associated with fresh water, resulting from the discharge would be avoided. 2. When considering any application for a discharge the consent authority must have regard to the following matters: (a) the extent to which the discharge would avoid contamination that will have an adverse effect on the health of people and communities as affected by their contact with fresh water; and (b) the extent to which it is feasible and dependable that any more than minor adverse effect on the health of people and communities as affected by their contact with fresh water resulting from the discharge would be avoided. 3. This policy applies to the following discharges (including a diffuse discharge by any person or animal): (a) a new discharge, or (b) a change or increase in any discharge – of any contaminant into fresh water, or onto or into land in circumstances that may result in that contaminant or, as a result of any natural process from the discharge of that contaminant, any other contaminant) entering fresh water. 4. Paragraph 1 of this policy does not apply to any application for consent first lodged before the National Policy Statement for Freshwater Management 2011 took effect on 1 July 2011 5. Paragraph 2 of this policy does not apply to any application for consent first lodged before	Policy 2A.1 was implemented in response to the NPS-FM 2014 and states that regional councils have regard to whether a discharge of contaminants avoids adverse effects on the life-supporting capacity of freshwater, and whether more than minor effects can be avoided. Equally this applies to the health of people. The applicant stated that the discharge of leachate will be inevitable, but considers that the effects of this discharge will be less than minor on the basis of modelling. Equally, it is anticipated that contaminants in stormwater will be discharged, as evident from the trigger action response plan. The degree of the effects remains uncertain for both aspects of the discharge and this has been the subject of the audit of this application. As stated in earlier sections, this uncertainty increases with time, due to liner degradation being inevitable. Although I acknowledge that degradation, or failure, other than due to human error or significant natural hazards, is projected some 400+ years into the future. With the emplacement of persistent contaminants, the discharge will eventually occur. Avoidance of contaminants of concern would be achievable with a revision of the waste acceptance criteria for the site. In terms of stormwater, the applicant has acknowledged, by way of providing a Stormwater Management Report in the appendices of the application, that several improvement measures are required to render the site best-practice in terms of stormwater management. Yet, not all of these measures will be adopted at the on-set of the proposed activity but instead will be incorporated ad hoc in response to trigger events. In my opinion, this introduces considerable uncertainties and does not demonstrate adequately that discharges with more than minor effects will be avoided 'to the extent to

the National Policy Statement for Freshwater Management 2014 takes effect.	which it is feasible and dependable'. This assessment also extends to human health. I consider that the proposal is likely inconsistent with the policy.
Objectives	
Objective 3.1: Land and water are managed as integrated natural resources to recognise and enable Ngāi Tahu culture, traditions, customary uses and relationships with land and water	Based on the cultural advice report by Mahaanui Kurataiao and the direct submission of Runanga, I consider that the proposal is inconsistent with this objective and the related policy 4.14B.
Objective 3.2: Water management applies the ethic of ki uta ki tai – from the mountains to the sea – and land and water are managed as integrated natural resources recognising the connectivity between surface water and groundwater, and between fresh water, land and the coast.	The CRC's experts have provided a review of water quality effects within the proposed catchment and have included consideration for several of the issues raised in this objective, incl. the interconnectedness between surface and groundwater, the effects of the land use activity on water downstream of the site. The conclusion is that while mitigation can be provided to ensure adequate management of the effects in the short term, uncertainties remain about long term effects of the proposal, contingency and the adequacy and mechanisms of remediation, should the proposed mitigation fail. Further, Runanga consider, through their submission (SUB034552), that the proposal is inappropriate as the '*proposal is inappropriate at the head of a catchment and would further diminish the mauri of the waterway.*'
Objective 3.5: Land uses continue to develop and change in response to socio-economic and community demand.	I agree with the applicant's assessment that the creation of a specific inert C+D landfill fulfils this objective. There is clearly a need for a disposal option for this waste stream beyond the Class 1 option (Kate Valley), due to the significant cost associated with the disposal fees and the distance from the major source of this waste.
Objective 3.6 Water is recognised as essential to all life and is respected for its intrinsic values	I have addressed this throughout the assessment of the CRPS and the relevant NPSs. I acknowledge that the applicant considers that this objective is being fulfilled and note that another proposed location was abandoned as it would have been contrary to this objective. I do not consider that abandonment of another site sufficiently demonstrates that effects

	on water were at the forefront of the applicant's consideration. The applicant acknowledges that leakage discharge is inevitable. I consider that the proposal is at least partly inconsistent with this objective.
Objective 3.7: Fresh water is managed prudently as a shared resource with many in-stream and out-of-stream values. Objective 3.8: The quality and quantity of water in fresh water bodies and their catchments is managed to safeguard the life-supporting capacity of ecosystems and ecosystem processes, including ensuring sufficient flow and quality of water to support the habitat and feeding, breeding, migratory and other behavioural requirements of indigenous species, nesting birds and, where appropriate, trout and salmon. Objective 3.8A: High quality fresh water is available to meet actual and reasonably foreseeable needs for community drinking water supplies. Objective 3.9: Abstracted water is shown to be necessary and reasonable for its intended use and any water that is abstracted is used efficiently	These objectives concern both the quantity of water taken as well as wider quality considerations. The proposal is consistent with Objective 3.9, and partly inconsistent with Objectives 3.7 and 3.8. In terms of water quantity, the applicant proposes to limit the water take to volumes that are accounted for under permitted activity rules and therefore, I do not anticipate an effect beyond what has been set as the acceptable level within the CLWRP for the catchment. Groundwater is primarily proposed to be discharged in its entirety back into the environment, either via a constructed wetland, into the river or via a re-injection well. The latter would meet the definition of a 'non-consumptive' take. This proposal is only manageable, as long as no leachate is detected within the subdrainage water take. The applicant has also considered the use of water for dust suppression but has not been clear on volumes, albeit they will be within the permitted activity provisions. As noted, uncertainty remains about the water supply of the local community, should leachate enter the Karetu River.
Objective 3.11: Water is recognised as an enabler of the economic and social wellbeing of the region.	The assessment is not dissimilar to the one made above. In terms of quantity, the proposal is consistent with the objective. The proposal does not impede the social and economic wellbeing of the region. However, a detrimental effect on water quality could also adversely affect the economic and social wellbeing of the region. Therefore, I consider that the proposal is partially inconsistent with this objective.
Objective 3.13: Groundwater resources remain a sustainable source of high quality water which is available for abstraction while supporting base flows or levels in surface water bodies, springs and wetlands and avoiding salt-water intrusion.	In terms of water quantity, the proposal meets the requirements of this objective. In terms of water quality, given the uncertainties that remains, I consider that the proposal is inconsistent with the objective.

Objective 3.15: Those parts of lakes and rivers that are valued by the community for recreation are suitable for contact recreation.	This objective addressed water quality primarily when considering the proposal. The CRC's expert, Ms Tiernan, has commented on the potential for a loss of amenity values due to stormwater discharges (clarity reduction) and contact with contaminants. Contaminants of concern are primarily faecal coliforms, which are not expected to result from the proposal. Other discharges, such as nitrates from the urea side wall etc. may lead to algal blooms, which would in turn affect amenity values. Overall, uncertainty remains but I consider that the proposal is at least in part inconsistent with this objective.
Objective 3.17: The significant indigenous biodiversity values of rivers, wetlands and hāpua are protected.	I consider that the proposal is contrary to this policy. The wetland and the lizard habitat are considered to be significant indigenous habitat and lizard species found on site are considered At Risk Declining. Dr Tochter's evidence (Appendix 13)considers that significant residual effects will result on lizards from this proposal and the compensation proposed is uncertain. Equally, the CRC's wetland expert has stated that while remediation is proposed to supplement the loss of baseflow to the wetland, uncertainty remains whether this proposal would be successful in maintaining values.
Objective 3.18: Wetlands that contribute to cultural and community values, biodiversity, water quality, mahinga kai, water cleansing and flood mitigation are maintained.	As noted above, uncertainty remains regarding the proposal to reduce the baseflow of the wetland and remedy the effect. Maintenance in theory is possible, if the remediation option is well executed and actions are taken in response to monitoring. I consider that with the uncertainties around success, the proposal is at least to some degree contrary to the objective.
Objective 3.21: The diversion of water, erection, placement or failure of structures, the removal of gravel or other alteration of the bed of a lake or river or the removal of vegetation or natural	The proposal includes the removal of a ford structure. If undertaken with the

defences against water does not exacerbate the risk of flooding or erosion of land or damage to structures.	recommended controls, the proposal will be consistent with the objective.
Objective 3.23: Soils are healthy and productive, and human-induced erosion and contamination are minimised.	Provided that the site construction works and rehabilitation is managed as proposed, I consider that the proposal is able to meet the objective.
Objective 3.24: All activities operate at good environmental practice or better to optimise efficient resource use and protect the region's freshwater resources from quality and quantity degradation.	The applicant has mentioned the implementation of stormwater management practices to reduce the sediment load of the Karetu River and has identified that this has been an ongoing issue. I do not consider that rectifying this issue, which is a requirement of the current operation regardless, should be seen in the context of mitigation for the proposal. However, I also acknowledge that the applicant is entitled to be assumed compliant with the proposed conditions frameworks (in relation to landfill leachate management, stormwater management and other ancillary activities) and therefore, the proposal is consistent with this objective.
Strategic Policies	
Policy 4.3 Surface water bodies are managed so that: a) toxin producing cyanobacteria do not render rivers or lakes unsuitable for recreation or human and animal drinking water; b) fish are not rendered unsuitable for human consumption by contaminants; c) the natural colour of the water in a river is not altered; d) the natural frequency of hāpua, coastal lakes, lagoons and river openings is not altered; e) the passage for migratory fish species is maintained unless restrictions are required to protect populations of native fish; f) reaches of rivers are not induced to run dry, thereby maintaining the natural continuity of river flow from source to sea, g) variability of flow, including floods and freshes, is maintained to avoid prolonged "flatlining" of rivers; to facilitate fish passage; and to mobilise bed material; and h) the exercise of customary uses and values is supported.	This policy covers a range of outcomes, and I consider that only (h) is relevant to this proposal and is addressed elsewhere with more specific policy direction. While the proposal might be inconsistent with (h), the proposal is not overall inconsistent with this policy.

Policy 4.4: Groundwater is managed so that: (a) groundwater abstractions do not cause a continuing long-term decline in mean annual groundwater levels or artesian pressures; (b) the individual and cumulative rate, duration and volume of water pumped from bores is controlled so as to prevent seawater contamination; (c) the rate and duration of individual abstractions is controlled to ensure that individually or cumulatively, localised pressure reversal does not result in the downward movement of contaminants; (d) in any location where an overall upwards pressure gradient exists, restrict the taking of groundwater so that at all times the overall upward pressure difference is maintained between any one aquifer and the next overlying aquifer; (e) overall water quality in aquifers does not decline; and (f) the exercise of customary uses and values is supported.	The policy addresses quantity and quality outcomes. I consider that the proposal will meet the policies in relation to quantity outcomes by only proposing to abstract water within the permitted activity volumes. The quality outcomes are uncertain, which has been subject of the audit of this application. Given the submission of Runanga, I also have to conclude that (f) cannot be met. Therefore, the proposal is in part inconsistent with the policy.
Policy 4.7: Resource consents for new or existing activities will not be granted if the granting would cause a water quality or quantity limit set in Sections 6 to 15 to be breached, or further over allocation (water quality and/or water quantity) to occur, or in the absence of any water quality standards in Sections 6 to 15 the limits set in Schedule 8 to be breached. Replacement consents, or new consents for existing activities may be granted to: a) allow the continuation of existing activities at the same or lesser rate or scale, provided the consent contains conditions that contribute to the phasing out of the over allocation (water quality and/or water quantity) within a specified timeframe; or b) exceed the allocation limit (water quality and/or water quantity) to a minor extent and in the short term if that exceedance is part of a proposal to phase out the overallocation within a specified timeframe included in Sections 6 to 15 of this Plan.	The proposed water take is within allocation limits. There remains some uncertainty as to whether there will be adverse localised (and downstream) effects on surface and groundwater and whether these would, in the worst-case scenario breach limits set by the plan. The proposal is therefore overall inconsistent with the policy.
Activity and Resource Policies	
Discharges of contaminants to land and water	

Policy 4.12 There are no direct discharges to surface water bodies or groundwater of: a) untreated sewage, wastewater (except as a result of extreme weather related overflows or system failures) or bio-solids; b) solid or hazardous waste or solid animal waste; c) animal effluent from an effluent storage facility or a stock holding area; d) organic waste or leachate from storage of organic material; and e) untreated industrial or trade waste	The applicant acknowledges that there will be liner leakage that cannot be avoided. Leakage discharge scenarios have attempted to quantify the associated effects. However, the CRC's experts maintain that the modelling requires inherent assumptions which have not been supported by data (e.g. hydrology of the Karetu River for dilution, preferential flow paths through the limestone). All that aside, because there will be a direct discharge of leachate (in small quantities in the best-case scenario), to groundwater and ultimately to surface water, the proposal is contrary to Policy 4.12.
Policy 4.13: For other discharges of contaminants into or onto land where it may enter water or to surface water bodies or groundwater (excluding those passive discharges to which Policy 4.26 applies), the effects of any discharge are minimised by the use of measures that: (a) first, avoid the production of the contaminant; (b) secondly, reuse, recovers or recycles the contaminant; (c) thirdly, minimise the volume or amount of the discharge; or (d) finally, wherever practical utilise land-based treatment, a wetland constructed to treat contaminants or a designed treatment system prior to discharge; and (e) in the case of surface water, results in a discharge that after reasonable mixing meets the receiving water standards in Schedule 5 or does not result in any further degradation in water quality in any receiving surface waterbody that does not meet the water quality standards in Schedule 5 or any applicable water conservation order.	The proposal broadly meets the requirements of the outlined hierarchy by proposing to implement measures to avoid the production of the contaminant (sediment lade stormwater or leachate), reuse/recycle/recover, minimise the discharge etc. It cannot however meet the first limb entirely, which is avoiding the production entirely, as it will be inherent to the proposal.
Policy 4.14: Any discharge of a contaminant into or onto land where it may enter groundwater (excluding those passive discharges to which Policy 4.26 applies): (a) will not exceed the natural capacity of the soil to treat or remove the contaminant; and (b) will not exceed available water storage capacity of the soil; and	Uncertainty remains regarding (c)(i), (ii), (iia) and (iii). The proposal is at least in part inconsistent with the policy.

(c) where meeting (a) and (b) is not practicable, the discharge will: (i) meet any nutrient limits in Schedule 8 or Sections 6 to 15 of this Plan; and (ii) utilise the best practicable option to ensure the size of any contaminant plume is as small as is reasonably practicable; and (iia) ensure there is sufficient distance between the point of discharge, any other discharge and drinking-water supplies to allow for the natural decay or attenuation of pathogenic micro-organisms in the contaminant plume; and (iii) not result in the accumulation of pathogens, or a persistent or toxic contaminant that would render the land unsuitable for agriculture, commercial, domestic, cultural or recreational use or water unsuitable as a source of potable water or for agriculture; and (iv) not raise groundwater levels so that land drainage is impeded.	
Policy 4.14B: Have regard to Ngāi Tahu values, and in particular those expressed within an iwi management plan, when considering applications for discharges which may adversely affect statutory acknowledgement areas, nohoanga sites, surface waterbodies, silent file areas, culturally significant sites, Heritage New Zealand sites, any listed archaeological sites, and cultural landscapes, identified in this Plan, any relevant district plan, or in any iwi management plan.	The policy requires that discharge proposals shall 'have regard' to Ngāi Tahu values. Due to the lack of consultation during the site selection process, as outlined in the submission, I consider that the proposal is contrary to this policy. I acknowledge that the applicant has proposed cultural health monitoring within the overall monitoring package but it has not been specified what this entails or how it will ensure that values are being considered.
Stormwater Systems	
Policy 4.17: Stormwater run-off volumes and peak flows are managed so that they do not cause or exacerbate the risk of inundation, erosion or damage to property or infrastructure downstream or risks to human safety	The applicant has provided a Stormwater Management Report as part of the application but has chosen not to implement all recommendations that are deemed to be best practice at the on-set of the activity. However, I acknowledge that at the same time, the CRC Erosion and Sediment Control Toolbox approach has been proposed for the management of stormwater from the site. A detailed Erosion and Sediment Control Plan is not available to view.

	Since not all recommended options are implemented, and that only general indication has been given regarding the proposed management of stormwater otherwise, I consider that the proposal is not entirely consistent with this policy.
Earthworks, land excavations and deposition of material into land over aquifers	
Policy 4.18: The loss or discharge of sediment or sediment-laden water and other contaminants to surface water from earthworks, including roading, works in the bed of a river or lake, land development or construction, is avoided, and if this is not achievable, the best practicable option is used to minimise the loss or discharge to water.	See notes for Policy 4.17. Considering the more directive wording of this policy, I consider that the proposal is currently inconsistent with the policy.
Policy 4.19: The discharge of contaminants to groundwater from earthworks, excavation, waste collection or disposal sites and contaminated land is avoided or minimised by ensuring that: (a) activities are sited, designed and managed to avoid the contamination of groundwater; (b) existing or closed landfills and contaminated land are managed and monitored where appropriate to minimise any contamination of groundwater; and (c) there is sufficient thickness of undisturbed sediment in the confining layer over the Coastal Confined Aquifer System to prevent the entry of contaminants into the aquifer or an upward hydraulic gradient is present which would prevent aquifer contamination.	This policy anticipates 'avoidance' of groundwater contamination and the applicant acknowledges that all liners leak, albeit in the best case scenario, the leakage rate may be minimal. However, avoidance of discharge is unlikely and unachievable. A mention of 'minimisation' is also included in the policy but only in relation to existing and closed landfills. Therefore, the proposal is contrary to the policy overall.
Protect source of drinking water	
Policy 4.23: Any water source used for drinking-water supply is protected from any discharge of contaminants that may have any actual or potential adverse effect on the quality of the drinking-water supply including its taste, clarity and smell and community drinking water supplies are protected so that they align with the CWMS drinking-water targets and meet the drinking-water standards for New Zealand.	While there are no community drinking water supply areas directly downstream of the site, submissions of locals have identified several properties that source drinking water from infiltration galleries or shallow bores with water hydraulically connected to the Karetu River. The policy includes the wording 'any actual or potential adverse effects on quality'. The uncertainties surrounding the modelling of contaminant discharge volumes and concentrations have been discussed in the audit of the application. When reviewing longer timeframes, the integrity of the engineered mitigation will gradually lose its ability to contain leachate and with

	the proposed acceptance and emplacement of persistent chemicals, I must conclude that the proposal is contrary to the policy by potentially compromising the drinking water supply of the local population.
Hazardous substance and hazardous activities	
Policy 4.25: Unless the substance is approved under the Hazardous Substances and New Organisms Act 1996 to be applied onto land or into water, activities involving the use, storage or discharge of hazardous substances will be undertaken using the best practicable option to: (a) as a first priority, avoid the discharge (including accidental spillage) of hazardous substances onto land or into water, including reticulated stormwater systems; and (b) as a second priority, ensure, where there is a residual risk of a discharge of hazardous substances including any accidental spillage, it is contained on-site and does not enter surface water bodies, groundwater or stormwater systems.	Subject to proposed conditions being adhered to, the proposal is consistent with this policy. This is in relation to fuel storage primarily.
Policy 4.26: Any discharges of hazardous substances from contaminated land, including existing and closed landfills, are managed to ensure that adverse effects beyond the site boundary on people's health or safety, on human or stock water supplies, or on surface water are avoided. Policy 4.27: Landfills and other waste collection or disposal sites are designed and sited to avoid the contamination of groundwater or surface water either through the direct discharge of hazardous substances to water or the leaching of contaminants into or onto land where they may enter water.	Both of these policies include the directive to 'avoid' the contamination of water or 'avoid' adverse effects arising from the discharge. While the proposed liner is generally deemed acceptable for the proposed WAC, residual uncertainties remain regarding the effects on freshwater bodies and ecosystems, and water supply. Therefore, the proposal is inconsistent with both policies and possibly contrary to 4.27.
Damming and Diversion of waterbodies	
Policy 4.48: Any dam or infrastructure for the storage of water is sited, designed, constructed and operated to minimise any risk of overspill, leakage, slips or other dam failure, provides for the diversion of floodwaters, and any associated risk of inundation or other adverse effects on people, communities or their property.	The proposal includes appropriately sized sediment retention ponds, and leachate storage ponds. The design for the leachate storage pond has taken into account contingency measures to avoid overspill. Modelling of flood levels has been undertaken and the site is unlikely to be inundated in scenarios that are <200 ARI events. I consider that the proposal is therefore consistent with the policy.
Abstraction of Water	

4.50 Where the rate of take or volume of water consented for abstraction from a catchment exceeds the environmental flow and water allocation limit for surface water or stream depleting groundwater, or the groundwater allocation limit for that catchment, any further allocation of water is limited to: (a) any abstraction necessary to meet community water supply and stockwater requirements; and (b) the replacement of existing resource consents provided that: (i) a reduction in over-allocation is enabled through the replacement resource consent being for no more than 90% of the previously consented rate of take and annual or seasonal volume unless there is a method and defined timeframe to phase out over-allocation set out in the relevant sub-region Section of this Plan; and (ii) there are significant and enduring improvements in the efficiency of water use and reductions in any adverse effects; or (iii) it is demonstrated that the existing use of water is efficient and that the efficiency is enduring.	The proposed water take is within permitted activity limits, and in the case of surface water take, allocation within the C band is available. The proposal is therefore consistent with the policy.
Policy 4.58: Non-consumptive groundwater takes, including the taking of heat from or adding heat to groundwater and any taking which in conjunction with other activities on a site results in a neutral or positive water balance, will not be subject to any groundwater allocation zone limits, and will generally be supported, provided the water either remains in the aquifer, or is returned to the same groundwater allocation zone within 24 hours and is protected from contamination, other than heat.	The applicant has proposed that the take of underdrainage water and its return to the environment is non-consumptive by definition. Only one of the return options is consistent with the definition of 'non-consumptive' as applied within the CLWRP, that is the use of a reinjection well. The applicant has not yet communicated a preferred option for the discharge of subdrainage water. If the reinjection well option is chosen, the proposal is consistent with the policy only if there is no leachate detected within the abstracted water.
Efficient use of water	
Policy 4.65: The rate, volume and seasonal duration for which water may be taken will be reasonable for the intended use.	This primarily relates to the hydraulically connected surface water take. I note that the applicant has not applied for this component of the proposal, as it is maintained that it can be undertaken as a permitted activity. If limits are imposed in

	accordance with CLWRP tables, I consider that the proposal is consistent with the policy.
Site Dewatering	
Policy 4.76: Localised land subsidence or other significant effects on the flows or levels of surface water or groundwater from the dewatering of construction sites or other sites, is avoided by limiting the rate or duration of pumping or other appropriate mitigation measures.	The CRC's hydrogeology reviewer did not raise concerns regarding the proposal of the groundwater take during the construction of the landfill cells. However, I note that there will be a temporary effect on the lower wetland. The proposal is therefore at least in part inconsistent with the policy.
Policy 4.76A: Adverse effects on surface water quality are minimised through limiting the concentration of sediment and other contaminants present in the dewatering water prior to its discharge to surface water.	The proposal includes the capture and treatment of construction phase stormwater and dewatering water to ensure that limits are being met. I note that the applicant, through the supply of the TARP acknowledges that there may be discharges beyond the exceedance limits for an uncertain period of time until actions can be implemented to prevent further discharges. Therefore, the proposal is at least in part inconsistent with the policy.
Wetlands and Riparian Margins	
Policy 4.81: Any take, use, damming or diversion of water, any discharge of contaminants onto land or into water, or any earthworks, structures, planting, vegetation removal or other land uses within a wetland boundary, do not adversely affect the significant values of wetlands, hāpua, coastal lakes and lagoons, except for: (a) a temporary and or minor adverse effect where that activity is part of installing, maintaining, operating or upgrading infrastructure, pest management, or habitat restoration or enhancement work; or (b) the artificial opening of hāpua, coastal lakes or lagoons to assist in fish migration or achieving other conservation outcomes, customary uses, or to avoid land inundation.	As assessed previously, the activities will have an effect on the wetlands on site by lowering the baseflow of the wetland. The effect is not temporary or minor but will persist for the unforeseeable future as the groundwater table will have to be permanently and perpetually lowered to avoid contact between the liner and groundwater. The effect of the baseflow reduction on the wetland, in combination with the remediation proposal is uncertain and therefore, the proposal is contrary to the policy.
Policy 4.82: Modification of wetlands, hāpua, coastal lakes and lagoons may occur if the modification is necessary, and necessarily has to be in that location to provide for the installation, upgrading or maintenance of infrastructure and any significant effects are offset by other improvements to or expansion of	The modification of the wetland is not necessary to enable the installation of, upgrading of or maintenance of infrastructure within that location. The proposed managed landfill site could be sited elsewhere, in a location where this effect can be avoided. Therefore, the proposal is contrary to this policy.

the same or another wetland, hāpua, coastal lake or lagoon.	
Policy 4.83: Restoration or enhancement of wetlands is encouraged provided it does not give rise to any adverse effects on other lawfully established activities, including any adverse effects on the reliability of supply of water for existing abstractors, or any inundation or erosion of other people's property.	While the applicant has proposed that the remediation of the baseflow is to be considered 'restoration or enhancement' I do not agree. The proposed baseflow supplementation is a remediation measure in the context of an effect that will occur as a result of the proposal. Therefore, this policy is not considered relevant but has been included for completeness, and in the context of the applicant's use of the LWRP rules.
Policy 4.85: Water quality, indigenous biodiversity and ecosystem health in lakes, rivers, wetlands, hāpua, coastal lakes and lagoons are enhanced through establishing or restoring riparian planting.	I agree with the applicant that the proposed planting of indigenous vegetation, stock fencing etc will enhance values. However, these are to be viewed in the context of mitigation and remediation which will offset the initial loss of biodiversity and values. Therefore, in my view, the net effect does not result in an 'enhancement' overall.
Activities in Beds of Lakes and Rivers	
Policy 4.88: Earthworks, structures, or the planting or removal of vegetation (other than by spraying) in the beds of lakes, rivers, hāpua, coastal lakes and lagoons, or within a wetland boundary do not occur in flowing or standing water unless any effects on water quality, ecosystems, or the amenity, recreational or cultural values will be minor or the effects of diverting water are more significant than the effects of the activity occurring in flowing or standing water.	I agree with the applicant that the activities related to the ford removal, bund instatement and planting can be undertaken in a manner that will be consistent with this policy with adequate controls in place.
Policy 4.89: Earthworks, structures (including defences against water), vegetation planting or removal, or other activities in the beds of lakes or rivers, do not materially restrict flood flows in any river, or create or exacerbate erosion of the bed or banks of any river or the bed or margins of any lake.	I agree with the applicant's assessment. The proposed works will not cause the restriction of flood flows or create erosion problems if construction activities and sizing of the proposed bridge are adequate.
Natural Hazards	
Policy 4.96: The consequential effects of seismic activity are recognised and timely and appropriate responses to such activity are facilitated.	The CRC's geotechnical expert has commented on the seismic risk at the site and considers it to be low, in agreement with the applicant. The proposal is consistent with the policy.
Submission of Water Quality Data	

Policy 4.102: Any resource consent granted with a consent condition requiring the collection of water quality samples, shall also include a condition requiring all the water quality sample data required by the consent condition to be submitted to the Canterbury Regional Council in a format suitable for automated upload to the Council's water quality database software.	This can be imposed on the resource consent, if granted and therefore, will meet the policy requirement.
Section 8: Waimakariri	
Policy 8.4.5: Management of freshwater, and the uses to which it is put supports the exercise of kaitiakitanga and the abundance of freshwater mahinga kai species that are safe to gather, harvest, consume and use.	I consider both the submission of Runanga and the conclusions of the CRC's surface water expert to be relevant for this assessment. Based on the uncertainties that remain regarding water quality, I consider that the proposal is in part inconsistent with the policies. The submission from Te Ngāi Tūāhuriri Rūnanga refers to the exercise of kaitiakitanga as well as mahinga kai and voice a disagreement with the proposal.
Policy 8.4.6 Protect wāhi tapu and wāhi taonga by avoiding as a first priority adverse effects on these sites, and only where avoidance is impracticable, requiring adverse effects of activities on sites of wāhi tapu and wāhi taonga to be minimised	
Policy 8.4.8: Recognise and provide for the cultural importance of waterbodies to Ngāi Tūāhuriri Rūnanga by: (a) improving the quality of water in groundwater, and in hill-fed and spring-fed rivers; and (b) improving flows in hill-fed and spring-fed rivers; and (c) extending the region-wide stock exclusion rules to springs (waipuna) and other surface waterbodies	
Policy 8.4.9: Surface water flows are improved in the Waimakariri Sub-region by ensuring all A, B and C permit abstractions comply with the environmental flow and allocation regimes set out in Tables 8c and 8d.	Due to a rule disagreement, the applicant did not include an application for the take of water from the Karetu River. However, allocation is available within the C permit abstraction block and therefore, the water take could be consistent with the policy.
Policy 8.4.31: Enable activities that maintain, restore or enhance mahinga kai, safe fish passage, indigenous vegetation, habitats of indigenous fauna and significant habitats of trout and salmon	The proposal does not primarily maintain, restore or enhance these values. Provisions are included for planting etc. however these are to be seen in the context of mitigation/ remediation/ compensation. The success of these measures is still uncertain and therefore, I cannot conclude that there will be a net gain of values from the proposal. The proposal is therefore at least partly inconsistent with the policies.
Policy 8.4.32: Enable catchment restoration activities that focus on the protection of springs, the protection, establishment or enhancement of planted riparian margins, the creation, restoration or enhancement of wetlands, indigenous biodiversity in riparian margins, weed and pest control activities, and the	

targeted removal of fine sediment from waterbodies.	
Policy 8.4.34: Provide for the regular review and adjustments in progress towards achieving the freshwater outcomes and limits by applying the following common expiry dates to resource consents: (a) 1 July 2037 for resource consents granted for the use of land for a farming activity; (b) 1 July 2037 for resource consents granted for the discharge of nutrients by an irrigation scheme or principal water supplier; (c) 1 July 2037 for resource consents granted for the take and use of water; (d) 1 July 2047 for any resource consent that replaces an existing water permit that expires after 1 July 2030 and that is affected by the provisions of section 124-124C of the RMA.	As stated, the applicant did not apply for a water take specifically but has included it within the proposal. If granted, the take of water from hydraulically connected surface water shall therefore not exceed a duration of 1 July 2037.

813. Overall, I consider the proposal as it currently stands is consistent with some individual objective and policies of the CLWRP but in conflict with others.

    a. I consider that when only viewed in the short-term, the proposal is not contrary to the overall objectives and policies of the CLRP, apart from those that address wetlands, indigenous biodiversity and tangata whenua involvement. The proposal is contrary to objectives and policies that address these aspects, but can address the majority of other applicable provisions, with some level of inconsistencies remaining.

    b. However, given the degree of uncertainty and the risk to the wider catchment over long term operations of the landfill, I consider that the proposal is overall contrary to the objectives and policies of the CLWRP.

Canterbury Air Regional Plan

814. The CARP is the operative regional plan with the purpose to maintain air quality where it provides for people's health and cultural wellbeing, or to improve it if it does not, recognising the investment in, and significant contribution to the economy and social wellbeing of Canterbury of industrial and trade activities that discharge into air.

815. I consider the following objectives and policies relevant to this proposal:

    Objective 5.1: Air quality protects the mauri and life supporting capacity of the environment.

    Objective 5.2: Ambient air quality provides for the health and wellbeing of the people of Canterbury.

    Objective 5.5: Air quality is managed in a way that provides for the cultural values and traditions of Ngai Tahu.

    Objective 5.6: Amenity values of the receiving environment are maintained.

Objective 5.7: Discharges from new activities are appropriately located to take account of adjacent land uses and sensitive activities.

Objective 5.9: Offensive and objectionable effects and noxious or dangerous effects on the environment are generally avoided.

Policy 6.1: Discharges of contaminants into air, either individually or in combination with other discharges, do not cause:

a) adverse effects on human health and wellbeing; or

b) adverse effects on the mauri and life supporting capacity of ecosystems, plants or animals; or

c) significantly diminished visibility; or

d) significant soiling or corrosion of structures or property.

Policy 6.2: Recognise the value of air quality as a taonga to Tāngata whenua and manage adverse effects of discharges into air on wāhi tapu, wāhi taonga, and places of significance to Ngāi Tahu.

Policy 6.4: Reduce adverse effects of discharges on people where ambient air quality does not meet the value set in a national ambient air quality standard or guideline.

Policy 6.5: Minimise adverse effects on people where ambient air quality is degraded when assessed against a national ambient air quality standard or guideline.

Policy 6.6: Maintain ambient air quality in locations where the quality is acceptable when assessed against an ambient air quality standard set in a national ambient air quality standard or guideline.

Policy 6.22: Applications for resource consent for discharges of contaminants into air from large scale fuel burning devices and industrial or trade activities shall identify the best practicable option to be adopted to minimise effects.

Policy 6.25: Applications for resource consent for discharges into air from industrial or trade activities or large-scale fuel burning devices classified as discretionary shall address:

a. where the discharge includes PM10, the mass emission rate of the proposed discharge relative to the total emission rate of all discharges within the Clean Air Zone; and the degree to which the proposed discharge exacerbates cumulative effects within the Clean Air Zone; and

b. localised effects of the proposed discharge and the location of sensitive receptors; and

c. available mitigation and emission control options; and

d. the duration of consent being sought and the practicability for the effects of the discharge to be reduced over time

Policy 6.28: Manage discharges of odour and dust from the storage, transfer, handling, treatment or disposal of liquid or solid waste, by ensuring that any discharges from those activities are appropriately located.

816. The potential effects of the proposal on air quality have been assessed by Tonkin +Taylor Ltd. Based on this review, I consider that the applicant is able to manage the proposed activity in a manner that will achieve the objectives of the CARP. Unmitigated, there is the risk that dust discharges will affect amenity values, cultural values and human health. However, provided the mitigation proposed is effectively implemented, I consider that these effects will be acceptable.

817. I consider that adverse effects on these properties and occupants can be avoided provided strict dust management methods are implemented and the applicant monitors dust generation as recommended. However, I note that this is contingent on the availability of water as dust suppression, or alternative dust suppressants. An evaluation of availability will be subject to the evidence provided at the hearing.

Conclusion

818. For the reasons outlined above, the proposal will be consistent with a number of the provisions within the applicable planning documents. However, it will be contrary to those relating to the protection of significant indigenous biodiversity, wetlands and ecological values within terrestrial and freshwater systems. It may also be contrary to, but at least inconsistent with those that relate to the interests, values and customary rights of Mana Whenua and ensuring that they are recognised in the sustainable management of natural and physical resources, noting that freshwater management and biodiversity are recurring themes within the objectives and policies of importance to Mana Whenua.

819. However, to determine whether an activity is contrary to objectives and policies, there needs to be more than a contradiction with a single provision and the assessment must be made in the context of a plan as a whole. Therefore, my conclusion is the following:

    a. NPS-FM: The proposal is contrary to at least one policy and inconsistent with several others. Some others can be achieved. Overall, notable inconsistencies remain.

    b. NPS-GHG: I agree with the applicant that the proposal, and particularly with the proposed change from coal fired heat to diesel fired heat, can meet the objective and policies of the NPS.

    c. CRPS: the proposal in its current form cannot achieve the objectives and policies of the CRPS relating to freshwater management, and ecosystems and biodiversity. The proposal cannot achieve the objectives related to public and Ngai Tahu access to riverbed. However, the proposal is not entirely inconsistent with the provisions relating to air quality and natural hazards.

    d. CLWRP: I consider that the proposal is inconsistent with several material objectives and policies and contrary to several, particularly those that address wetlands, indigenous biodiversity, ‘safe-guarding’ of the life supporting capacity of water, and those that address direct discharges of contaminants to water (i.e. landfill leachate). Given the level of uncertainty, I consider that overall, the proposal is contrary to the provisions of the CLWRP when viewing the proposal over the long term, and beyond the operational lifetime of the landfill.

    e. CARP: Provided the mitigation proposed is effectively implemented, I consider that the proposal can meet the objectives and policies of the CARP as a whole.

Other Relevant Matters (Section 104(1)(c))

820. Section 104(1)(c) of the RMA allows the Consent Authority to consider any other matter relevant and reasonably necessary to determine the application.

821. I have addressed submissions received and the key matters raised throughout earlier sections of my report. I have taken all the matters submitters have raised into consideration when assessing the application in terms of actual and potential adverse effects and consistency with the relevant planning documents, including Part 2 matters, as will be addressed further below.

822. I consider the other matters that the decision makers may wish to consider include:

a. The Mahaanui Iwi Management Plan 2013;

b. The Canterbury Water Management Strategy;

c. The Wildlife Act 1953;

d. The WasteMINZ Technical Guidelines for Disposal to Land (2023).

The Mahaanui Iwi Management Plan 2013

823. The Mahaanui Iwi Management Plan 2013 (MIMP) is a non-statutory planning document that is an expression of kaitiakitanga and rangatiratanga. It is a manawhenua planning document reflecting the collective efforts of six Papatipu Rūnanga that represent the hapū who hold manawhenua rights over lands and waters within the takiwā from the Hurunui River to the Hakatere River and inland to Kā Tiritiri o Te Moana.

824. The applicant addressed the MIMP within Appendix X of the AEE.

825. Mahaanui Kurataiao Limited (MKT), in their cultural advice report submitted to the CRC (J6669) assessed the proposal against the relevant policies of Mahaanui Iwi Management Plan as follows:

826. The relevant Objectives and Policies of the IMP to this proposal have been identified as:

K2.3 *In giving effect to Te Tiriti, government agencies and local authorities must recognise and provide for kaitiakitanga and rangatiratanga. As the tāngata whenua who hold manawhenua, Ngāi Tahu interests in resource management extend beyond stakeholder or community interests.*

Ranginui/ Sky

R1.1 *To protect the mauri of air from adverse effects associated with discharge to air activities.*

R1.2 *To require that the regional council recognise and provide for the relationship of Ngāi Tahu with air, and the specific cultural considerations for air quality, including the effects of discharge to air activities on sites and resources of significance to tāngata whenua and the protection of cultural amenity values.*

Wai Māori/ Water

WM2.3 *To require that decision making is based on intergenerational interests and outcomes, mō tātou, ā, mō kā uri ā muri ake nei.*

WM6.2 *To require that water quality in the takiwā is of a standard that protects and provides for the relationship of Ngāi Tahu to freshwater. This means that:*

(a) The protection of the eco-cultural system (see Box - Eco-cultural systems) is the priority, and land or resource use, or land use change, cannot impact on that system; and

(b) Marae and communities have access to safe, reliable, and untreated drinking water; and

(c) Ngāi Tahu and the wider community can engage with waterways for cultural and social well-being; and

(d) Ngāi Tahu and the wider community can participate in mahinga kai/food gathering activities without risks to human health.

WM6.9 *To require that local authorities work to eliminate existing discharges of contaminants to waterways, wetlands and springs in the takiwā, including treated sewage, stormwater and industrial waste, as a matter of priority.*

Papatuanuku/ Land

P6.1 *To require on-site solutions to stormwater management in all new urban, commercial, industrial and rural developments (zero stormwater discharge off site) based on a multi tiered approach to stormwater management:*

(a) Education - engaging greater general public awareness of stormwater and its interaction with the natural environment, encouraging them to take steps to protect their local environment and perhaps re-use stormwater where appropriate;

(b) Reducing volume entering system - implementing measures that reduce the volume of stormwater requiring treatment (e.g. rainwater collection tanks);

(c) Reduce contaminants and sediments entering system - maximising opportunities to reduce contaminants entering stormwater e.g. oil collection pits in carparks, education of residents, treat the water, methods to improve quality; and

(d) Discharge to land based methods, including swales, stormwater basins, retention basins, and constructed wet ponds and wetlands (environmental infrastructure), using appropriate native plant species, recognising the ability of particular species to absorb water and filter waste.

P9.3 *To protect the land from induced soil erosion as a result of unsustainable land use and development.*

P11.1 *To assess proposals for earthworks with particular regard to:*

(a) Potential effects on wāhi tapu and wāhi taonga, known and unknown;

(b) Potential effects on waterways, wetlands and waipuna;

(c) Potential effects on indigenous biodiversity;

(d) Potential effects on natural landforms and features, including ridge lines;

(e) Proposed erosion and sediment control measures; and

(f) Rehabilitation and remediation plans following earthworks.

P11.9 *To require stringent and enforceable controls on land use and earthworks activities as part of the resource consent process, to protect waterways and waterbodies from sedimentation, including but not limited to:*

(a) The use of buffer zones;

(b) Minimising the extent of land cleared and left bare at any given time; and

(c) Capture of run-off, and sediment control.

P13.3 *To require all applications for mining and quarrying activities to include:*

(a) Quarry management plans for earthworks, erosion and sediment control, waterway protection, on site stormwater treatment and disposal and provisions for visual screening/ barriers that include indigenous vegetation; and

(b) Site rehabilitation plans that include restoration of the site using indigenous species.

Tane Mahuta/ Biodiversity

TM1.2 *To advocate that the protection and restoration of traditional and contemporary mahinga kai sites and species is recognised and provided for as a matter of national importance under the RMA 1991.*

TM1.5 *To require that freshwater management recognises and provides for mahinga kai, by: (a) Customary use as a first order priority; (b) Restoring mahinga kai values that were historically associated with waterways, rather than seeking to maintain the existing (degraded) mahinga kai value of a waterway; and (c) Protecting indigenous fish recruitment and escapement by ensuring that waterways flow Ki Uta Ki Tai and there is sufficient flow to maintain an open river mouth.*

Rakahuri

R1.6 *To require improved tributary management in the catchment to restore mahinga kai habitat, with priority given to the following tributaries of 'high use' value:*

(a) Taranaki Stream;

(b) Saltwater Creek;

(c) Waikuku Stream;

(d) Okuku River;

(e) Te Wera Wera (Little Ashley Stream);

(f) Harris's Creek; and

(g) Smarts Road Creek;

R3.3 *To require the restoration of wetlands in the catchment as a priority, as a means of restoring cultural health and connectivity to the catchment.*

827. In addition, the applicant has also identified P8.1, P11.8, P13.2, WM6.1, WM6.7, WM6.8, WM6.11,WM6.16, WM6.17, WM7.14, WM8.14, WM10.1, WM10.3, WM12.2, WM12.13, WM12.8, WM13.1-13.3 and R4.1 as relevant. I agree that these policies should also be further considered.

828. After undertaking a review of Mahaanui Kurataiao's advice and the submission provided directly by Te Ngāi Tūāhuriri Rūnanga (SUB034552), I consider that the proposal is **contrary** to the Mahaanui Iwi Management Plan objectives and policies.

The Canterbury Water Management Strategy

829. The proposal is located within the area managed by the Waimakariri Zone Committee. The committee have generated a Zone Implementation Programme (ZIPs) for this zone. ZIPs are non-statutory documents that are being completed by each of the Zone Committees within the Canterbury region. ZIPs contain zone specific recommendations for water management to achieve the CWMS targets.

830. The strategy is to ensure waterways and aquifers are maintained and improved over time. Key areas that are addressed by the ZIP for the region are: improving stream health, protecting and enhancing indigenous biodiversity, reducing nitrated, managing surface water quantity, managing groundwater quantity.

831. I consider the proposal is in part inconsistent to this strategy for the reasons discussed throughout this report, as surface water quality and the underlying aquifer quality may be negatively impacted and as indigenous biodiversity is not being enhanced but rather adversely impacted.

The Wildlife Act 1953

832. The Wildlife Act protects all wildlife unless otherwise specified in the schedules 1 to 5.

833. Indigenous birds, lizards and some invertebrates are fully protected under this Act and it is an offence to disturb, harm, or remove them without a permit from the Minister of Conservation. This includes the deliberate disturbance of potential habitat even if the presence of native species has not been specifically surveyed.

834. Notwithstanding the requirements of this consent, a permit is required from the Minister of Conservation to address the management of wildlife under the Wildlife Act. This is a separate process and does not require further consideration as part of the assessment of this application, noting that there may well be overlaps with fauna management measures likely required to address adverse effects associated with the proposed landfill.

835. However, as noted by Dr Tochter in her evidence, recent case law raises questions regarding the legality of issued Wildlife Act permit 107310-FAU.

WasteMINZ Technical Guidelines for Disposal to Land (2023)

836. The Waste Minimisation Institute of New Zealand ("WasteMINZ") Technical Guidelines for Disposal to Land 2023 provide technical guidance relating to the siting, design, operation, and monitoring of landfills in New Zealand. It seeks to establish good practice requirements for the various types of facilities based on waste acceptance criteria.

837. The applicant has not provided an assessment of the guidelines as such, but has referred to several aspects of the guidelines throughout the report.

838. I note that the acceptance criteria for the site are not in accordance with a single Class as identified within the guidelines, but the proposal is rather a hybrid approach/

839. The design for the landfill generally reflects the requirements of a Class 1 landfill design, as summarised by Mr Kortegast in his conclusion.

840. Several other experts have commented on recommendations for operational practices and monitoring to better align with the guidelines.

841. Additionally, Dr Massey has prepared an addendum to his evidence (Appendix x), assessing the applicant's site selection process (Appendix T of the AEE) in relation to the guidelines.

842. He quotes the guidelines, which state that as part of site selection, direct the consideration of "*the proximity of water bodies or wetlands*" as well as "*the risks of pollution of water bodies used for drinking water or aquaculture*".

843. Further, important considerations for the site selection process are "*social and cultural issues associated with the site*" and "*Consultation with the community, including tangata whenua, is a critical component of any landfill/ fill site selection process*".

844. Traffic and haulage are also considerations highlighted in the guidelines.

845. The guidelines also recognise that an economic assessment forms part of the selection process, by stating that: "*A preliminary economic assessment should be undertaken for shortlisted sites so that the costs of developing and operating a disposal facility at the different sites can be compared*"

846. The applicant's description of the site selection process consisted of the following steps (Appendix T):

    a. The selection process was restricted to existing quarry sites within Canterbury. The following risk features were used to eliminate options within 1 km of identified features: residential areas, community drinking water protection zones, active faults, Department of Conservation protected areas and Māori land. This process left 23 options available.

    b. The site selection process did not include proximity to rivers and lakes as an eliminating factor as *"it eliminated all potential sites as the network of rivers and lakes in the South Island is extremely widespread*."

    c. Scoring points were allocated based on the identified risk features. The greater the distance, the higher the points.

d. Underlying geology was scored with points but was limited to a review of Canterbury Maps available data.

e. Scoring points were allocated based on distance to Christchurch. The closer the quarry to Christchurch, the higher the points, as haulage costs decrease with distance.

f. Scoring points were then added on the basis of size of the existing quarry and the potential landfill capacity.

g. Finally, the list of five candidates was further refined by excluding two sites due to distance (Duntroon and Maungatiro) and two further sites did not want to proceed with a managed landfill proposal.

h. This left the option of White Rock as an option.

847. Dr Massey highlights that this site selection process was heavily weighted towards economic factors such as haulage. The guidelines doe does not suggest that economic assessment takes precedent in site selection over potential environmental impacts or social concerns.

848. The rivers and wetlands were specifically excluded from consideration, as the site selection process was self-limiting by only including existing quarry sites.

849. Dr Massey therefore concludes that "*Excluding these critical drivers of sensitivity and risk from the site selection process, and focusing largely on economic factors, seems to be contrary to both the letter and spirit of the Technical Guidelines for Disposal to Land (2023)*."

850. I adopt the conclusion by Dr Massey and further note that several submitters have also criticised the site selection process followed by the applicant.

Consideration of Activities Affecting Drinking Water Supplies (Section 104G)

851. Section 104G of the RMA requires consent authorities to have regard to:

a. The actual or potential effect of the proposed activity on the source of a registered drinking water supply; and

b. Any risks that the proposed activity may pose, that are identified within a source water risk management plan.

852. I have had regard to the above matters and note that there is no source for a registered drinking water supply, as listed in the public database of Taumata Arowai, which is likely to be affected by the proposed activity. However, there are some uncertainties around the potential impact of *'forever chemicals'* leaching from the landfill and what these effects would be over time.

Other Section 104 Matters

853. I have also considered those other matters in Section 104 of the RMA to determine whether they affect my recommendation. I consider that the following other matters, as discussed below, in Section 104 are relevant to this application.

854. Section 104(3) of the RMA requires a consent authority not to have regard to trade competition or the effect of trade competition when considering an application.

855. In this regard Transwaste Canterbury Ltd have provided a submission (SUB034870) on the proposal and highlighted they are a trade competitor. I therefore consider that any effect on Transwaste Canterbury Ltd must be disregarded (e.g., the proposed landfill taking business away from Transwaste). Nonetheless, I note that the Transwaste Canterbury Ltd submission relates more to the appropriateness of the landfill design and

the potential for adverse effects on the environment as a result thereof. These concerns are valid and have been considered in this report.

856. Section 104(6) states that a consent authority may decline an application for a resource consent on the grounds that it has inadequate information to determine the application.

857. As detailed above in the report, there is inadequate information in many aspects of the proposal including the following:

a. Inadequate information on terrestrial ecology, in particular, herpetofauna, which prevents a meaningful assessment of the likely effects and suitability of avoidance measures, remediation, mitigation or compensation;

b. Inadequate information on the remedial options presented to remedy the effects on the wetlands. There is considerable uncertainty in the proposed options and a meaningful assessment cannot be made as to the likelihood of success and therefore, I cannot determine whether residual effects will be significant or not.

c. Incomplete information regarding stormwater management for the site. While the application provides some general details about the management of sediment, the expert reviewer has identified aspects of stormwater management which have not been addressed. Additionally, the effects assessment in relation to sediment discharges relies on the implementation of a management plan that will be submitted at a later stage. I have provided commentary in relation to management plans in earlier sections of this report and consider that a meaningful assessment of effects can only be made with reference to clear performance standards and how these are achieved. Management plans should only be left to non-critical components and processes of the proposal.

d. Lack of detail regarding the proposed composition of waste streams on site. While the proposed engineered mitigation is suitable for the proposed waste acceptance criteria in general, it cannot be relied upon in perpetuity. The expert reviewers have stated that waste acceptance criteria and the underlying geology of the site are critical components that will determine likely effects on the environment. It is uncertain whether the site will primarily operate as a Class 3 landfill with some minor additions of higher Class (1 and 2) waste streams or whether the bulk of the waste material will be Class 1 contaminated soils.

e. Lack of certainty around monitoring and responses to monitoring to address adverse effects should they occur.

f. Lack of detail regarding the aftercare management of the site. As post-closure is a critical component to ensure that adverse effects are mitigated, a review of this report is critical for an informed assessment of potential and actual adverse effects.

858. If these matters are not addressed in the applicant's evidence, I consider that declining of the application under Section 104(6) of the RMA is appropriate.

Matters Relevant to Certain Applications (Section 105)

Discharges

859. In addition to the matters in Section 104(1) of the RMA, Section 105(1) requires decision makers to have regard to the following matters for applications for that would contravene Section 15 or Section 15B of the RMA:

a. The nature of the discharge and the sensitivity of the receiving environment to adverse effects;

b. The applicant's reasons for the proposed choice; and

c. Any possible alternative methods of discharge, including discharge into any other receiving environment.

860. The applicant has provided a range of technical reports including a surface water management report (Appendix E) and hydrogeological report (Appendix G) that support the application and identifies that the proposal will have less than minor effect on the environment. Appendix W includes a discussion of alternatives.

861. Part *a.* has been addressed throughout this application in earlier sections.

862. Based on the CRC's expert review of the application uncertainty remains through the types of contaminants to be discharged to land and water and the long-lasting legacy.

863. I note that the above not only applies to a short to medium term assessment. The fact that leakage will be discharged during the operational phase, albeit at low quantities, has been acknowledged by the applicant and the resulting effects have been assessed as no more than minor.

864. Without the liner, and due to the underlying geology of the site, looking into the medium to long-term when breakdown of the liner has commenced, leakage discharges will unavoidably lead to effects on groundwater, surface water and surface water ecology and water users, which may be more than minor.

865. The topography of the site does not lend itself to an alternative discharge location and no expert reviewer has detailed any possible alternative discharge method. However, the applicant has proposed alternatives within Appendix W of the AEE, citing:

a. An alternative Class 1 liner;

b. A deeper and larger landfill;

c. A 15 m and 5 m high leachate storage tank;

d. Land application of leachate.

866. None of the above alternatives are likely to alter the assessments in relation to the discharge to the receiving environment.

867. I consider there is no alternative to the incidental discharge of leachate via the liner, due to the setting of the site and the design of the landfill.

868. I consider there are no other alternatives at this site for discharges in general, except for selecting another location for the proposal, and thus selecting a lower sensitivity receiving environment.

869. The only alternative available to the applicant in terms of stormwater discharges is collection and off-site disposal. Due to the likely volumes generated, and the size of storage required to contain stormwater discharges from the entire project catchment, and the available footprint to construct such storage, I consider this alternative very unlikely and unreasonable.

870. For the discharge of contaminants to air as detailed within the report, I consider with the dust, odour and smoke management methods proposed along with monitoring measures, the proposal will have less than minor effects on the surrounding environment and on people.

Part 2- Purpose and Principles

871. Having had regard to those matters specified in Section 104(1)(b) of the RMA and following the guidance of Davidson (discussed above), I must consider whether it is necessary to resort to Part 2 in order to determine this application.

872. Section 5 of the RMA states that the purpose of this Act is to

Promote the sustainable management of natural and physical resources.

873. Section 5(2) then goes on to state that:

> *In this Act, sustainable management means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural wellbeing and for their health and safety while—*
>
> *(a) Sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and*
>
> *(b) Safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and*
>
> *(c) Avoiding, remedying, or mitigating any adverse effects of activities on the environment*

874. The purpose is then achieved by recognising and providing for the Matters of National Importance in Section 6, having particular regard to the Other Matters in Section 7, and by taking into account the principles of Treaty of Waitangi (Section 8).

875. The Court of Appeal has clarified how to approach the assessment of "subject to Part 2" in section 104(1). *In R J Davidson* the Court of Appeal found that (in summary):

a. Decision makers must consider Part 2 when making decisions on resource consent applications, where it is appropriate to do so. The extent to which Part 2 of the RMA should be referred to depends on the nature and content of the planning documents being considered.

b. Where the relevant planning documents have been prepared having regard to Part 2 of the RMA, and with a coherent set of policies designed to achieve clear environmental outcomes, consideration of Part 2 is not ultimately required. In this situation, the policies of these planning documents should be implemented by the consent authority. The consideration of Part 2 "*would not add anything to the evaluative exercise*" as "*genuine consideration and application of relevant plan considerations may leave little room for Part 2 to influence the outcome*". However, the consideration of Part 2 is not prevented, but Part 2 cannot be used to subvert a clearly relevant restriction or directive policy in a planning document.

c. Where it is unclear from the planning documents whether consent should be granted or refused, and the consent authority has to exercise a judgment, Part 2 should be considered.

d. If it appears that the relevant planning documents have not been prepared in a manner that reflects the provisions of Part 2, the consent authority is required to consider Part 2.

876. I have considered the objectives and policies of the relevant documents in Section 104(1)(b) and consider that the CARP as an operative plan has been prepared to give effect to the CRPS, which can be considered to reflect the provisions of Part 2. The CLWRP, while prepared to give effect to the CRPS, does not give full effect to the NPS-FM 2020 and neither does the CRPS. In addition, the CRPS does not give effect to the NPS-IB 2023.

877. For this reason, I consider it is necessary to consider Part 2 for the regional land use consent, discharge permits and water permits.

878. Section 6 of the RMA identifies a number of matters of national importance which shall be recognised and provided for to achieve the purpose of the RMA. Of these, I consider the following of relevance:

(c) The protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna:

(e) The relationship of Maori and their culture and traditions with their ancestral lands, water, sites, wahi tapu, and other taonga:

(h) The management of significant risks from natural hazards is relevant to the proposal.

879. I consider that the proposal would not achieve matters (c) and (e) of Section 6 of the RMA, as the proposal may have significant adverse effects on significant habitats of indigenous fauna (lizards) and the mauri of the water. In addition, I have also considered the submission of Te Ngāi Tūāhuriri Rūnanga, which is in strong opposition when outlining concerns on how the proposal will affect the cultural values of the area.

880. Section 7 of the RMA sets out other matters that are to be given particular regard to in achieving the purpose of the RMA. Of these, I consider the following are relevant:

(a) Kaitiakitanga:

(aa) The ethic of stewardship:

(b) The efficient use and development of natural and physical resources;

(c) The maintenance and enhancement of amenity values;

(d) Intrinsic values of ecosystems:

(f) Maintenance and enhancement of the quality of the environment;

(g) Any finite characteristics of natural and physical resources; and

(i) The effects of climate change.

881. I consider that the proposal is not consistent with the relevant matters in Section 7. The quality of the environment is unlikely to be maintained nor enhanced through this proposal. Further, climate change could result in unforeseen effects due to increased severe weather events, which will challenge the outlined mitigation within the proposal. I also note that the proposal does not give effect to kaitiakitanga, as expressed in the submission by Te Ngāi Tūāhuriri Rūnanga.

882. Section 8 of the RMA requires specific regard to be had to the principles of the Treaty of Waitangi (Te Tiriti o Waitangi). The principles have not been taken into account as detailed from the advice received and submission provided by Te Ngāi Tūāhuriri Rūnanga.

883. As noted above, Section 5 of the RMA sets out the purpose of the act which is the promotion of the sustainable management of natural and physical resources. Sustainable management allows for the use of resources to provide for social, economic and cultural well-being while sustaining those resources, safeguarding the life-supporting capacity of air, water, soil and ecosystems and managing adverse effects. A key element of this purpose is to *'meet the reasonably foreseeable needs of future generations'.*

884. Based on the assessment above, I consider that the proposal does not meet the purpose of the RMA. There is insufficient detail in some aspects of the application to demonstrate that the proposal will safeguard the life-supporting capacity of water and that adverse effects will, or can be avoided, remedied, or mitigated. Several matters have been identified in this report where there is a level of uncertainty in the mitigation measures to avoid significant adverse effects on the environment. Further, I consider the chosen location to be not appropriate for the currently proposed landfill design. As outlined by the expert reviewers, no amount of engineering mitigation will compensate for the siting constraints and underlying geology. The discharges of contaminants will have a negative

impact on the surrounding receptors being the aquifers, the nearby surface waterbodies and the ecosystems when measured in long term time scales, and thus will compromise the ability of future generations to benefit from the natural resources.

Determination of the Application

885. Having had regard to those matters specified in Sections 104(1), 104 (2), 104 (3) and 104 (6) and 105(1), it is then necessary to consider those matters relevant to determining the application, as determined by its status.

886. The application is considered as a non-complying bundles activity, and therefore I must consider the matters in the following subsections when considering whether to recommend granting or refusing the application:

Determination of Applications for Non-complying Activities (Section 104D)

887. As a non-complying activity, I must determine whether it meets the 'gateway' tests of Section 104D of the RMA, specifically the application may only be granted if the decision maker is satisfied that:

   a. The adverse effects of the activity (except where Section 104(3)(a)(ii) of the RMA applies) will be minor; or

   b. The application is not contrary to the objective and policies of the relevant plan and/or proposed plan.

888. As outlined in the above sections, I consider that the adverse effects of the activity have the potential to be more than minor, in particular

   a. from the leaching of contaminants to water and the resulting adverse effects on water quality, aquatic ecology and effects on water users;

   b. due to the effects on indigenous terrestrial ecology;

   c. due to the effects on natural inland wetlands

   d. due to the effects on cultural values.

889. I have also considered this application against the provisions of the operative plans being the CLWRP and the CARP. Overall, I have concluded that the proposal is contrary to the CLRWP but is consistent with the provisions of the CARP.

890. Accordingly, the proposal does not meet either one of the two gateway tests under s104D and must therefore be refused.

Determination of Applications for Discretionary or Non-complying Activities (Section 104B)

891. If the decision makers are of a mind to grant the application, in accordance with Section 104B of the RMA, after considering an application for a resource consent for a non-complying activity, a consent authority:

   a. May grant or refuse the application; and

   b. If it grants the application, may impose conditions under section 108 of the RMA.

Restriction on Grant of Certain Discharge Permits (s107)

892. Under Section 107(1) of the RMA a consent authority shall not grant a consent for the discharge of a contaminant into water, or onto or into land, if after reasonable mixing the discharge is likely to give rise in the receiving waters, to:

   (c) The production of conspicuous oil or grease films, scums, foams, floatable or suspended material:

(d) Any conspicuous change in the colour or visual clarity:

(e) Any emission of objectionable odour:

(f) The rendering of fresh water unsuitable for consumption by farm animals:

(g) Any significant adverse effects on aquatic life.

893. I consider that the applicant can sufficiently mitigate and treat stormwater from the site, if recommendations are implemented, to ensure that sediment laden discharges from the site do not give rise to the effects listed in Section 107.

894. The applicant has not provided sufficient information, as highlighted by Mr Cochrane, that other contaminants contained within stormwater discharges do not give rise to any of the above after reasonable mixing. To date, the applied reasonable mixing zone is also unclear.

895. I consider that the proposal could potentially give rise to the effects listed in Section 107 being (c) (d) (f) and (g) for surface water due to the limited mitigation the engineering containment will provide over the long term, the eventual leaching of contaminants over time and potentially significant adverse effects on the catchment when failure does occur. Uncertainty remains in relation to modelling of leakage, including the best-case scenario, particularly when relying on the Karetu River for dilution and the possibility of encountering preferential flow paths through the limestone geology.

896. Therefore, the resource consent must not be granted.

Recommendation

897. I recommend, pursuant to sections 104, 104B, 104D, 105 and 107 and subject to Part 2 of the RMA, to **REFUSE** the applications made by Protranz International Limited for resource consents to continue operation of and expand an existing hard rock quarry and to establish, maintain, operate a landfill at 513 Trig Road, Woodstock.

898. The reasons for this recommendation are related to the following:

a. Regulation 45B(6) of the Resource Management (National Environmental Standard for Freshwater) Regulations 2020 only allows the proposal to be granted provided that (b) can be satisfied. My assessment concludes that suitable alternative locations already exist within the region, and even locally, and therefore resource consent cannot be granted.

b. The potentially significant adverse effects on the lower wetland, as the success of remediation cannot be assessed and no alternative has been proposed;

c. The significant adverse effects on indigenous fauna and habitat;

d. The location of the site being at the top of the catchment where it could have significant impacts on the wider catchment in the event of a low probably but high consequence effect;

e. The long-term adverse effects on the mauri of water in the immediate receiving environment and downstream in the Karetu River;

f. The significant effects on Tangata Whenua values;

g. I am concerned that the number of operational constraints and monitoring requirements necessary to manage the activity to an acceptable effects standard will be very difficult to comply with and enforce.

899. Having had regard to those matters in Section 104, 104B, 104D, 105 and 107, I recommend that this application be **declined**.

Conditions (Section 108)

900. Section 108 enables the consent authority to impose conditions subject to those restrictions specified in s108 and s108AA.

901. I have not provided any recommended resource consent conditions at this point of time due to the extent of the effects, the uncertainties involved, and the proposal being contrary to objective and polices of the CLWRP. However, if the decision makers are of a mind to grant the application, I am open to providing recommended resource consent conditions when or if required.

902. For completeness, the applicant has provided a set of draft conditions within Appendix Y of the application which the CRC's experts have provided some generic comments on.

Duration (Section 123)

903. Section 123 of the RMA details the possible durations of resource consent.

904. I have not provided any recommendation at this point of time due to the extent of the effects and being contrary to objective and polices of the CLWRP, the uncertainties involved, and my recommendation being decline.

905. However, if the decision makers are of a mind to grant the application, I recommend that a short-term duration of no longer than 15 years be applied to all resource consents given the potential for adverse effects discussed throughout this report. If after this duration, the applicant has demonstrated to be effectively managing and operating the landfill, then longer-term resource consents could be sought.

Appendix 1 – CRC Public Notification List

NAME	ADDRESS 1	ADDRESS 2	ADDRESS 3	ATTN
Te Rūnanga o Ngāi Tahu - Te Ao Tūroa				Sir/Madam
Te Ngāi Tūāhuriri Rūnanga				Sir/Madam
Fish & Game NZ, North Canterbury				Sir/Madam
Department of Conservation Planning & Permissions Unit				Sir/Madam
Royal Forest & Bird Protection Society of NZ Inc.				Nicky Snoyink
Land Information New Zealand				Sir/Madam
Tihiraki North Loburn School Board				Board of Trustees Attn: Andy Wells
North Loburn School				Attn: Principal Address to the following students: s9(2)(a) [redacted]

				s9(2)(a)
Ministry for the Environment				Sir/Madam
Te Mana Ora - Community & Public Health				Attn: Manager Health Protection
Forests for New Zealand Limited				Sir/ Madam
White Rock Community Incorporated c/- Elrick & Co Limited				Attn: Simon Hedley
Hurunui District Council				Attn: District Planner
Waimakariri District Council				Attn: District Planner
s9(2)(a)				Sir/Madam

s9(2)(a)				Sir/Madam
Mairangi Dairies Limited				Sir/Madam
s9(2)(a)				Sir/Madam
s9(2)(a)				Sir/Madam
s9(2)(a)				Sir/Madam
s9(2)(a)				Sir/Madam
s9(2)(a)				Sir/Madam
s9(2)(a)				Sir/Madam
s9(2)(a)				Sir/Madam
White Rock Mains Limited				Sir/Madam
s9(2)(a)				Sir/Madam
s9(2)(a)				Sir/Madam
s9(2)(a)				Sir/Madam
JGM & MAE Aarts Company Limited				Sir/Madam
s9(2)(a)				Sir/Madam
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s9(2)(a)				Sir/Madam

Appendix 2 – Rule Assessments

Canterbury Land and Water Regional Plan

Discharge of Domestic Wastewater into Land

Rule 5.7 relates to the discharge of wastewater from an existing on-site wastewater treatment system onto or into land in circumstances where a contaminant may enter water as a **permitted activity**, provided the following conditions are met:

Table A-1: Rule assessment against LWRP Rule 5.7

Conditions		*Assessment*	*Status*
(1) The discharge was lawfully established prior to 1 November 2013; and		Unknown	**May not comply**
(2) The treatment and disposal system has not been altered or modified from that established at the time the system was constructed, other than through routine maintenance; and		Unknown, although, based on aerial imagery, I consider that the system has likely not been altered from the original state	Complies
(3) The volume of the discharge has not been increased as a result of the addition of buildings, an alteration of an existing building, or a change in use of a building that is connected to the system; and		Unknown	Complies
(4) The treatment and disposal system is operated and maintained in accordance with the system's design specification for maintenance or, if there is no design specification for maintenance, Section 6.3 of New Zealand Standard AS/NZS 1547:2012 – On-site Domestic Wastewater Management; and		Unknown	**May not comply**
(5) The discharge is not onto or into land:	(a) where there is an available sewerage network	There is no available sewerage network.	Complies
	(b) that is listed as an archaeological site; or	The site is not listed as an archaeological site.	Complies
	(c) where the discharge would enter any surface waterbody; or	It is assumed that the septic tank on site discharges into land via a soak hole or into a tile drain nearby, entering surface water.	**Does not comply**
	(d) within 20 m of any surface waterbody or the Coastal Marine Area; or	The discharge into land is assumed to be within 20 m of the Karetu River	**Does not comply**

	(e) within 50 m of a bore used for water abstraction; or	There are no bores on the property that are used for abstraction of water.	Complies
	(f) within a Community Drinking-water Protection Zone as set out in Schedule 1 of this Plan; or	There are no CDWPZ on the property.	Complies
	(g) where there is, at any time, less than 1 m of vertical separation between the discharge point and groundwater; and	Uncertain. Appendix F of the application contains information on groundwater depths at the site. The closest monitoring bore to the facilities is BH07, with a recorded groundwater depth of 1.4 m, based on a single measurement in October 2022. Groundwater may be higher.	**May not comply**
(6) The discharge does not result in wastewater being visible on the ground surface; and		Assumed to comply, as the discharge is directed into a septic tank and subsequent discharge into the environment, either via a soak hole or via a tile drain.	Complies
(7) The discharge does not contain any hazardous substance.		The discharge only contains grey water and sewerage from the weighbridge office, incl. a kitchenette, hand basin, toilet and emergency shower facilities.	Complies

1. I consider that there given the likely discharge within 20 metres of the Karetu River, and the uncertainties associated with the installation and operation of the on-site system, the discharge of wastewater **cannot comply** with the conditions of Rule 5.7

Rule 5.8 relates to the discharge of wastewater from a new, upgraded or modified wastewater treatment system onto or into land and is a **permitted activity**, provided the following conditions are met:

Table A-2: Rule assessment against LWRP Rule 5.8

Conditions	***Assessment***	***Status***
(1) The discharge volume does not exceed 2 m^3 per day	The total discharge volume from the site is not expected to exceed 2 m^2 per day. The estimated volume s 1.05 m^3/ day, based on vehicle movements and staff on site.	Complies
(2) The discharge is onto or into a site that is equal to or greater than 4 hectares in area	The site is larger than 4 ha.	Complies

(2)(a) The discharge is not located within an area where residential density exceeds 1.5 dwellings per hectare and the total population is greater than 1000 persons.		The residential density does not exceed 1.5 dwellings per hectare. The total population is less than 1,000 persons.	Complies
(3) The discharge is not onto or into land:	(a) where there is an available sewerage network	There is no available sewerage network.	Complies
	(b) that is contaminated or potentially contaminated	All possible discharge locations situated adjacent to the office/ amenity block are considered to be contaminated or potentially contaminated	**Does not comply**
	(c) that is listed as an archaeological site	The site is not listed as an archaeological site.	Complies
	(d) in circumstances where the discharge would enter any surface waterbody	The discharge will not enter surface water.	Complies
	(e) within 20 m of any surface waterbody or Coastal Marine Area	The discharge location could be to an area that is at least 20 m from the Karetu River. However, this would require modification of the haul roads and on-site access.	**May not comply**
	(f) within 50 m of a bore used for water abstraction	There are no bores used for abstraction located on the property.	Complies
	(g) within and Community Drinking Water Protection Zone as set out in Schedule 1	There are no CDWPZ on the property.	Complies
	(h) where there is, at any time, less than 1 m of vertical separation between the discharge point and groundwater	Uncertain. Appendix F of the application contains information on groundwater depths at the site. The closest monitoring bore to the facilities is BH07, with a recorded groundwater depth of 1.4 m, based on a single measurement in October 2022. Groundwater may be higher.	**May not comply**
(4) The treatment and disposal system is designed and installed in accordance with Sections 5 and 6 of New Zealand Standard AS/NZS 1547:2012 – On-site Domestic Wastewater Management; and		It is assumed that a newly designed system will be to the current standards and requirements. The likely method would be drip lines with an approximate area of 250 m^2.	Complies
(5) The treatment and disposal system is operated and maintained in accordance with the system's design specification for maintenance or, if there is no design specification for maintenance, Section 6.3 of New Zealand Standard AS/NZS 1547:2012 – On-site Domestic Wastewater Management; and		It is assumed that a newly designed system will be maintained in accordance with the condition.	Complies

(6) The discharge does not result in wastewater being visible on the ground surface; and	It is assumed that a newly build onsite wastewater treatment system will be such, that it would avoid wastewater being visible on the ground surface.	Complies
(7) The discharge does not contain any hazardous substance	The discharge will not contain any hazardous substances. Discharge consists of greywater and sewerage only.	Complies

2. The consultant considers that a new system could be designed and installed to meet the requirements of Rule 5.8. However, I note that given the contaminated land status across the site on the LLUR, the setback distances from the Karetu River, site constraints and the location of the current office buildings and proposed processing/ office location on the lower terraces, the likely high groundwater table, and the inconvenient available locations for a discharge field, it is not likely that Rule 5.8 can be complied with.

3. The discharge of wastewater from an on-site wastewater treatment system that does not meet conditions of Rule 5.7 or 5.8 is a **restricted discretionary activity** requiring consent under **Rule 5.9**.

4. However, I note that the applicant may choose to truck wastewater off site, alongside leachate from the leachate pond, thereby not requiring a resource consent for the discharge of wastewater.

Discharge of hazardous waste

Rule 5.89 addresses the discharge of hazardous waste into land, or onto or into land where a contaminant may enter water and is not categorised as a prohibited activity as a **discretionary activity**. There are no other rules that address the discharge of hazardous waste.

The discharge of construction phase stormwater

Rule 5.94A addresses the discharge of construction phase stormwater, other than into or from a reticulated stormwater system to a surface waterbody, or onto or into land in circumstances where a contaminant may enter groundwater or surface water as a **permitted activity**, provided the following conditions can be met:

5. Note that the consultant's interpretation was to include the quarrying activities into this activity classification. However, the CLWRP definition only includes '*construction and demolition activities or the development of buildings*' in the definition of construction phase stormwater[13]. Therefore, while the construction of the landfill may fall into this activity classification the ongoing quarry works, and the channelised nature of the runoff (i.e.

[13] Construction phase stormwater: means water, sediment and entrained contaminants resulting from precipitation on exposed or unstabilised land and which arises from construction or demolition activities, or the development of a building site.

through retention ponds and road cuts) will be treated as operational phase stormwater discharges, encompassed in the wider definition of '*stormwater*[14]' in the CLWRP, which is consistent with the interpretation taken by the CRC in the past.

Table A-3: Rule assessment against LWRP Rule 5.94A

Conditions		***Assessment***	***Status***
(1) The area of disturbed land from which the discharge is generated is less than:	(a) 1000m^2 for any construction-phase stormwater generated as a result of work carried out in an area shown as High Soil Erosion Risk on the Planning Maps; or	n/a, not located in the High Soil Erosion Risk areas	n/a
	(b) two hectares in any other location; and	Will exceed 2 ha of open area during construction activities. The lined footprint in total will be 4 ha in two stages, but there will also be other associated construction works.	**Does not comply**
(2) The concentration of total suspended solids in the discharge shall not exceed:	(a) 50g/m^3 where the discharge is to any spring-fed river, Banks Peninsula river, or to a lake except when the background total suspended solids in the waterbody is greater than 50g/m^3 in which case the Schedule 5 visual clarity standards shall apply; or	n/a	
	(b) 100g/m^3 where the discharge is to any other river or to an artificial watercourse except when the background total suspended solids in the waterbody is greater than 100g/m^3 in which case Schedule 5 visual clarity standards shall apply; and	The consultant stated that the discharge limit cannot be complied with, without the use of water treatment chemicals.	**May not comply**

[14] Stormwater: means runoff water and entrained contaminants arising from precipitation on the external surface of any structure or any land modified by human action, and that has been channelled, diverted, intensified or accelerated by human intervention. It excludes construction-phase stormwater, sediment-laden water and drainage water which are separately defined.

(3) The discharge does not result in an increase in the flow in the receiving waterbody at the point of discharge of more than 1% of a flood event with an Annual Exceedance Probability of 20% (one in five year event); and	Retention is provided in the proposes Sediment Retention Pond and within excavations.	Complies
(4) The discharge is not from, into or onto contaminated or potentially contaminated land; and	The site is registered on the LLUR and therefore is contaminated or potentially contaminated.	**Does not comply**
(5) The discharge does not contain any hazardous substance; and	The discharge may contain hazardous substances, if water treatment chemicals are added.	**May not comply**
(6) The discharge does not occur within a Community Drinking-water Protection Zone as set out in Schedule 1.	n/a	n/a

6. As the conditions of Rule 5.94A cannot be complied with, a consent is required as a **restricted discretionary activity** under **Rule 5.94B**.

Discharge of operational phase stormwater to land and to water

Rule 5.95 addresses the discharge of stormwater into a river, land, wetland or artificial watercourse or onto or into land in circumstances where a contaminant may enter a river, lake, wetland or artificial watercourse as a **permitted activity**, provided the following conditions are met:

Table A-4: Rule assessment against LWRP Rule 5.95

Conditions		***Assessment***	***Status***
(1) The discharge is not from, into or onto contaminated or potentially contaminated land; and		The site is registered on the LLUR and therefore considered contaminated or potentially contaminated.	**Does not comply**
(2) The discharge is not into:	(a) a water race, as defined in Section 5 of the Local Government Act 2002; and	n/a	n/a
	(b) a wetland, unless the wetland is part of a lawfully established stormwater or wastewater treatment system; and	n/a	n/a
	(c) a waterbody that is Natural State, unless the discharge was lawfully established before 1 November 2013; and	n/a	n/a

(3) The discharge does not result in an increase in the flow in the receiving waterbody at the point of discharge of more than 1% of a flood event with an Annual Exceedance Probability of 20% (one in five year event); and		Assumed to comply	Complies
(4) The discharge meets the water quality standards in Schedule 5 after reasonable mixing with the receiving waters, in accordance with Schedule 5; and		Assumed to comply, if adequate treatment is available on site. Currently, the stormwater management proposal has not been fully outlined and is proposed to be adaptive in nature.	**May not comply**
(5) The concentration of total suspended solids in the discharge shall not exceed:	(a) 50 g/m^3, where the discharge is to any spring-fed river, Banks Peninsula river, or to a lake except when the background total suspended solids in the waterbody is greater than 50 g/m^3 in which case the Schedule 5 visual clarity standards shall apply; or	n/a	n/a
	(b) 100 g/m^3 where the discharge is to any other river or to an artificial watercourse except when the background total suspended solids in the waterbody is greater than 100 g/m^3 in which case the Schedule 5 visual clarity standards shall apply; and	The consultant stated that the discharge limit cannot be complied with, without the use of water treatment chemicals.	**May not comply**
(6) The discharge to water is not within a Community Drinking-water Protection Zone as set out in Schedule 1; and		The site is not located within a CDWPZ.	Complies.
(7) The discharge does not occur where there is an available reticulated stormwater system.		There is no available reticulated network.	Complies

Rule 5.96 addresses the discharge of stormwater onto or into land where contaminants may enter groundwater as a **permitted activity**, provided the following conditions can be met:

Table A-5: Rule assessment against LWRP Rule 5.96

Conditions		***Assessment***	***Status***
(1) The discharge is not from, into or onto contaminated or potentially contaminated land; and		The site is registered on the LLUR and therefore considered contaminated or potentially contaminated. Discharges occur form the processing facility, and if feasible, soak holes will be utilised.	**Does not comply**
(2) The discharge:	(a) does not cause stormwater from up to and including a 24-hour duration 10% Annual Exceedance Probability rainfall event to enter any other property; and	Assumed to comply	Complies
	(b) does not result in the ponding of stormwater on the ground for more than 48 hours, unless the pond is part of the stormwater treatment system; and	Assumed to comply	Complies
	(c) is located at least 1 m above the highest groundwater level that can be reasonably inferred for the site at the time the discharge system is constructed; and	Unknown, depending on the location of the discharge	**May not comply**
	(d) is only from land used for residential, educational or rural activities; and	The site is used for an activity other than a residential, educational or rural activity.	**Does not comply.**
	(e) does not occur where there is an available reticulated stormwater system, except where incidental to a discharge to that system; and	There is no reticulated network available for the discharge.	Complies
	(f) is not from a system that collects and discharges stormwater from more than five sites.	Discharges arise from a single site.	Complies

7. A discharge of operational phase stormwater that does not meet the conditions of Rule 5.95 or 5.96 requires a consent as a **discretionary activity** under **Rule 5.97.**

Discharge of water treatment chemical residuals

Rule 5.99 addresses the discharge of water or contaminant into surface water or onto and into land in circumstances where it may enter surface water as a **permitted activity**, provided the following conditions are met:

Table A-6: Rule assessment against LWRP Rule 5.99

Conditions		***Assessment***	***Status***
(1) The discharge is not from or into contaminated or potentially contaminated land; and		The site is registered on the LLUR and therefore considered contaminated or potentially contaminated.	**Does not comply**
(2) The discharge is not into a Natural State water body; and		The discharge is not into a Natural State water body	Complies.
(3) The discharge meets the water quality standards in Schedule 5 after reasonable mixing with the receiving waters, in accordance with Schedule 5; and		Assumed to comply	Complies
(4) The concentration of total suspended solids in the discharge shall not exceed:	(a) 50 g/m^3, where the discharge is to any spring-fed river, Banks Peninsula river, or to a lake; or	n/a	n/a
	(b) 100 g/m^3 where the discharge is to any other river or to an artificial watercourse; and	n/a - this rule addresses the discharge of water treatment chemicals from the SRP to the Karetu River.	Complies.
(5) The discharge does not result in more than a 20% change in the rate of flow of the receiving surface water body; and		Assumed to comply	Complies
(6) The discharge does not contain any hazardous substance, hazardous waste or added radioactive isotope.		Several water treatment chemicals, in particular coagulants, contain hazardous substances.	**Does not comply**

8. As the conditions of the rule cannot be met, consent is required as a **discretionary activity** under **Rule 5.100**.

Installation, maintenance and use and decommissioning of bores

Rule 5.104 relates to the installation, maintenance and use of a bore for hydrological or geotechnical investigation or monitoring is **a permitted activity**, provided the following conditions are met:

Table A-7: Rule assessment against LWRP Rule 5.104

Conditions		***Assessment***	***Status***
(1) For any permanent bore, including monitoring bores, contaminants or water are prevented from entering the top of the bore or underlying groundwater by:	(a) covering or capping the bore when not in use; and	The consultant states that standard sealing, and reporting, as required by the rule, will be undertaken when commissioning bores for monitoring purposes. I consider that it is likely that these conditions can be met, provided an experienced bore drilling company undertakes the drilling.	Complies
	(b) sealing the exterior of the bore (the annulus) with bentonite or concrete grout from ground level to above the screen or 1 m below ground level, whichever is the lesser; and		
	(c) sealing the bore-head at ground or pumphouse floor level with a concrete pad of at least 0.3 m radius and 0.1 m thickness which is contoured to slope away from the bore or pipe; and		
(2) Information on bore location, bore installation (including bore logs and intended uses) is submitted to the CRC:	(a) within 20 working days of drilling the bore; or		
	(b) for hydrological or geotechnical investigations, within 40 working days of carrying out the geotechnical investigation		

Rule 5.107 relates to the decommissioning or a bore as a **permitted activity**, provided the following conditions are met:

Table A-8: Rule assessment against LWRP Rule 5.107

Conditions	*Assessment*	*Status*
(1) The bore is backfilled with inert material and sealed at the surface to prevent any contaminants or surface water from entering the bore; and	I consider that it is likely that decommissioning can be undertaken in compliance with the requirements of this rule.	Complies
(2) Any bore intercepting groundwater is sealed to prevent the vertical movement of groundwater between aquifers or water bearing layers within an aquifer and to permanently confine the groundwater to the aquifer or water bearing layer within an aquifer, in which it originally occurred; and		
(3) The bore has not been used for hydrocarbon exploration or production.	The bores on site are not expected to be used for hydrocarbon exploration or production, but rather for monitoring purposes.	Complies

9. I consider that Rules 5.104 and 5.107 can be met and therefore the activities can be undertaken as **permitted activities** under the LWRP.

Taking and using of groundwater (small and community water takes)

Rule 5.114 addresses the take and use of water from groundwater as a **permitted activity**, provided the following conditions are met:

Table A-9: Rule assessment against LWRP Rule 5.114

Conditions		*Assessment*	*Status*
The taking and using of less than 5 L/s and more than 10 m^3 but less than 100 m^3 per property per day of groundwater on a property more than 20 ha in an area is permitted activity, provided the following conditions are complied with:	(1) The bore is located more than 20 m from the property boundary or any surface waterbody.	This water take addresses the small water take from the infiltration gallery. Due to the definitions of the CLWRP, the water take is treated as a groundwater take as opposed to a surface water take, albeit a direct hydraulic connection is likely present. The property is more than 20 ha in size. The location of the gallery is indicated to be <20 m from the Karetu River. The consultant states that the take is abstracted via a small pump that would not exceed 0.5L/s.	**Does not comply**

		Daily volumes are calculated based on the fixed fixtures and the use of five staff per day, incl. 10 truck drivers per day who may use the toilet and hand basin. This equates to 1.05 m^3 The gallery is being used to abstract water for facilities on site, and also to supply a neighbouring property with stock water. Total volumes are unknown.	

10. As the conditions of the rule cannot be met, consent is required as a **restricted discretionary activity** under **Rule 5.114A**.

The permanent take of groundwater from the underdrainage system and subsequent discharge

11. The consultant addressed the water take for the purpose of lowering the water table beneath the landfill liner, via an underdrainage system and the subsequent discharge with three options. Option 1 and 2 include a water take assessment under Rule 5.6 of the CLWRP.

12. I consider that Rule 5.6 is not applicable for the water take component, for the following reasons:

    a. The Supreme Court in its decision in *Cloud Ocean Water Limited v Aotearoa Water Action Incorporated* [2023] instructed that the CLWRP does not provide the framework to address 'take and use' consents in separate 'take' and 'use' components and thus permits. Therefore, the 'take' of water must be read conjunctively with the 'use' of water.

    b. There are some situations in the CLWRP where the take of water is anticipated without the associated use, and these have been specifically addressed in provisions.

    c. Where there is no specific activity rule, it is not possible to 'disaggregate' the take from the use under the CLWRP, and therefore the general 'take and use' rules must be used. These are either regional rules, or the relevant sub-regional rules.

13. Therefore, I consider the following rules are relevant for the three options presented in the proposal:

<u>Option 1 and 2: the take of groundwater via the underdrainage system and subsequent discharge into water or onto land where it may enter water</u>

Rule 5.114 provides for the taking and using of less than 5 L/s and more than 10 m^3 but less than 100 m^3 per property per day of groundwater on a property more than 20 ha in area as a **permitted activity**, provided the bore is located more than 20 m from the property boundary or any surface waterbody. I note that the definition of 'bore' in the LWRP covers the proposed underdrainage system.

The proposed take of water is for approx. 34 m^3/day at an average rate of 0.39 L/s. The property is more than 20 ha in area, and the take location can be placed >20 m from the property boundary.

The discharge of water to Option 1: the Karetu River, or Option 2: onto land where it may enter the Karetu River are addressed by Rules 5.99 and 5.98 respectively, which relate to the discharge of water in circumstance where it is not classified by any other rule in the plan, as a permitted activity provided the following conditions are met:

Table A-10: Rule assessment against LWRP Rule 5.98

Conditions		***Assessment***	***Status***
(1) The volume of the discharge does not exceed 10 m^3 per day and the application rate does not exceed 10 mm per day; and		The volume of discharge will exceed 10 m^3 per day.	**Does not comply**
(2) The discharge is not directly into groundwater; and		The discharge is proposed to be onto land near the Karetu River. The area will be planted with wet tolerant species to passively infiltrate the land or flow into the Karetu River.	Complies
(3) The discharge does not result in any overflow or runoff into any surface water body or onto neighbouring site; and		The discharge will result in overland flow into the Karetu River.	**Does not comply**
(4) The discharge does not, in groundwater, render fresh water unsuitable or unpalatable for consumption by animals or humans; and		Unknown, as the discharge may contain leachate in case of landfill liner leakage.	**May not comply**
(5) The discharge does not contain any hazardous substance, hazardous waste or added radioactive isotope; and		Unknown, as the discharge may contain leachate in case of landfill liner leakage.	**May not comply**
(6) The discharge does not occur when the soil moisture exceeds field capacity; and		The discharge will be to an area designed to receive the proposed volume of water.	Complies
(7) The discharge is not from or into contaminated or potentially contaminated land; and		The discharge is from water sourced from beneath a landfill and will be discharged to land that is registered on the LLUR.	**Does not comply**
(8) The discharge is not within	(a) 50 m of a bore used for water abstraction; or	n/a	n/a
	(b) within a Community Drinking-water Protection Zone as set out in Schedule 1; and	n/a	n/a

(9) Where the discharge is from the use of live ammunition associated with military training under the Defence Act 1990, conditions 1 to 8 do not apply.	n/a	n/a

Table A-11: Rule assessment against LWRP Rule 5.99

Conditions		***Assessment***	***Status***
(1) The discharge is not from or into contaminated or potentially contaminated land; and		The discharge is from water sourced from beneath a landfill and will be discharges to land that is registered on the LLUR.	**Does not comply**
(2) The discharge is not into a Natural State water body; and		n/a	n/a
(3) The discharge meets the water quality standards in Schedule 5 after reasonable mixing with the receiving waters, in accordance with Schedule 5; and		Unknown, as the discharge may contain leachate in case of landfill liner leakage.	**Does not comply**
(4) The concentration of total suspended solids in the discharge shall not exceed:	(a) 50 g/m^3, where the discharge is to any spring-fed river, Banks Peninsula river, or to a lake; or	n/a	n/a
	(b) 100 g/m^3 where the discharge is to any other river or to an artificial watercourse; and	Assumed to comply	Complies
(5) The discharge does not result in more than a 20% change in the rate of flow of the receiving surface water body; and		May not comply. The discharge may be up to 0.39 L/s and while the mean flow of the Karetu is 214.3 L/s, the median flow is 89.5 L/s, the Karetu River is also known to run dry at times.	**May not comply**
(6) The discharge does not contain any hazardous substance, hazardous waste or added radioactive isotope.		Unknown, as the discharge may contain leachate in case of landfill liner leakage.	**May not comply.**

Both discharge options cannot meet the permitted activity conditions under Rule 5.98 or 5.99, therefore requiring consent as a **discretionary activity** under **Rule 5.100**.

Option 3: the take of groundwater via the underdrainage system and subsequent discharge via a reinjection well

Option 3 relies on the reinjection of groundwater into a well, in accordance with Rule 5.131. **Rule 5.131** addresses the non-consumptive taking and using of groundwater, and the associated discharge to groundwater as a **permitted activity**, provided the following conditions are met:

Table A-12: Rule assessment against LWRP Rule 5.131

Conditions	*Assessment*	*Status*
(1) The discharge of the groundwater is to the same aquifer or groundwater source as the abstraction, and the discharge is within 50 m of the abstraction point; and	The discharge of groundwater will be in the lower elevation of the site, and at a deeper depth that is more permeable silica sand geology. Therefore, the discharge point is >50 m from the abstraction point, and may not be into the same groundwater source.	**Does not comply**
(2) The use of the water is for domestic purposes; and	The use of water is not for domestic purposes.	**Does not comply**
(3) No contaminants, other than water of the same or different temperature, enter the groundwater.	Unknown, as the discharge may contain leachate in case of landfill liner leakage.	**Does not comply**

The proposed non-consumptive take and subsequent discharge into a reinjection well therefore requires consents as a **discretionary activity** under **Rule 5.132**.

Temporary take of groundwater for dewatering purposes and subsequent discharge

Rule 5.119 addresses the taking of water from groundwater for the purpose of dewatering for carrying out excavations, construction, maintenance and geotechnical testing and the associated use and discharge of water as a **permitted activity**, provided the following conditions are met:

Table A-13: Rule assessment against LWRP Rule 5.119

Conditions	*Assessment*	*Status*
(1) The take continues only for the time required to carry out the work but the take shall not last for a period exceeding 6 months; and	The take is proposed to be for the construction of the landfill footprint area, incl. the installation of the underdrainage system. Temporary water take will be in the order of up to 74 m^3/day.	Complies

(2) The take or discharge is not from, into, or onto contaminated or potentially contaminated land; and		The land parcels subject to the activity are registered on the LLUR and therefore, the site is considered to be contaminated or potentially contaminated.	**Does not comply**
(3) The take does not lower the groundwater level more than 8 m below the ground level of the site or cause subsidence of any other site; and		Not assessed and no details provided in the assessment, but presumed that since the take of water is only for the installation of the underdrainage system, only the required amount of water will be taken and discharged. The underdrainage system will not require lowering of more than 2 m of the water table.	**May not comply**
(4) The take does not have a moderate, high or direct stream depletion effect on a surface waterbody, determined in accordance with Schedule 9, unless the abstracted groundwater is being discharged to the surface waterbody to which it is hydraulically connected; and		Not assessed specifically by the consultant. Water is proposed to be discharged to the Karetu River, so if hydraulically connected and if the take causes a direct stream depletion effect, the condition can be complied with.	Complies
(5) An assessment of interference effects, undertaken in accordance with Schedule 12, does not show that any community, group or private drinking-water supply bore will be prevented from taking water; and		This method of assessment has not been undertaken as no registered drinking water supply wells are within a reasonable distance for the take to have an effect. Therefore, this constitutes a technical non-compliance.	**Does not comply**
(6) At the point and time of any discharge to surface water, the rate of flow in the river or artificial watercourse is at least five times the rate of the discharge; and		The discharge may be directed to the eastern watercourse on the property, which only has intermittent flows. Therefore, the discharge of water may not comply with the requirements of this condition.	**May not comply**
(7) The concentration of total suspended solids in any discharge to a surface waterbody does not exceed:	(a) 50g/m^3 where the discharge is to any spring-fed river, Banks Peninsula river, or to a lake or wetland; or	It is proposed to meet the 100 g/m^3 limit for suspended solids. The discharge will be via temporary sumps to enable dropping out of solids.	Complies
	(b) 100 g/m^3 where the discharge is to any other river or to an artificial watercourse; and		
(8) The discharge after reasonable mixing with the receiving waterbody meets the visual clarity standards in Schedule 5; and		The discharge may be directed to the eastern watercourse on the property, which only has intermittent flows. Therefore, the discharge of water may not comply with the requirements of this condition.	**May not comply**

(9) The point of discharge is not within a Community Drinking-water Protection Zone as set out in Schedule 1.	The discharge will not be within a CDWPZ.	Complies

14. As the activity cannot meet the conditions of Rule 5.119, consents are required under **Rule 5.120** as a **restricted discretionary activity** for the take and use of water, and the subsequent discharge of water.

Installation of the stormwater and underdrainage outfall structures, use and maintenance of the structures

15. I note that the consultant addressed the activities under 5.6 as a discretionary activity. I consider that the outfall structure can be considered a 'pipe' in accordance with Rule 5.136.

Rule 5.136 addresses the installation, or removal of pipes, including the associated drilling, tunnelling, or disturbance in or under the bed of a river as a **permitted activity**, provided the following conditions are met:

Table A-14: Rule assessment against LWRP Rule 5.136

Conditions	***Assessment***	***Status***
(1) The activity is not undertaken in, on, or under the bed of a lake listed as a high naturalness lake in Sections 6 to 15 or in a salmon spawning site listed in Schedule 17, or in any inanga spawning habitat during the inanga spawning season of 1 March to 1 June inclusive, or in any Critical Habitat; and	The site is not located in a salmon spawning, inanga spawning or Critical Habitat.	Complies
(2) The activity does not involve the deposition of any substance, other than bed material, on the bed of a lake or river; and	The outfall structures are likely constructed out of material that is not bed material.	**Does not comply**
(3) The activity is undertaken at a distance greater than 10 m from any dam, weir, bridge, or network utility pole, pylon or flood protection vegetation, or 150 m from any water level recorder, or 50 m from any defence against water, or closer where there is evidence that permission has been obtained from the owner of the infrastructure or the works are being carried out by or on behalf of the owner; and	There are no other structures in the vicinity of the proposed outfall location.	Complies.
(4) Within 30 days of the completion of the activity the bed of the lake or river is returned to its original contour; and	Assumed to comply	Complies
(5) Marker posts are erected for the lifetime of the pipes, ducts, cables or wires; and	Assumed to comply	Complies

(6) The works do not occur in flowing water.	Assumed to comply. Diversions of water were described in the application for the installation of bridge abutments. It is assumed the same methodology can/ will be applied for the installation of the outfall structures.	Complies

16. **Rule 5.139** applies to the use and maintenance of the outfall structures and can be undertaken as a **permitted activity** (see assessment in Table A-17).

17. I consider that the installation will likely not comply with condition 2 and therefore requires a consent under **5.141A** as a **discretionary activity**.

Bridge structure and installation

Rule 5.137 addresses the installation, alteration, extension, or removal of bridges and culverts, including the associated excavation, disturbance and deposition of substances on, in or under the bed of a lake or river as a **permitted activity**, provided the following conditions can be met:

Table A-15: Rule assessment against LWRP Rule 5.137

Conditions	***Assessment***	***Status***
(1) Any material deposited in, on, under or over the bed of a lake or river in order to construct or maintain the structure is of inert materials of colour and material type that blends with the surrounding natural environment and does not contain or is not coated with any hazardous substance; and	Assumed to comply.	Complies.
(2) The activity is undertaken at a distance greater than 10 m from any dam, weir, bridge, or network utility pole, pylon or flood protection vegetation, or 150 m from any water level recorder, or 50 m from any defence against water, or closer where there is evidence that permission has been obtained from the owner of the infrastructure or the works are being carried out by or on behalf of the owner; and	There are no other structures in the vicinity of the site.	Complies.
(3) The works do not occur in flowing water; and	The works will be undertaken in low flows, so that abutments can be placed outside of flowing water. However, ground improvement requirements are not yet known.	Assumed to comply but may require further consideration

(4) The activity is not undertaken in a salmon spawning site listed in Schedule 17, or in any inanga spawning habitat during the inanga spawning season of 1 March to 1 June inclusive, or in any Critical Habitat; and		The site is not an inanga or spawning habitat, and not a Critical Habitat.	Complies
(5) Upon completion of the activity:	(a) any area of the bed of a lake or river which has been disturbed is returned to as near as practicable to its original state; and	Assumed to comply	
	(b) any excavated areas are left with battered slopes not steeper than 3:1 slope angle (3 horizontal to 1 vertical) and any flow channels disturbed during the activity are reinstated; and	Assumed to comply, although I note that at the location of the proposed bridge, the Karetu River embankments are naturally very flat.	Complies
(6) For any permanent culvert at the time of its installation: (abridged version)		n/a	n/a
(7) For any bridge:	(a) there are no piers within the bed; and	Piers are proposed to be outside of the bed of the river. I have sought advice on the matter from CRC Hazards Team Leader to confirm that the design will likely be able to meet the conditions. See C24C/109965 for further information.	Complies
	(b) the bridge and the approaches are designed so that a 5% Annual Exceedance Probability flood event does not cause any increase in upstream water levels; and		
	(c) the soffit (underside) of any bridge is higher than the top of the river bank, and at least 500 mm above the 5% AEP flood level; and		
	(d) the bridge abutments are constructed parallel to the flow; and	Assumed to comply.	Complies
(8) The works or structures do not prevent any existing fish passage.		Levels will be high enough to not prevent the passage of fish. Works are proposed to be in the dry and therefore, passage of fish is not a consideration.	Complies

18. Provided that the bridge design meets the above requirements, and that works are undertaken as described in the application, I consider that the bridge construction can be undertaken as a **permitted activity** under **Rule 5.137**.

Use and maintenance of a ford river crossing in the Karetu River and the culvert in the eastern waterway

Rule 5.139 relates to the use and maintenance of structures, excluding dams, in or under the bed of the river as a permitted activity, provided the following conditions are met:

Table A-16: Rule assessment against LWRP Rule 5.139

Conditions	***Assessment***	***Status***
(1) The structures have been lawfully established; and	Unable to determine if the ford and culvert were lawfully established; but constructed prior to the RMA 1991. At the advice of CRC Principal Consents Advisor, unless evidence is available to the contrary, the structures are presumed to have been lawfully established.	Complies
(2) Any material deposited in, on, under or over the bed in order to maintain the structure is of inert materials of colour and material type that blends with the surrounding natural environment, is not contaminated with any hazardous substance; and	During the site visit undertaken for processing this consent, the ford appeared to only contain inert material with colours and types that blend in with the surrounding natural environment. I was unable to view the culvert but assume that it is a standard concrete structure.	Complies
(3) Any upgrading or minor alteration does not increase the footprint, height, or external envelope of the structure; and	Not proposed	Complies
(4) Except for bridges, culverts, pipes, ducts, cables and wires and their associated support structures the maintenance of that part of the structure within the bed of a lake or river is not undertaken within a salmon spawning site listed in Schedule 17, or in any inanga spawning habitat during the inanga spawning season of 1 March to 1 June inclusive, or in any Critical Habitat.	The site is not located in a salmon spawning, inanga spawning or Critical Habitat.	Complies

19. I consider that the use and maintenance of structure can be undertaken as a **permitted activity** under **Rule 5.139.**

The use and maintenance of the bridge and associated structures (abutments)

Rule 5.139 also applies to the use and maintenance of the bridge and associated abutments as a **permitted activity**. The assessment for the use and maintenance of the bridge is the same as above for Rule 5.139 (Table A-17) and is therefore not repeated.

Diversions associated with the installation of bridge abutments and outfall structures

Rule 5.140 relates to the installation, alteration, extension or removal of temporary structures and diversions associated with undertaking activities in Rules 5.135 to 5.139 as a **permitted activity**, provided the following conditions can be met:

Table A-17: Rule assessment against LWRP Rule 5.140

Conditions		***Assessment***	***Status***
(1) The activity is not undertaken in a salmon spawning site listed in Schedule 17, or in any inanga spawning habitat during the inanga spawning season of 1 March to 1 June inclusive, or in any Critical Habitat		The site is not located in an inanga or salmon spawning habitat or a Critical Habitat	Complies
(2) The temporary structure and diversion is in place for not more than 4 weeks in any 12 month period; and		Assumed to comply	Complies
(3) The activity does not prevent any existing fish passage or result in the stranding of fish; and		Assumed to comply, as water flow will be maintained.	Complies.
(4) Any diversion of water out of a river channel does not reduce the wetted width of that existing channel by more than 25% at any point; and		The proposal includes a temporary diversion using a river gravel or structured bund to deflect water around the works area, but it is unlikely to reduce the wetted width by more than 25 %.	Complies.
(5) For any temporary culvert in a river:	(a) The maximum length of the culvert is 14m; and	n/a – no indication in the application that a temporary culvert may be used as part of the works.	n/a
	(b) The culvert is and open bottom culvert, or the base of the culvert is embedded below bed level by 25% to 50% of the culvert height and is covered with water at the estimated 7DMALF; and		
	(c) The maximum width of the riverbed at the point of the crossing is 5 m; and		
(6) The activity is not in a river, lake or artificial watercourse managed for flood control or drainage purposes unless written permission has been obtained from the authority responsible for maintaining the flood and drainage carrying capacity of that water body or watercourse.		n/a – not located in an area managed for flood or drainage	n/a

20. Provided that the works occur as described, I consider that the works can be completed as **permitted activities** under **Rule 5.140**.

Temporary discharges associated with the bridge installation and outfall structures installation

Rule 5.141 addresses temporary discharges to water and to land where a contaminant may enter water associated with undertaking activities in Rules 5.135 to 5.140A as a **permitted activity**, provided the following conditions are met:

Table A-18: Rule assessment against LWRP Rule 5.141

Conditions	*Assessment*	*Status*
(1) The discharge is only of sediment, organic material and water originating from within the bed of the lake, river, or artificial watercourse; and	The discharges are only expected to arise from the disturbance of the banks and riverbed and are hence primarily sediment and organic material.	Complies
(2) The discharge is not undertaken in a salmon spawning site listed in Schedule 17, or in any inanga spawning habitat during the inanga spawning season of 1 March to 1 June inclusive, or in any Critical Habitat; and	The site is not located within a salmon spawning, inanga spawning habitat or a Critical Habitat.	Complies
(3) The discharge is not for more than ten hours in any 24-hour period, and not more than 40 hours in total in any calendar month, and except within the first 4 hours of discharge, does not exceed the Schedule 5 visual clarity standards.	May not comply with timeframe limits.	**May not comply**

21. The consultant assessed that Condition 3 may not be complied with, therefore requiring a discharge consent under **Rule 5.141A** as a **discretionary activity**.

Removal of the ford crossing

There are no applicable rules in the LWRP that reference the decommissioning of a ford crossing. Rule 5.137 is limited to the decommissioning of bridges and culverts. In the absence of any applicable rules, Rule 5.6 is applied. Therefore, I consider that the disturbance of the riverbed for the removal of the ford crossing, associated discharges and the proposed instream diversion are a **discretionary activity** under **Rule 5.6**.I note however, that the works could be undertaken without the need for diversion when the Karetu River runs dry and therefore the s14 and s15 components may not be required.

Vegetation clearance and earthworks outside the bed of a river

Rule 5.167 relates to the use of land for vegetation clearance outside the bed of a river, but within 5 m of the bed of a river or adjacent to a wetland boundary on land not shown as High Soil Erosion Risk on the Planning Maps or defined as Hill and High Contril on the Planning Maps, and the associated discharge of sediment or sediment-laden water in circumstance where sediment may enter surface water, as a **permitted activity**, provided the following conditions are met:

Table A-19: Rule assessment against LWRP Rule 5.167

Conditions		***Assessment***	***Status***
(1) Except in relation to recovery activities, the area of bare ground resulting from vegetation clearance:	(a) does not exceed 10% of the area within the relevant riparian margin at any time; or	It is assumed by the consultant that vegetation clearance will exceed 10% of the area within the riparian margin adjacent to the site.	**Does not comply**
	(b) is undertaken in accordance with a Farm Environment Plan that has been prepared in accordance with Schedule 7 Part A; or	n/a	n/a
	(c) for plantation forestry activities is undertaken in accordance with the Environmental Code of Practice for Plantation Forestry (ECOP) 2007; and	n/a	n/a
(2) Except in relation to recovery activities, the vegetation clearance is not on land above 900 m above sea level; and		The site is not located above 900 m above sea level	Complies
(3) Except in relation to recovery activities, or the establishment, maintenance or repair of network utilities and fencing, the concentration of total suspended solids in the discharge does not exceed:	(a) 50g/m^3 where the discharge is to any spring-fed river, Banks Peninsula River, or to a lake, except when the background total suspended solids in the waterbody is greater than 50g/m^3 in which case the Schedule 5 visual clarity standards shall apply; or	n/a	n/a
	(b) 100g/m^3 where the discharge is to any other river or to an artificial watercourse except when the background total suspended solids in the waterbody is greater than 100g/m^3 in which	The consultant stated that the discharge of sediment may not be possible to be managed to the required suspended solids limit.	**May not comply**

	case the Schedule 5 visual clarity standards shall apply; and		
(4) The felling of trees, or any part of a tree, is away from any lake, river or wetland, except where it is not practicable to do so to ensure human safety, and no logs or tree trunks are dragged through or across the bed of a lake or a permanently flowing river, or a wetland; and		Assumed to comply	Complies
(5) The vegetation clearance does not occur adjacent to a salmon spawning site listed in Schedule 17, or in any inanga spawning habitat during the period of 1 January to 1 June inclusive, or in any Critical Habitat; and		The Karetu River is not listed as salmon spawning habitat, inanga spawning habitat or Critical Habitat.	Complies
(6) The vegetation is not flood or erosion control vegetation; and		The vegetation is not listed as flood or erosion control vegetation.	Complies
(7) From 5 September 2015, and in the riparian margins of the Clarence, Waiau, Hurunui, Waimakariri, Rakaia, Rangitata, and the Waitaki rivers, vegetation clearance or cultivation does not result in a reduction in the area or diversity of existing riparian vegetation, unless the works have been authorised by a land use consent granted by the relevant territorial authority and conditions 1 to 6 above are also met, or the activity is for the purpose of the installation, operation, maintenance, upgrade or repair of infrastructure.		n/a	n/a

Rule 5.168 in turn, addresses the use of land for earthworks outside the bed of a river, but within 5 m of the bed of a river or adjacent to a wetland boundary on land not shown as High Soil Erosion Risk on the Planning Maps or defined as Hill and High Contril on the Planning Maps, and the associated discharge of sediment or sediment-laden water in circumstance where sediment may enter surface water, as a **permitted activity**, provided the following conditions are met:

Table A-20: Rule assessment against LWRP Rule 5.168

Conditions		***Assessment***	***Status***
(1) Except in relation to recovery activities, or the establishment, maintenance or repair of network utilities	(a) does not at any time exceed: (i) an area of 500 m^2, or 10% of the area, whichever is the lesser; or	It is assumed by the consultant that vegetation clearance will exceed 10% of the area within the riparian margin adjacent to the site. (ii) is not relevant for this site.	**Does not comply**

and fencing, the extent of earthworks within the riparian margin:	(ii) a volume of 10m^3 on land shown as High Soil Erosion Risk on the Planning Maps; or		
	(b) is undertaken in accordance with a Farm Environment Plan that has been prepared in accordance with Schedule 7 Part A; or	n/a	n/a
	(c) or plantation forestry activities is undertaken in accordance with the Environmental Code of Practice for Plantation Forestry (ECOP) 2007 and the NZ Forest Road Engineering Manual (2012); and	n/a	n/a
(2) Except in relation to recovery activities or the establishment, maintenance or repair of network utilities and fencing, the concentration of total suspended solids in the discharge does not exceed:	(a) 50g/m^3 where the discharge is to any spring-fed river, Banks Peninsula River, or to a lake, except when the background total suspended solids in the waterbody is greater than 50g/m^3 in which case the Schedule 5 visual clarity standards shall apply; or	n/a	n/a
	(b) 100g/m^3 where the discharge is to any other river or to an artificial watercourse except when the background total suspended solids in the waterbody is greater than 100g/m^3 in which case the Schedule 5 visual clarity standards shall apply; and	The consultant stated that the discharge of sediment may not be possible to be managed to the required suspended solids limit.	**May not comply**
(3) The activity does not occur adjacent to a salmon spawning area listed in Schedule 17, or in any inanga spawning habitat during the period of 1 January to 1 June inclusive, or in any Critical Habitat; and		The Karetu River is not listed as salmon spawning habitat, inanga spawning habitat or Critical Habitat.	Complies
(4) Except in relation to recovery activities or the establishment, maintenance or repair of network utilities and fencing, any earthworks or cultivation is not within 5 m of any flood control structure without the prior written permission of the person or agency responsible for maintaining that flood control structure; and		n/a	n/a
(5) From 5 September 2015, and in the riparian margins of Clarence, Waiau, Hurunui, Waimakariri, Rakaia, Rangitata, and Waitaki rivers, earthworks or cultivation do not result in a reduction in the area or diversity of existing riparian vegetation, unless the works have been authorised by a land use consent granted by the relevant territorial authority and conditions 1 to 4 above are met, or the activity is for the purpose of the installation, operation, maintenance, upgrade or repair of infrastructure.		n/a	n/a

22. As not all conditions of Rules 5.167 and 5.168 can be complied with, resource consents are required as a **restricted discretionary activity** under **Rule 5.169** for the proposed land use and the discharge of sediment.

Introduction or planting of any plant into the bed of a river

Rule 5.163 relates to the introduction or planting of any plant, or the removal and disturbance of existing vegetation in, on or under the bed of a river and any associated discharge of sediment or sediment-laden water in circumstances where sediment may enter surface water as a **permitted activity** provided the following conditions are met:

Table A-21: Rule assessment against LWRP Rule 5.163

Conditions		***Assessment***	***Status***
(1) The activity does not prevent access to lawfully established structures, including flood protection works, or to flood control vegetation; and		There are no existing structures that could be affected by the proposed activity.	Complies
(2) No vegetation used for flood control or bank stabilisation is disturbed, removed, damaged or destroyed without the prior written permission of the person or agency responsible for maintaining that vegetation for flood control purposes; and		n/a	n/a
(3) No woody vegetation is disposed of in, on, over or under the bed of a lake or river other than for in situ decomposition of sprayed weeds that were growing in, on, over or under the bed; and		Assumed to comply	Complies
(4) Introduction or planting of vegetation in, on, or under the bed of any lake or river is not of a species listed in the Biosecurity NZ Register of Unwanted Organisms or the Canterbury Regional Pest Management Plan; and		The proposal consists of the establishment of indigenous vegetation along the banks of the Karetu River and the banks and bed of the eastern watercourse (intermittent).	Complies
(5) Introduction or planting of vegetation in, on, or under the bed of any river or lake listed as a high naturalness waterbody in Section 6 to 15 is only of indigenous plant species that naturally occur in the catchment; and		n/a	n/a
	(a) non-indigenous species; or	Assumed to comply	Complies

(6) Vegetation clearance in, on, or under the bed of any river or lake listed as a high naturalness waterbody in Section 6 to 15 is only of:	(b) indigenous species that form the understorey of plantation forest that is being harvested and a minimum 5 m set back from the river or lake is provided upon replanting (if replanting occurs); and	Assumed to comply	Complies
(7) Vegetation clearance does not occur in a salmon spawning site listed in Schedule 17, or in any inanga spawning habitat during the period of 1 January to 1 June inclusive, or in any Critical Habitat; and		The Karetu River is not a site associated with salmon or inanga spawning habitat, not a Critical Habitat	Complies
(8) In a flood control rating district scheme area, the introduction or planting of any plant, has the prior written permission of the person or agency responsible for maintaining that vegetation for flood control purposes; and		n/a	n/a
(9) From 5 September 2015, and within the bed of the Clarence, Waiau, Hurunui, Waimakariri, Rakaia, Rangitata, and Waitaki rivers, vegetation clearance or cultivation does not result in a reduction in the area or diversity of existing riverbed vegetation, unless the activity is for the purpose of the operation, maintenance, upgrade or repair of infrastructure; and		n/a	n/a
(10) Except in relation to recovery activities, or the establishment, maintenance, repair or upgrading of network utilities and fencing, the concentration of total suspended solids in the discharge does not exceed:	(a) 50g/m^3 where the discharge is to any spring-fed river, Banks Peninsula River, or to a lake, except when the background total suspended solids in the waterbody is greater than 50g/m^3 in which case the Schedule 5 visual clarity standards shall apply; or	n/a	Complies
	(b) 100g/m^3 where the discharge is to any other river or to an artificial watercourse except when the background total suspended solids in the waterbody is greater than 100g/m^3 in which case the Schedule 5 visual clarity standards shall apply.	The planting along the eastern watercourse can be undertaken during the dry. The planting of the Karetu River banks will be undertaken with minimal activity and disturbance to ensure that total suspended solid limits will be achieved, or visual clarity standards will be achieved.	

23. I consider that the planting of the riverbanks with indigenous vegetation, as proposed, can be undertaken as a **permitted activity** in accordance with **Rule 5.163**.

24. I note that Rule 8.5.37 will take precedent, if the purpose of the activity is indigenous habitat enhancement. In case of establishment of indigenous vegetation (i.e. currently not existing on site), Rule 5.163 will apply.

Bed and bank river habitat enhancement

Sub-regional **Rule 8.5.37** relates to habitat enhancement, specifically, the disturbance of the bed and banks of a river and any associated deposition of excavated bed material on, under or over the bed of a river for the purpose of the maintaining or enhancing indigenous vegetation, habitats of indigenous fauna, or habitats of trout and salmon, as a **permitted activity**, provided the following conditions are met:

Table A-22: Rule assessment against LWRP Rule 8.5.37

Conditions	***Assessment***	***Status***
(1) The disturbance of the bed does not occur within 100 metres of birds, which are nesting or rearing their young in the bed of the river; and	Proposed to comply	Complies
(2) The activity is not undertaken in or on the bed of a salmon spawning site listed in Schedule 17, or in any inanga spawning habitat during the inanga spawning season of 1 March to 1 June inclusive, or in any indigenous freshwater species habitat; and	The site is not located in a salmon spawning habitat, inanga spawning habitat or any Critical Habitat.	Complies
(3) The activity is not located in, on, under, or over any wetland in the bed; and	The activity will not be undertaken in, on or over any wetland	Complies
(4) The quantity of bed material disturbed is less than 10 cubic metres; and	Proposed to comply	Complies
(5) The disturbance does not occur within 5 metres of any flood protection works; and	n/a	n/a
(6) The disturbance does not occur within 50 metres of any structure, other than flood protection works, located in the riverbed.	A 50 m set back will be maintained from the ford crossing or the new bridge structure.	Complies

25. I consider that the proposed activity, which is indigenous habitat enhancement in the watercourses can be undertaken as a **permitted activity** in accordance with Rule **8.5.37**.

Reduction of the area of a wetland

Rule 5.162 addresses the reduction of the area of a wetland by the taking, use, damming or diversion (including draining) of water, or by other means, including vegetation clearance, cultivation, burning, or earthworks, except as provided for by Rule 5.161 is a **non-complying activity**. Rule 5.161 provides for the above activities as a restricted discretionary activity, but only in relation to the operation, maintenance or repair of existing infrastructure, or construction of new infrastructure for transport, electricity or water distribution or reticulation.

26. The consultant has not addressed Rule 5.162, instead stating that providing the mitigation for the modelled baseflow reductions (i.e. drainage) of the wetland, via Rule 5.159, no reduction of the area of the wetland will result as a consequence of the activity.

27. I disagree with this assessment. Rule 5.159 does not apply, as the principal activity does not consist of the '*enhancing, restoring or creating of a wetland'* and the associated activities. Instead, the principal activity, related to the works to facilitate the operation of the landfill, causes the reduction of the baseflow to the wetland. The supplementation of the loss of baseflow by returning drainage water back into the wetland is considered to be remediation in the context of the activity.

28. It is clear that the proposed remediation (supplementation of flow) does not occur in order to enhance or create a wetland. I also do not consider that the activity represents a 'restoration' of the wetland, such as is the case when historically present wetlands are restored to functional wetlands. The 'restoration' in this case happens as a result of the impact on the wetland, which only arises for the purpose of enabling the wider landfill proposal to take place.

29. Informal advice provided by the CRC Solicitor agrees with this interpretation, concluding that Rule 5.159 does not apply in the context of the proposal.

30. CRC Planning advice is also consistent with the above interpretation, stating that the principal activity (lowering of the baseflow and therefore reduction of the area of the wetland) must be assessed against the rule framework. The remediation/ mitigation must subsequently be considered against the activity applied for.

31. I therefore consider that the proposed activity requires a consent under **Rule 5.162** as a **non-complying activity**.

Remediation proposal for the wetland

32. The consultant assessed Rule 5.159 for the proposal that includes earthworks and a replacement of groundwater seepage flows to and out of the southern wetland impacted by the proposed landfill activity. As noted above, I do not consider that this rule applies to the activity, as the activity is not primarily for the enhancement, restoration or creation of a wetland, but rather the remediation for the expected loss of baseflow and thus reduction of the area of the wetland.

33. Consequently, I have assessed the activities associated with the remediation proposal under separate rules:

a. **5.100** for the discharge of water into the wetland as a **discretionary activity,** as the discharge cannot meet Condition (1), being from or into contaminated or potentially contaminated land. Refer to Table A-11 for the rule wording. Conditions (3) and (7) cannot be met.

b. **5.176** for the use of land to excavate material over an unconfined or sei-confined aquifer, as a **restricted discretionary activity**, if the excavation is within 50 m of the wetland[15], and more than 100 m^3 is excavated. If the excavations are <100 m^3, this can be undertaken as a **permitted activity** under **Rule 5.176**. See Table A-24 for the rule wording.

c. The application is silent on the exact distance of the earthworks from the wetland for the purpose of installing the remediation options, and also silent on the volumes of earthworks expected for this activity (see Appendix F of the AEE). Parts of the AEE discuss a minimum setback of 10 m to the wetlands, incl. for the groundwater seepage inducing works.

d. In the absence of this information, I have assessed the proposed activity to be **discretionary** under **Rule 5.100** for the discharge of water into the wetland, and a **restricted discretionary activity** under **Rule 5.176** for earthworks within 50 m of the wetland. The discharge of sediment laden water arising from this activity is considered under **Rule 5.94B** as a **restricted discretionary activity**, as the property is registered on the LLUR and therefore cannot comply with permitted activity Rule 5.94A. Please refer to Table A-3.

Excavations over aquifers

Rule 5.175 relates to the use of land to excavate material as a **permitted activity**, provided the following conditions are met:

Table A-23: Rule assessment against LWRP Rule 5.175

Conditions		***Assessment***	***Status***
(1) Over the Coastal Confined Gravel Aquifer System, as shown on the Planning Maps:	(a) there is more than 1 m of undisturbed material between the deepest part of the excavation and Aquifer 1; and	n/a- the site is not located over the Coastal Confined Aquifer as shown on the Planning Maps	n/a
	(b) if more than 100 m3 of material is excavated, the excavation does not occur within 50 m of any surface waterbody; or		
(2) Over an unconfined or semi-confined aquifer:	(a) the volume of material excavated is less than 100 m^3; or	Works within the lower terrace of the site, which is located over the unconfined/ semi-confined aquifer system as per Canterbury Maps, will involve more than 100 m^3.	n/a

[15] The rule references 'surface waterbody' and the LWRP definition includes the water above ground surface within a wetland in this definition.

	(b) the volume of material excavated is more than 100 m^3 and: (i) there is more than 1 m of undisturbed material between the deepest part of the excavation and the highest groundwater level; and (ii) the excavation does not occur within 50 m of any surface waterbody.	The works to excavate the stormwater management areas (Sediment Retention Ponds) will involve more than 100 m3 of material being excavated. Therefore, part (b) of this rule applies. The SRP may be located within 50 metres of the Karetu River and within 1 m of the highest groundwater level. The consultant has taken a precautionary approach and assessed that therefore, this condition cannot be met.	**May not comply**

34. As the land use cannot meet conditions of Rule 5.175, the activity is classified as a **restricted discretionary activity**, requiring consent under **Rule 5.176**.

Deposition of material

Rule 5.177 relates to the use of land for the deposition of more than 50 m^3 of material in any consecutive 12 months period onto land which has been excavated to a depth in excess of 5 m below the natural land surface and is located over an unconfined or semi-confined aquifer, where the highest groundwater level is less than 5 m below the deepest point in the excavation, and the associated discharge of contaminants onto or into land where it may enter water as a **controlled activity,** provided the following conditions are met:

35. Note, that this rule relates to the deposition over the unconfined or semi-confined aquifer only, which is located only on the western extent of the site. However, the exact line is not to be interpreted from Canterbury Maps, as the '*Unconfined and Semiconfined Aquifer'* layer is only indicative. Therefore, some deposition may indeed be subject to this rule.

36. Excavations have already occurred in excess of 5 metres below the natural land surface at the site for the purpose of lime quarrying.

Table A-24: Rule assessment against LWRP Rule 5.177

Conditions	***Assessment***	***Status***
(1) The material is only cleanfill; and	The material is proposed to be Class 3 (WasteMINZ, 2023) material plus inert construction and demolition waste. The proposed material therefore does not meet the definition of cleanfill	**Does not comply**
(2) The volume of vegetative matter in any cubic metre of material deposited does not exceed 3%; and	It is proposed to minimise putrescible material as much as possible, incl. limiting the occurrence of vegetative matter to < 3%.	Complies

(3) The material is placed in the land at least 1 m above the highest groundwater level at the site; and	A liner will be placed at the bottom of the excavation, but ongoing drainage of groundwater will be required to ensure that the liner does not come into contact with groundwater. Therefore, groundwater is likely to be within 1 m of fill material	**Does not comply.**
(4) The material is not concrete slurry, coal tar or hydro-excavated waste; and	Not included in the waste acceptance materials list	Complies
(5) The material is not deposited onto or into land that is listed as an archaeological site; and	The site is not listed as an archaeological site	Complies
(6) A management plan has been prepared in accordance with Section 8.1 and Appendix B of "A Guide to the Management of Cleanfills", Ministry for the Environment, January 2002; and	A management plan has been supplied in L of the application but is consistent with the requirements for a managed fill site, rather than a cleanfill site. WasteMINZ has superseded the MfE publication.	**Does not comply** by definition, but likely to be consistent with WasteMINZ requirements.
(7) A site rehabilitation plan has been prepared for the site and is submitted with the application for resource consent.	It is proposed in the application to submit a rehabilitation plan within 5 years of commencing the activity.	**Does not comply.**

37. As the land use and associated discharge cannot comply with Rule 5.177, it cannot be undertaken as a controlled activity. Therefore, consent is required under **Rule 5.178** as a **restricted discretionary activity**.

Storage of hazardous substances in a portable container

Rule 5.179 relates to the use of land for the storage of hazardous substances in a portable container as a **permitted activity**, provided the following conditions are met:

Table A-25: Rule assessment against LWRP Rule 5.179

Conditions	***Assessment***	***Status***
(1) The substance is approved under the Hazardous Substances and New Organisms Act 1996 and the storage and use of the substance is in accordance with all conditions of the approval; and	The proposed storage relates to fuels and chemicals.	Complies

(2) The container(s) are not located within:	(a) 20 m of a surface water body or a bore; or	The storage will be in a location that is at least 20 m from a surface water body or a bore.	Complies
	(b) a Community Drinking-water Protection Zone as set out in Schedule 1.	There is no CDWPZ located on the site.	n/a

38. As the conditions of the Rule can be complied with, the storage of hazardous substances can be undertaken as a **permitted activity** in accordance with **Rule 5.179**.

Storage of hazardous substances other than in a portable container

Rule 5.181 addresses the use of land for the storage of hazardous substances other than in a portable container as a **permitted activity**, provided the following conditions are met:

Table A-26: Rule assessment against LWRP Rule 5.181

Conditions		***Assessment***	***Status***
(1) The substance is approved under the Hazardous Substances and New Organisms Act 1996 and the storage and use of the substance is in accordance with all conditions of the approval; and		The proposed storage relates to fuels and chemicals for a future scenario where the applicant may wish to establish more permanent storage of diesel on site via an above ground storage tank. The	Complies
(2) A current inventory of all hazardous substances on the site is maintained, and a copy of the inventory shall be made available to the CRC or emergency services on request; and		Assumed that this can be complies with.	Complies
(3) For hazardous substances stored or held on or over land, all areas or installations used to store or hold hazardous substances are inspected at least once per month or annually if the site is outside of any area or zone identified in a proposed or operative district plan for residential, commercial or industrial purposes and is unstaffed, and repaired or maintained if any defects are found that may compromise the containment of the hazardous substance; and		Assumed compliance	Complies
(4) For hazardous substances stored or held in a container located in or under land:	(a) if there has been any physical loss of product, then the Canterbury Regional Council shall be notified within 24 hours of confirmation of the loss; and	Assumed compliance	Complies

	(b) records of stock reconciliations over the past 12 months shall be made available to the CRC upon request. If requested, a copy of the stock reconciliation and the most recent certification of the container shall be provided to the CRC within five working days; and		
(5) For substances stored within a Community Drinking-water Protection Zone as set out in Schedule 1:	(a) all hazardous substances on a site are stored under cover in a facility which is designed, constructed and managed to contain a leak or spill and allow the leaked or spilled substance to either be collected or lawfully disposed of; and	n/a, not within a CDWPZ	n/a
	(b) spill kits to contain or absorb a spilled substance are located with the storage facility and use areas at all times and		
(6) Except where the storage was lawfully established before 4 July 2004 and the maximum quantity stored has not increased since that date, or the storage relates to transformers and other equipment associated with electricity infrastructure, the substances shall not be stored within:	(a) 20 m of a surface waterbody or a bore used for water abstraction; or	Assumed that it can be complied with	Complies
	(b) 250 m of a known active fault that has a recurrence period of less than 10,000 years, and the land is: (i) over an unconfined or semi-confined aquifer; or (ii) within 50 m of a permanently or intermittently flowing river or a lake.	The nearest known active fault line is 1.75 km to the south, so n/a	n/a

39. The above assessment relates to the storage of diesel on site specifically. However, the storage of leachate in leachate ponds can also be considered under this rule, in which case, Condition (1) cannot be complied with. The storage of leachate in the leachate pond therefore requires consent as a **discretionary activity** under **Rule 5.182**.

Canterbury Air Regional Plan

Fuel burning device

Rule 7.20 addresses the discharge of contaminants into air from the external combustion of fuel in any large-scale fuel burning device as a **permitted activity**, provided the following conditions are met:

Table A-27: Rule assessment against CARP Rule 7.20

Conditions	*Assessment*	*Status*
(1) The discharge is directed vertically into air and is not impeded by any obstruction above the emission stack which decreases the vertical efflux velocity below that which would occur in the absence of such obstruction; and	Consultant's assessment states that the discharge complies. The vertical stack is not obstructed. However, the applicant has not provided any further evidence to support this statement. The original proposal included a newly installed 11 m stack to replace the current 6 m stack. The existing 6 m stack includes a cowl (rain cap) which affects the dispersion properties of the stack. It is unclear whether the applicant intends to retain the proposal to install a new stack.	**May not comply**
(2) Except for a period not exceeding two minutes in each hour of operation, the opacity of the discharge is not darker than Ringelmann Shade No. 1, as described in Schedule 6; and	Consultant's assessment states that the discharge will comply.	Complies
(3) The emissions are discharged through an emission stack which meets the requirements set out in Schedule 5; and	Consultant's assessment states that the discharge complies. The stack requirements in Schedule 5 only apply to solid fuel devices within the permitted 1 MW threshold. The lime drying plant has an operating heat output of 1.79 MW. See notes under Condition (1).	**May not comply**
(4) The fuel burning equipment is maintained in accordance with the manufacturer's specifications at least once every year by a person competent in the maintenance of that equipment, a copy of each maintenance report is held for three years and made available to the CRC on request, and the annual maintenance includes adjustment, as required, of the fuel to air mix and testing of the ratio of combustion gases discharged to optimise efficiency; and	Proposed to be met.	Complies

(6) Where the discharge is from the combustion of diesel:	(a) the sulphur content of the fuel to be burnt does not exceed 0.001% by weight, and		The commercially available diesel supply generally meets this requirement.	Complies
	(b) the combined net energy output capacity of all diesel-fired devices is less than or equal to:	(i) 500kW within a Clean Air Zone; or	The discharge is not within a Clean Air Zone, therefore n/a	n/a
		(ii) 2MW outside a Clean Air Zone;	It is proposed to use 2x 154 kW burners on site.	Complies

40. Outside of the Clean Air Zone, the discharge of contaminants into air from the external combustion of fuel in a large-scale fuel burning device that does not meet one or any of conditions 1,2,4,5 or 6 is a **discretionary activity** under **Rule 7.24**. The applicant needs to clarify the details of the proposed changes to the proposal.

Handling of bulk solids

Rule 7.35 addresses the discharge of contaminants into air from the handling of bulk solid materials, as a **permitted activity**, provided the following conditions are met:

Table A-28: Rule assessment against CARP Rule 7.35

Conditions	***Assessment***	***Status***
(1) The discharge of dust does not cause an offensive or objectionable effect beyond the boundary of the property of origin, when assessed in accordance with Schedule 2; and	Based on management practices on site, it is not expected that the handling of bulk solid materials will cause offensive or objectionable effects beyond the property boundary.	Complies
(2) The handling occurs indoors, or where the handling occurs outdoors the rate of handling does not exceed 100t per hour; or	The rate of handling is unlikely to exceed 100 T per hour based on the intended volume of 300 T per day.	Complies
(3) Where handling occurs outdoors on less than 21 days per calendar year, the rate of handling does not exceed 250t per hour; and	n/a, the handling is proposed to occur on more than 21 days per calendar year	n/a
(4) Where the handling occurs outdoors and the rate of handling exceeds 20t per hour, a dust management plan is prepared in accordance with Schedule 2 and implemented by the person responsible for the discharge into air; and	Likely to exceed 20 t per hour at times. The DMP has been prepared.	Complies
(5) The dust management plan is supplied to the CRC on request; and	Supplied as part of the Site Management Plan (Appendix L)	Complies

(6) The discharge does not occur within 200m of a sensitive activity, wāhi tapu, wāhi taonga or place of significance to Ngāi Tahu that is identified in an Iwi Management Plan; and	The site is within 200 m of the Karetu River, identified as a Nga Wai, and an area of significance to Māori.	**Does not comply**
(7) Notwithstanding condition 6, where the discharge is from production blasting at a quarry site the discharge does not occur within 500m of a sensitive activity wāhi tapu, wāhi taonga or a place of significance to Ngāi Tahu that is identified in an Iwi Management Plan.	n/a	n/a

41. As the permitted activity conditions cannot be met, the discharge from the handling of bulk solid materials required a consent under **Rule 7.63** as a **discretionary activity.**

Onsite storage of bulk solid materials

Rule 7.36 addresses the discharge of contaminants into air from the outdoor storage of bulk solid materials as a **permitted activity**, provided the following conditions are met:

Table A-29: Rule assessment against CARP Rule 7.36

Conditions	***Assessment***	***Status***
(1) The discharge of dust does not cause an offensive or objectionable effect beyond the boundary of the property of origin, when assessed in accordance with Schedule 2; and	Based on management practices on site, it is not expected that the handling of bulk solid materials will cause offensive or objectionable effects beyond the property boundary.	Complies
(2) The amount of material stored does not exceed 1000t when it has an average particle size of less than 3.5mm; and	The outdoor storage of materials will exceed 1,000 T and the average particle size may be less than 3.5 mm.	**Does not comply**
(3) Where the storage exceeds 200t, a dust management plan is prepared in accordance with Schedule 2 and implemented by the person responsible for the discharge into air; and	Supplied as part of the Site Management Plan (Appendix L)	Complies
(4) The dust management plan is supplied to the CRC on request; and	Supplied as part of the Site Management Plan (Appendix L)	Complies
(5) The discharge does not occur within 100m of a sensitive activity, wāhi tapu, wāhi taonga or place of significance to Ngāi Tahu that is identified in an Iwi Management Plan.	The site is within 100 m of the Karetu River, identified as a Nga Wai, and an area of significance to Māori	**Does not comply**

42. As the permitted activity conditions cannot be met, the discharge from the storage of bulk solid materials required a consent under **Rule 7.63** as a **discretionary activity.**

Processing of lime

Rule 7.36 addresses the discharge of contaminants into air from industrial and trade premises that is not managed by any other rules (7.47-7.63) in the plan. The discharge to air associated with the use of the rotary drying kiln is therefore a **discretionary activity** requiring consent under **Rule. 7.63.**

Landfill activity

The CARP provides for a permitted activity air discharge from the storage, transfer, handling, treatment or disposal of waste, that was established before 1 June 2002. However, the discharge into air from newly established landfill sites is not managed by any rules. A landfill meets the definition of an industrial trade premises. In the absence of any activity specific rules, **Rule 7.63** applies, and consent is required as a **discretionary activity** for the discharge of contaminants (odour, dust, particulates) into air from the storage, transfer, handling, treatment and disposal of waste.

Appendix 3: Summary of Submissions

Supplied as a separate document due to its size.

Appendix 4: CRC, Contaminated Land and Waste s42A report, prepared by Dr Michael Massey

Before the Independent Hearing Panel appointed by the Canterbury Regional Council

IN THE MATTER OF The Resource Management Act 1991

AND

IN THE MATTER OF Application CRC243699 to CRC243706, 150 to 176 Quarry Road, Loburn

Section 42A Officer's Report

Report of Michael Massey

Introduction

Background

1. This report forms part of the Environment Canterbury's audit of the assessment of environmental effects (AEE) provided by Protranz International Limited (the applicant) in support of resource consent applications CRC243699 to CRC243706 to establish and operate a landfill at the Whiterock Quarry site, 150 to 176 Quarry Road, Loburn (the site).
2. This report will provide the decision-maker with information and advice related to:
    a. Contaminants of concern at the proposed landfill, their behaviour, and persistence of contamination;
    b. Mitigation measures including the Waste Acceptance Criteria (WAC) for material that will be emplaced at the site;
    c. Monitoring and trigger actions; and,
    d. Management of the permanent legacy that will be created by the proposed activities.

Qualifications

3. I am Principal Science Advisor on the Contaminated Land and Waste Team at Environment Canterbury Regional Council (CRC, colloquially known as ECan). I have been in this role since February 2020. In my time at CRC, I have provided technical advice relating to the investigation and remediation of contaminated sites in Canterbury, and have written extensive guidance on landfilling and cleanfilling in support of Consents Planning as well as Compliance, Monitoring, and Enforcement.
4. I am a Certified Environmental Practitioner (no. 1361) under the scheme managed by the Environment Institute of Australia and New Zealand (EIANZ), and am a member of the Australasian Land and Groundwater Association. I am also a member of the American Association for the Advancement of Science.
5. Prior to this role I worked as a professor at a mid-sized public university in the United States.
6. I hold a Doctor of Philosophy degree in Environmental Earth System Science from Stanford University in Stanford, California, United States. I also hold a Master of Science

degree in Soil Science from Colorado State University in Fort Collins, Colorado, United States. My areas of expertise include soil and water chemistry, groundwater chemistry, and contaminant biogeochemistry and transport.

7. I have been a practicing environmental scientist since 2006, and as of this writing I have around 18 years of experience in environmental work, including research, teaching, and practice. In addition to my work for the Regional Council, I remain active in research, scientific publishing, and peer review of scientific studies.

8. As part of the CRC's Contaminated Sites Team, I provide technical advice and undertake technical reviews on matters relating to contaminated land. We serve a variety of internal and external customers including Consents Planning, Compliance and Enforcement, Incident Response, environmental consultants, other councils and government agencies, and private landowners and companies.

9. I have read the updated Environment Court Practice Note (2023), including the Code of Conduct for Expert Witnesses in giving evidence to the Environment Court. I agree to comply with that code when giving evidence to the Hearing Panel in this matter. All my evidence is within my expertise and I have considered and stated all material facts known to me which might alter or qualify the opinions I express.

Scope of Report

10. This report is prepared under the provisions of Section 42A of the Resource Management Act 1991 (RMA). This section allows a council officer or consultant to provide a report to the decision-maker(s) on a resource consent application made to the council and allows the decision-maker(s) to consider the report at the hearing. Section 41(4) of the RMA allows the decision-maker(s) to request and receive from any person who makes a report under Section 42A "*any information or advice that is relevant and reasonably necessary to determine the application*".

11. This report is supplementary to the Section 42A Report prepared by the Environment Canterbury for the above resource consent applications. Full details of the consent applications are provided in that report.

12. To carry out this audit of the consent applications, I have:

    a. Considered the relevant sections of the assessment of effects on the environment (AEE) submitted by the applicant, including its technical appendices.

    b. Reviewed further information that was provided by the applicant on 23 August 2024, specifically the revised Appendix L (Site Management Plan draft Rev B), Appendix M (Monitoring Programme and TARP draft Rev B), and Appendix Y (proposed conditions Rev 1).

    c. Attended a visit to the site on 30 May 2024, with the applicant and technical and planning experts from both Regional and District Councils and a variety of consultancies.

    d. Taken into account relevant issues raised by submitters in relation to the effects I have considered in this report.

13. Finally, this report provides conclusions on the scale and significance of adverse and positive effects, as well as commentary on proposed or potential consent conditions.

Description of the Affected Environment

14. I have reviewed the Preliminary Site Investigation report (PSI) provided with the application as Appendix D. As noted in the PSI, several activities on the Ministry for the Environment's Hazardous Activities and Industries List (HAIL) have taken place at the site.

15. Accordingly, the site is listed on the Canterbury Regional Council Listed Land Use Register (LLUR), for activities including HAIL activity E3 (cement or lime manufacture), and HAIL activity A17 (storage tanks or drums for fuel, chemicals, or liquid waste).

16. The quarry pit is not included on the LLUR. However, the proposal is to establish a landfill at the site (HAIL activity G3). The quarry pit location will become a HAIL G3 site as a consequence of the proposal, if consent is granted and the activity commences.

17. Other than the subject site, there are a few other HAIL sites in the area documented on the LLUR. Most HAIL sites in the surrounding area are old sheep dips, relatively small areas of localised contamination compared to the subject site. It is likely that there are other sites in the surrounding area that are not documented on the LLUR, such as farm pits and offal pits, but these would also be relatively small compared to the subject site.

18. An important feature of the receiving environment is the Karetu River, located immediately to the west of the quarry site. Access to the quarry also currently requires fording the river, and a new access bridge will be constructed as part of the proposed activities to replace the existing ford. I consider the river to be among the highest priority considerations, in terms of environments likely to be affected by the proposed activities.

19. The Karetu River is used for domestic water supply downstream of the site. Domestic water use and ecological values are discussed in my colleagues' evidence (Dr Matt Silver and Fleur Tiernan).

20. Fleur Tiernan of SLR Consulting Ltd stated in her report, "Water quality sampling was carried out by the applicant on two occasions by the applicant: on 18 October 2022 and 20 April 2023. This is insufficient to characterise the water quality of the river." I view the existing water quality of the river as a critical information gap, since I consider the Karetu River to be a key feature of the receiving environment.

21. My colleague Dr Matt Silver of CRC stated that fractures in the rock and associated preferential flow paths are important features of the receiving environment and potentially play an important role in groundwater flow. I concur with his assessment, and view preferential flow paths that discharge to the Karetu River as important pathways for transport of contamination.

22. The Karetu River and groundwater are the two features of the receiving environment I have considered most thoroughly in my evidence, though I have also made a few comments regarding gaseous contaminants and dust discharges, where applicable.

Assessment of Effects on the Environment

Actual and Potential Effects on the Environment

23. The proposed landfill will have a capacity of approximately 500,000 cubic metres, and filling is expected to continue for around 20 years, depending on demand for waste disposal. The proposed landfill will accept some types of construction & demolition waste, contaminated soil, and other material such as asbestos and coal tar roading. The proposed landfill will be lined and have a leachate collection system.

24. The importation of waste has the potential to impact the environment beyond the landfill, and the characteristics of the imported waste can influence the nature and extent of environmental impacts.

25. After filling ceases and the landfill is closed, I anticipate the actual or potential environmental effects of the proposed activity to continue in perpetuity, due to the persistent nature of many of the contaminants that will be emplaced at the site.

26. In this evidence, I have considered both the possibility of high probability effects (e.g., liner leakage), as well as low probability, high consequence effects (e.g., discharges of highly contaminated material or leachate to the Karetu River).

27. For the most part, I defer to my colleagues for their assessment of effects on the receiving environment, as their areas of subject matter expertise include groundwater, surface water, ecology, and air quality. The primary focus of my assessment relates to the acceptance and management of waste at the site, as well as management of the longer-term legacy that the proposed activities will create. These are the main issues that are relevant to my work on management of contaminated sites—waste generation at contaminated sites, waste disposal to the proposed site, and the ongoing management of the new contaminated site that the proposal would create.

28. Contaminants of concern include but are not limited to trace elements, pesticides, hydrocarbons, asbestos, per- and polyfluoroalkyl substances (PFAS), and incidental amounts of combustible or putrescible wastes such as vegetative matter.

29. Gypsum wallboard (which has many names, including drywall, Gibraltar board, or “gib board”) is not prohibited according to the proposed Waste Acceptance Criteria (WAC) listed in the application (Appendix K, Section 5.4 Prohibited Materials, Table 5-1). However, gypsum products are prohibited in the proposed conditions for CRC243705 Schedule B revision 1. I consider that sulphate and PFAS (a common coating of gypsum wallboard) are potential contaminants of concern as well, even if gypsum products are only inadvertently emplaced at the site as incidental components of other waste.

30. Sulphate is not generally considered a health hazard, but it can be transformed in low-oxygen conditions into hydrogen sulphide (H_2S), which is a toxic and corrosive gas that tends to accumulate in low-lying areas because of its density. Hydrogen sulphide gas generation can be more prevalent in a construction & demolition waste landfill due to the presence of gypsum wallboard, whereas in a municipal solid waste landfill hydrogen sulphide gas is generally only a relatively small proportion of the landfill gas. Many municipal solid waste landfills do not accept gypsum wallboard, because of the corrosiveness of hydrogen sulphide, in addition to safety concerns.

31. For example, a landfill on the West Coast of the South Island had an incident in 2023 in which two workers were hospitalised from exposure to hydrogen sulphide gas (“Residents raised concerns about ‘toxic fumes’ two weeks before worker critically injured,” *The Press*, 8 August 2023).

32. Although PFAS are prohibited according to the proposed WAC (Appendix K, Section 5.4 Prohibited Materials, Table 5-1), I consider that PFAS are not routinely tested in soil at this time. PFAS are also ubiquitous in construction materials. I therefore consider it likely that PFAS-contaminated material will inadvertently be accepted to the site.

33. The proposed WAC include acceptance of coal tar-containing roading material, which typically has a high concentration of polycyclic aromatic hydrocarbons (PAHs). PAH-contaminated sediment is known to be particularly toxic to aquatic organisms (e.g.,

Depree and Ahrens, 2007), so it is important to prevent the discharge of PAH contamination to the nearby Karetu River.

34. Other persistent soil contaminants that can have deleterious impacts on aquatic life in the nearby river include zinc, copper, nickel, pesticides, and PFAS. In addition to these, common trace metal contaminants observed in soil in Canterbury include lead, manganese, chromium, and arsenic—which can have human health and ecological impacts, and also can have aesthetic impacts (such as staining clothing).

35. For some contaminants such as zinc, copper, and nickel, the risk to aquatic ecology is typically considered to be greater than the risk to human health. In fact, in 2022 the Maximum Acceptable Value (MAV) for zinc was removed from the New Zealand Drinking Water Standards, which are meant to protect human health. In contrast, the ecological guideline values for zinc range from 2.4 to 31 micrograms per litre—far lower than the previous 1.5 milligram per litre (1500 micrograms per litre) MAV in human drinking water.

36. All these trace metal contaminants are persistent, and can have adverse human health impacts, adverse ecological impacts, or adverse impacts on both human health and ecology.

Mitigation measures

37. According to the WasteMINZ Technical Guidelines for Disposal to Land Revision 3.1 (2023) a critical mitigation measure to limit environmental effects from a class 1, class 2, or class 3 landfill is appropriate siting. For a class 3 managed landfill, the Guidelines state, *"the site selection process should focus on areas with appropriate geology, hydrogeology and surface hydrology."*

38. The site's close proximity to the Karetu River, and the fact that landfill access requires crossing the river, causes me to question whether the proposed site is fit-for-purpose for the proposed activities. In combination with the proximity, the fact that the river is used for domestic supply also calls into question the suitability of the site, from my perspective.

39. Mr Anthony Kortegast in his evidence reviewing the engineering design of the landfill stated that the site is "suitable for a landfill disposing of mainly low risk materials with engineering of a landfill liner and leachate management system generally as proposed." While I can agree with this statement, I do not consider soils with contaminants up to class 1 landfill limits to be "low risk materials."

40. In practice, I anticipate that material with significant amounts of contaminants will be the primary wastes emplaced at the proposed landfill. While "clean" soil might be needed as daily cover or intermediate cover material, I consider that customers are unlikely to be willing to pay premium tipping fees for disposal of cleanfill at this site. Nor does it seem advantageous for the applicant to fill up valuable landfill space with material that does not generate a premium tipping fee.

41. In the same vein, "moderately" contaminated soil can be disposed of at other facilities, at potentially lower expense in both haulage and tipping fees. Material disposed at this site would potentially otherwise have to go to Kate Valley landfill. I therefore anticipate that much of the material at this site will have significant amounts of leachable contaminants, since if that were not the case, the material could be disposed of at existing, less expensive facilities. I consider that the materials proposed to be emplaced at the Loburn site could present moderate to high risk of contaminant leaching, and the Loburn site might not be an appropriate location for that material.

42. Beyond siting, engineered containment is also a mitigation measure for limiting certain environmental impacts. The minimum requirements of a class 3 managed landfill do not include an engineered liner system, but given the potential for transport of contamination through rock fractures, I consider that an engineered liner system would be necessary at this site.

43. While I am not a landfill engineer, I consider that the proposed liner system is not fully equivalent to a class 1 landfill liner and leachate collection system. By my reading, the proposed polyurea side walls are not compliant with the minimum liner standards set out in the WasteMINZ Technical Guidelines (2023). Mr Kortegast states that the design is "unconventional." A similar liner component was initially proposed for the sidewalls of the Woodstock Quarries Limited class 1/2 landfill, and was found not to align with the minimum liner requirements set out in the Technical Guidelines (2023). The design was eventually altered to comply with the guidelines.

44. I am not aware of any data to support the use of polyurea coating in landfill liner applications. The only information I was able to find regarding the service life of polyurea coatings estimated the service life to range from years to decades as a coating for concrete water pipes (Peng et al., 2024). Even if the service life of polyurea in a landfill is decades to centuries, it could still be shorter than the centuries that one might expect a fit-for-purpose class 1 landfill liner to last. In any case, the contaminants in the landfill will largely not degrade over time, unlike the liner performance.

45. However, Mr Kortegast considers the engineering design to meet current accepted design standards, in spite of the unconventional sidewall construction.

46. The expected lifetime of a typical engineered class 1 liner system is approximately 400 to 750 years. After that point, Mr Kortegast stated that the liner will be somewhat effective for a longer period. On an even longer timescale, geologic containment (i.e., engineered clay layers or natural containment from the surrounding geology) might provide some degree of containment of potential discharges.

47. However, as noted by Mr Kortegast, the limestone material underlying this site does not provide good geologic containment over time. From my perspective, only the compacted low-permeability layer of the bottom liner will provide such containment over the long term. No corresponding layer is proposed for the side walls, as far as I am aware.

48. Also of particular interest to me from a (geo)chemical perspective is the impact of calcium (from limestone rock below, or waste such as concrete emplaced above) on clay particles or layers in the engineered containment. Specifically, calcium can exchange with other interlayer ions in micaceous clays, such as sodium ions in the bentonite clay commonly used for lining. This ion exchange causes the clay particles to contract and the clay layer to become more permeable. I cannot quantify the extent to which this geochemical process would potentially decrease the effectiveness of the engineered containment over time, or whether design solutions or source material composition might mitigate the effects of calcium ion exchange. However, given the potential impact on liner effectiveness, it seems an important consideration.

49. Due to the certainty of defect development in the liner system over time, I consider engineered containment to be a medium-term mitigation measure (decades to centuries). After a sufficiently long period of time, I expect the engineered containment to become less effective, and I expect the probability of discharges to water to increase. Any contamination that escapes containment will enter the surrounding environment. If contamination escapes slowly and at low concentration, water quality impacts will be

minimised. The reverse is also true: contamination that escapes rapidly, or at high concentration, can have deleterious impacts to water quality.

50. Monitoring and maintenance of the capping system can help to minimise (but not eliminate) the ingress of water into the waste material and resulting leachate generation. I therefore recommend cap monitoring and maintenance of the site in perpetuity.

51. Many of the Canterbury landfills which closed in the 1990s have since developed significant issues with their caps, and have required extensive repairs and maintenance. At a minimum, I would expect relatively frequent monitoring (every 1-3 years, perhaps) for 75-100 years. After this time, if the cap was demonstrated to be stable, monitoring might decrease. People tend to forget about legacy landfills, though, and the longer problems are left, the more difficult they are to remedy.

52. Since much of the contamination that will be emplaced at the site is persistent and will not degrade over time, I consider that the hazard from discharges will not appreciably decrease over time, except perhaps as emplaced material is weathered on a geologic timescale (millions of years).

53. It is a common misconception that contamination will biodegrade or otherwise be attenuated over time. While this is true for municipal solid waste, some contaminants such as hydrocarbons and certain organic contaminants like non-persistent pesticides (which can have half-lives of days to months), the inorganic contaminants will not degrade, ever. Inorganic contaminants will ultimately either remain in place, or be transported out of the landfill.

54. Therefore, aside from careful and fit-for-purpose landfill site selection, I consider the Waste Acceptance Criteria (WAC) to be the primary mitigation measure to limit both short- and long-term environmental impacts of the proposed activity. That is, controlling what goes into the site will ultimately constrain what comes out of it. Any WAC for soil should also apply to construction & demolition waste fines, except where noted (for example, my colleague Dr Silver recommends a limit for PFAS that is higher for C&D fines than for soil).

55. I recommend explicitly prohibiting gypsum wallboard, treated timber, as well as sawdust or wood chips from treated and untreated timber, and all other materials listed in Appendix K, Section 5.4 Prohibited Materials, Table 5-1 (e.g., municipal solid waste, green waste, biosolids), as conditions of consent. Offal, carcasses, and other animal byproducts should also be explicitly prohibited. I note that there are inconsistencies between Appendix K and the proposed CRC243705 Schedule B revision 1. Schedule B revision 1 does include prohibition of gypsum products.

56. I recommend including PFAS limits in CRC243705 Schedule B revision 1, and/or as a condition of consent. Although I understand that the applicant does not intend to accept PFAS-contaminated materials, I consider that PFAS-containing materials are likely to be emplaced at the site. Proactively including PFAS limits in the consent will hopefully avoid compliance issues in the future, if PFAS-containing materials are inadvertently accepted at the site.

57. The landfill acceptance criteria in the PFAS NEMP 3.0 (released March 2025) is capped at a total concentration of 50 mg/kg PFAS in soil for the equivalent of a modern municipal solid waste landfill. This would be a very high limit for a facility at which the operator has no intention to accept PFAS-contaminated soil. I recommend a concentration of 1 microgram per kilogram (1 ppb, part per billion) as an “incidental” total PFAS limit in soil (the sum of selected PFAS lab analytes as defined by my colleague Dr Matt Silver in his

evidence), in case material contaminated with low levels of PFAS is accepted to the site. This recommended limit of 1 ppb is ten times the proposed limit in CRC243705 Schedule B revision 1. Dr Silver recommends a higher PFAS limit for construction & demolition waste, due to the prevalence of PFAS in C&D materials.

58. Additionally, I recommend explicitly including a list of acceptable materials (such as that in Appendix K, Section 5.3 Acceptable Materials) as a condition of consent. The list is currently also in CRC243705 Schedule B revision 1, but would benefit from the certainty of being included as consent conditions. I suggest expanding the prohibition of carpet to include carpet padding, which can be a source of PFAS.

59. It might be possible to include some components of the WAC as a Schedule in the consent (similar to CRC243705 Schedule B revision 1 proposed by the applicant), and then include consent conditions that allow minor updates to the WAC by mutual agreement between the consent holder and the consent authorities. Otherwise it might be challenging to implement the intent of Appendix K Section 5.7 Establishing Future Waste Acceptance Criteria, as such an update might require a formal Change of Conditions. (I am not a planning expert, but I have been involved in consenting several landfills in Canterbury, and we have recommended this approach in the past.) In principle, I support the intent of the process outlined in Appendix K Section 5.7 for adding new WAC for emerging contaminants.

60. I do not, however, support a process that could be used to make major changes to the WAC, such as changing the WAC to accept unsorted C&D waste or municipal solid waste. I consider that major changes to the WAC should not be allowed through an incremental process.

61. While PFAS acceptance could be prohibited as a condition of consent, I do not consider that such a prohibition would be achievable in practice. I therefore concur with the inclusion of PFAS in the proposed monitoring regime. PFAS monitoring has been discussed by my colleague Dr Matt Silver in his evidence, and I concur with his recommendations.

62. Even though gypsum wallboard is prohibited in CRC243705 Schedule B revision 1 proposed by the applicant, I recommend continuous gas monitoring for oxygen and hydrogen sulphide in the quarry/landfill pit. If gypsum products are inadvertently emplaced at the site, I recommend a higher sampling frequency for PFAS which is a common coating in gypsum wallboard.

63. The Toxicity Characteristic Leaching Procedure (TCLP) limits set out in Table 5-4 of Appendix K are aligned with those of a class 1 landfill in the WasteMINZ Technical Guidelines for Disposal to Land (2023). Given the proposed class 1 liner and leachate collection system, this might be appropriate. If leachate is highly alkaline in pH, such as from acceptance of concrete, I recommend high-pH Australian Standard Leaching Procedure (ASLP) testing in addition to TCLP.

64. However, I consider that the proposed limits would lead to highly contaminated soil being accepted to the site, compared to material with relatively lower contaminant concentrations that would go to a “typical” class 3 landfill as set out in the WasteMINZ Technical Guidelines (2023). I do not consider material with the proposed contaminant limits to be “low risk material.”

65. I consider that the potentially highly contaminated nature of material that could be brought to the site increases the magnitude of risks associated with discharges of contamination to the nearby Karetu River.

66. Asbestos is not referenced in the WasteMINZ Technical Guidelines (2023). Asbestos is the subject of the recent guidelines for "Disposal of low-level asbestos-contaminated soil at a landfill" (2024), but the proposed landfill will accept more than low-level asbestos, so I do not consider that those guidelines are applicable in this case.

67. I recommend conditions of consent specifying the mitigation measures and acceptance of asbestos outlined in Appendix K of the application. Specifically, material should be handled in accordance with the Health and Safety at Work (Asbestos) Regulations 2016 and subsequent updates; asbestos-containing materials should be wrapped; and, management must ensure that *"the total mass of asbestos mineral in the soil and/or asbestos-containing material does not exceed a maximum concentration of 5%."*

68. It is crucial that asbestos fines and fibres do not escape during transport, so loads should be wetted, covered, and managed accordingly to effectively eliminate dust discharge during transport. Once asbestos reaches the site, it will also need to be managed accordingly to mitigate potential health impacts.

69. In addition to the WAC, site operations and management will help to mitigate shorter-term environmental impacts. For example, adequate stormwater and sediment management will help to prevent and eliminate the discharge of contaminated sediment and stormwater from the site. I anticipate that controlling sediment discharges from the site will also decrease the likelihood of contaminants building up in river sediments.

70. On our initial site visit, it was evident that sediment management on the existing site was an ongoing problem. Accordingly, I anticipate that management of contaminated soil and other material could be a problem during the proposed activities.

71. Due to the proximity of the Karetu River, management of both contaminated sediment from the landfill, and uncontaminated sediment from quarrying activities will be crucial for mitigating environmental impacts to the surface water body. Paving roads on the site, along with good housekeeping, might help to mitigate some sediment discharges near the river.

72. I recommend prohibiting stockpiles of contaminated soil or other material outside of the landfill, as a condition of consent.

73. If stockpiling of contaminated material outside of the landfill footprint is allowed, any stockpiles of contaminated soil should be stored well away from the river. Stockpiles should be managed to control erosion and dust in the first instance (for example, stockpiles should be wetted and covered for dust and erosion control). To control sediment transport, I recommend that any stockpiles of contaminated soil outside the landfill are bunded.

74. A number of activities and different areas are proposed on the site, including an area for waste containers, areas for the handling of asbestos waste vs waste that does not contain asbestos, decontamination areas, a containment area for waste that is discovered that cannot go into the landfill, sediment pond(s), a leachate pond, and so forth. In addition to landfill operations, ongoing lime processing is proposed. Room to manoeuvre heavy vehicles will be required for all of the proposed activities. Practically speaking, I wonder whether there is enough room on the site to fulfil all of these operational needs, many of which are key mitigation measures.

75. There is a common saying that "monitoring is not mitigation." However, monitoring is a necessary component of this proposal. I recommend monitoring of leachate, groundwater, and surface water, and my colleagues Dr Silver and Fleur Tiernan have discussed these topics in their reports.

76. I do not believe it is practical to include an exhaustive list of the specific content of Trigger Action Response Plans (TARPs) or other management plans as consent conditions. However, I recommend that key bottom lines, trigger responses, and mitigation measures are included as conditions of consent, and are mirrored in any management plan or response plan.

77. Put another way, I recommend that key trigger values, responses, and mitigation measures be included in the consent as conditions. Then the associated management plans and TARPs can give operational effect to the relevant consent conditions.

78. I recommend that triggers are set to levels that require action well before any threshold of adverse impacts is reached. For example, for contaminants that have a Maximum Acceptable Value (MAV) or an aesthetic threshold in the New Zealand Drinking Water Standards, I recommend that trigger values in the receiving environment are set as a fraction of the relevant threshold or MAV, since the water in the receiving environment is used for domestic purposes.

79. For contaminants that do not have a MAV or aesthetic value, or for which the ecological protection values are more protective, I recommend selecting the more protective guideline value as the critical value.

80. An initial trigger value could be set as 20% of the critical value (MAV, aesthetic threshold, or ecological protection guideline), for example, and the associated initial trigger action could support increased vigilance (i.e., additional monitoring, operational tweaks). Further action could be required to protect the resource at 40-50% of the critical value (e.g., repairs, operational changes). At 80% of the critical value, I recommend direct and decisive trigger actions to preserve the usability of the water resources.

81. I do not recommend a trigger value set at the MAV, aesthetic threshold, or ecological protection guideline. Once contamination in the receiving environment reaches that point, I consider that the resource would already be critically degraded. Trigger actions should occur well before this point, to avoid degradation of the water to the point that it becomes unusable.

82. A Closure and Aftercare Plan (CAP) is proposed to be submitted to the Regional and District Councils for approval *"within 5 years of the first deposition of managed fill in the landfill."* Since monitoring and aftercare will be required in perpetuity, I consider the CAP a critical document for mitigating longer-term environmental impacts of the proposed activities. I recommend requiring a draft CAP for review as part of the consenting process, since aftercare is such an important aspect of mitigating medium- to long-term environmental effects of the proposed activities.

83. The proposed minimum aftercare period is ten years. I consider this period to be inadequate, though I note Mr Kortegast's evidence that a 30-year aftercare period is customary in New Zealand.

84. Many of the landfills closed in Canterbury in the 1990s, including relatively "modern" facilities, have developed issues over the past 25-30 years. The problems are only now coming to light. I therefore consider a reasonable minimum aftercare period to be 75-100 years, which allows time for problems to develop, time for problems to be remedied, and time for the effectiveness of the remedies to be evaluated. In practice, the site will require aftercare in perpetuity.

85. Many of the legacy landfills that have been in the news recently are less than a century old, and require substantial remediation or outright removal at significant cost.

86. Accordingly, I also recommend a minimum bond term of 100 years. Other than stating that I consider a bond to be prudent, and that a bond should be of sufficient quantity and duration to meaningfully address potential issues arising over the landfill's first century at a minimum, the specifics of a bond are well beyond my expertise.

87. Unfortunately, I anticipate that at some point in the future, after the bond lapses, the proposed landfill will become a public liability. Even if the land were owned privately, few private owners have, or are willing to commit, the resources for legacy landfill management. Public agencies typically lack such resources, as well.

Offsetting of, or Compensation for, Actual and Potential Adverse Effects to Ensure Positive Effects on the Environment

88. Due to the persistent nature of the contaminants in many of the materials proposed to be accepted, much of the waste emplaced at the site will not degrade over time. Therefore, I consider that any offsetting or compensation measures should account for the effectively permanent hazard the proposed activities would create.

89. That is, I consider short-term (years to decades) offsetting or compensation measures not commensurate with the timescales of potential environmental impacts from the activities, which could persist for thousands of years or more.

Consideration of Submissions

90. Some submissions in favour of the proposal cited high disposal costs for contaminated soil at sites such as Kate Valley landfill as reasons for their support. I acknowledge the submitters' point, and am not opposed in principle to landfills purpose-built for the disposal of soil and construction and demolition waste. I have offered technical advice in the consenting process for two such landfills that have been consented in the region in recent years, which I anticipate will provide lower-cost disposal options than Kate Valley landfill.

91. Numerous submissions raised the issue of the proximity of the site to the Karetu River, and concern for water quality in the river. It should be clear from my evidence that I find these submitters' concerns to be credible.

92. Numerous submitters also highlighted the persistent nature of the contaminants that will be emplaced at the landfill. From a scientific and technical perspective, I find these submitters' concerns to be valid. Much of the contamination at the site will not degrade or decompose over time, as waste at other landfills might.

93. The comprehensive submission by White Rock Community Incorporated refers to the proposed activity as a "hybrid Class 1/2/3 landfill," and states that the proposed landfill is a "significant deviation from Class 3 specifications." I consider both of these statements to be accurate, and clarification on exactly what was being proposed was among the first enquiries we made to the applicant. Regardless of nomenclature, the approach I have adopted is to assess the proposal as it stands, regardless of what the landfill is called or what its landfill class is determined to be.

94. The submission by TransWaste highlighted the fact that the landfill as proposed does not comply with the WasteMINZ Technical Guidelines for Disposal to Land (2023) with regard to site selection. I concur with the submitter. If the proposed liner is to be considered equivalent to a class 1 landfill, I would add that the proposed polyurea sidewalls are, by my understanding, not compliant with the minimum standards for a class 1 landfill liner in the Guidelines. I also acknowledge the evidence of Mr Kortegast which states that the polyurea sidewalls are unconventional but adequate. In any case,

I anticipate that the proposed polyurea coating will degrade over time, unlike the contaminants emplaced at the site.

95. Submitters also stated that the river is used for domestic water supply as well as mahinga kai. Water quality in the river therefore has human health, ecological health, and cultural implications. I considered the protection of all of these values in my advice.

96. Many submitters commented on traffic impacts. While traffic is generally a district council matter, I recommend that at a minimum, loads of contaminated soil are covered during transport to help control the loss of contaminated dust along the route. Numerous submitters raised concerns regarding asbestos, and I consider asbestos management during transport at least as important as management of asbestos on the landfill site itself. Covering of loads could be included as a condition of consent. Additional mitigation measures, such as wetting or wrapping, are important for loads containing asbestos, as noted previously.

97. While traffic movements are not my area of expertise, we routinely advise on earthworks, earthworks consents, and disposal of contaminated soil. I consider that traffic movements at the site could vary considerably, depending on the generation of contaminated soil and other material at source sites.

98. During peak periods or a major project, it is possible that the need for disposal of contaminated soil could substantially exceed the capacity of the proposed average truck movements. For context, a single large truck is nominally considered to carry approximately 10 cubic metres of soil, and a relatively modest project such as an intersection upgrade requiring disposal of 500 tonnes of soil would correspond to about 25-30 truckloads of material (50-60 truck movements).

99. Some submitters including the Rangiora Ashley Community Board commented on the sufficiency of Kate Valley landfill and other alternatives. My understanding is that Kate Valley landfill was opened in the 2000s as a regional resource that would replace smaller landfills with a single regional landfill. Kate Valley leverages its regional scale to be a well-managed, state-of-the-art waste disposal facility. My understanding is that it is about half filled, with ample room for expansion.

100. I also anticipate that waste reduction and waste diversion efforts could decrease the amount of material going to Kate Valley landfill (and other disposal sites) over time.

101. It is interesting to witness the current cycle of proliferation of applications and consents for smaller landfills in Canterbury, after the consolidation in the late 1990s and early 2000s. In recent years, CRC has consented one class 3 managed landfill and one class 2 construction & demolition waste landfill. A consent application for a separate class 2 landfill is currently being appealed to the Environment Court after being declined by a panel of independent commissioners. Another class 3 managed landfill in Canterbury has been announced on the government's "Fast Track" list. I have advised on all of these projects.

102. Legacy landfills are among the more challenging contaminated sites in Canterbury and across the country—especially sites near rivers. So in principle, I consider that having fewer landfill sites is preferable to having more, because of the ongoing issues that each site creates. I acknowledge some submitters' point, that other alternatives do exist (including Kate Valley), and some of those alternatives might be "better" than the proposed site.

103. I do not have a strong opinion on whether there should be more landfills in Canterbury. What is most important to me is that any new landfills are appropriately sited, constructed to be fit-for-purpose, and are managed well to mitigate adverse impacts both now and into the indefinite future.

104. I also view manawhenua partnership as critical to the landfill conversation. My view is influenced by the shameful legacy of past landfills being sited near culturally-significant places. For example, Ōnuku landfill sits nearly atop Takapūneke, outside Akaroa. Takapūneke is a nationally-significant cultural site, and in my view it is no accident that the landfill was placed there. I do not support expanding on this unfortunate inheritance from the past. The submission by Ngāi Tūāhuriri highlighted a lack of manawhenua input into the site selection process, and noted that lack of input from manawhenua is contrary to the WasteMINZ Technical Guidelines for Disposal to Land (2023). The submission also highlighted the cultural significance of the Karetu River.

105. Submitters including Mr Nigel Coughlan have highlighted the risk of long-term landfill management becoming the responsibility of the public. As I noted above, I consider that, on a long enough timeframe, any private landfill seems likely to become a public liability. Perpetual management of the landfill site is a critical issue to consider at this stage.

Recommendations and Conclusions

106. Firstly, I recommend a drafting consideration: any conditions that use language similar to "or subsequent…revisions" might be better written as a logical "and" rather than "or"—that is, "and subsequent…revisions." This potentially avoids perverse interpretations. For example, if a management plan or a guideline is updated, the intent is for the most recent updated version to apply—not the most recent update *or* a previous version.

107. Additionally, for "deemed certification" conditions (e.g., CRC243700 condition 14 revision 1 proposed by the applicant), I recommend at least thirty (30) working days for Council(s) to review and certify changes. Simple changes can be reviewed relatively quickly, but more complex changes take time. Small or large, the review and certification must still be integrated into existing workflows, which can take time. My preference would be for no "deemed certification," but I acknowledge that such conditions can provide a measure of certainty for the applicant.

108. When something is resubmitted for certification (e.g., CRC243700 proposed condition 16 revision 1 proposed by the applicant), the proposed timeframe is five working days. Again, I recommend at least thirty (30) working days for review and certification, as I consider five working days to be wholly unreasonable for a fit-for-purpose review.

109. I recommend the term "contamination discovery" rather than "unexpected discovery" (e.g., CRC243700 conditions 40-43 revision 1 proposed by the applicant). It is desirable to avoid questions around whether a discovery was "unexpected."

110. I consider that spills and contamination discoveries should be included in required reporting, and that the required reporting for these events be more urgent than an annual report or similar.

111. I recommend that a landfill liner compliant with at least the minimum standards set out for a class 1 liner in the WasteMINZ Technical Guidelines for Disposal to Land (2023) be required as a condition of consent. Alternatively, in the absence of a fit-for-purpose landfill liner, I recommend Waste Acceptance Criteria aligned with a class 4 controlled fill, at most, to mitigate potential environmental impacts.

112. Even with a compliant class 1 liner, I do not consider the material proposed to be emplaced at the site to be "low risk," and recommend lower contaminant concentrations in the final Waste Acceptance Criteria, if consent is granted.

113. As previously mentioned, I recommend a minimum aftercare period of 75-100 years rather than the proposed minimum of ten years (CRC 243700 condition 54 revision 1 proposed by the applicant). Ten years is not a fit-for-purpose aftercare period for a site that will become a geologic feature of the landscape.

114. As discussed above, I recommend that stockpiling be prohibited as a condition of consent. If allowed, I recommend that any stockpiles are kept well away from the river, are wetted and covered to prevent erosion and dust in the first instance, and are bunded to limit sediment transport.

115. I consider it crucial to include key trigger values, responses, and mitigation measures as clear conditions of consent, rather than relying on generic conditions that the site be operated in accordance with management plans. Reliance on generic conditions and management plans in my experience often results in costly and contentious misunderstandings and uncertainty for both the consent holder and the consenting authorities.

116. I recommend requiring a draft Closure and Aftercare Plan (CAP) for review as part of the consenting process, rather than within five years of commencement. If all goes as planned, I anticipate many of the environmental impacts of the proposed activities will occur after closure, rather than while the facility is in operation—and the CAP is therefore an important part of mitigating those longer-term effects. I would therefore prefer the CAP to be considered at this stage of the process.

117. Regarding waste acceptance criteria and procedures, as noted above I recommend prohibiting gypsum wallboard (also known as drywall, Gibraltar board, or “gib board”) as a condition of consent. Even with such a prohibition, I recommend continuous gas monitoring for oxygen and hydrogen sulphide in the quarry/landfill pit. If gypsum products are inadvertently accepted, I recommend a higher sampling frequency for PFAS which is a common coating in gypsum wallboard.

118. I recommend conditions outlining a specific process for minor updates or additions to the waste acceptance criteria (WAC). However, I also recommend explicitly prohibiting certain wastes (e.g., municipal solid waste, offal and animal products, unsorted C&D waste, treated or untreated timber, wood chips, and sawdust) as conditions of consent, to ensure that the WAC are very clear, understandable, and enforceable.

119. Regarding record keeping (CRC243705 condition 64c revision 1 proposed by the applicant), I recommend that specific source addresses or land parcels are required, to enable effective compliance monitoring. If waste comes from a sorting yard, I recommend that the source address is maintained so that waste material can be traced to its original source site.

120. Despite my commentary and various recommendations regarding consent conditions, it is my considered position that practically no amount of engineered mitigation nor management via consent conditions could overcome the limitations of the site itself for the activities as proposed. Substantially more protective waste acceptance criteria could alter my opinion, but there would likely be commercial consequences.

121. Specifically, the proximity of the proposed landfill to the Karetu River, the fact that landfill access requires crossing the river, the use of the river for domestic supply, and existing issues with discharges to the river all raise serious questions in my mind regarding the fitness of the site for the proposed purpose. Importation of contaminated soil and other material will only exacerbate these fundamental issues.

References

Depree, C; Ahrens, M. 2007. Sources and bioavailability of PAHs in Auckland’s receiving environments. *2007 South Pacific Stormwater Conference*.

Ministry for the Environment Hazardous Activities and Industries List (HAIL), 2011

“Residents raised concerns about ‘toxic fumes’ two weeks before worker critically injured,” *The Press*, 8 August 2023

Peng, C; Ren, J; Wang, Y. 2024. Degradation Behavior and Lifetime Prediction of Polyurea Anti-Seepage Coating for Concrete Lining in Water Conveyance Tunnels. *Materials* 17, 1782. https://doi.org/10.3390/ma17081782

WasteMINZ Technical Guidelines for Disposal to Land, version 3.1, 2023

WasteMINZ Waste Industry Guidelines Disposal of low-level asbestos-contaminated soil at a landfill, 2024

Appendix 5: CRC, Groundwater Quality s42A report, prepared by Dr Matt Silver

Before the Independent Hearing Panel appointed by the Canterbury Regional Council

IN THE MATTER OF The Resource Management Act 1991

AND

IN THE MATTER OF Application CRC Application CRC243699 to CRC243706, 150 to 176 Quarry Road, Loburn

Section 42A Officer's Report

Report of Matthew Silver

Introduction

Background

1. This report forms part of the Canterbury Regional Council's (CRC) audit of the assessment of environmental effects (AEE) provided by WSP on behalf of Protranz (the applicant) in support of resource consent applications CRC243699 - CRC243706.
2. This report will provide the decision-maker with information and advice related to:
    a. The actual and potential effects of the proposed activities on groundwater quality and quantity

Qualifications

3. My name is Matthew Silver. I hold a bachelor's degree in geology from Whitman College (Walla Walla, Washington, USA), a Master of Science degree in geology (focus: hydrogeology) from California State University Sacramento (USA) and a Doctor of Natural Sciences (PhD equivalent) degree in environmental geochemistry from Technical University of Darmstadt (Germany).
4. I am a Senior Scientist at the Environment Canterbury Regional Council (CRC, colloquially known as ECan), where I have worked since May 2023, first in the Groundwater North team and since October 2024 in the Water Quality team. My work at the CRC includes technical advice in relation to groundwater and water quality topics including groundwater levels, contaminant discharges, dewatering and stormwater infiltration.
5. My areas of expertise include hydrogeology, hydrogeochemistry, and contaminant transport and fate in groundwater. Prior to my current position, I have ten years of experience in the U.S. and Germany as a hydrogeologist and applied research scientist on environmental contaminants.
6. For three years immediately prior to beginning work at the CRC, I worked for the Wisconsin Department of Natural Resources, a U.S. state government agency, in the position Emerging Contaminant Advanced Hydrogeologist. I was responsible for using science to provide advice on how to response to community concerns regarding emerging contaminants, in particular per- and polyfluoroalkyl substances (PFAS). In

2023, I published a journal article on PFAS occurrence in and sources to groundwater[1] in Wisconsin, USA. I also provided internal advice to the Remediation and Redevelopment program on a site with questions on contaminant migration pathways involving surface water – groundwater interactions.

7. My experience also includes work as a hydrogeologist at Shaw Environmental (2009 – 2011) in California, USA on sites with soil and/or groundwater contamination. I contributed to hydrogeologic conceptual site models by synthesising data collected from previous investigations and applying this knowledge to questions about contaminant migration.

Scope of Report

8. This report sets out my review of the proposed application in relation to groundwater quality, including the possibility of groundwater acting as a conduit for leachate contaminants traveling to the Karetu River. To carry out this audit of the consent applications, I have:
    a. Considered the relevant sections of the assessment of effects on the environment (AEE) submitted by the applicant, including its technical appendices:
        i. Appendix F – Groundwater and Surface Water Effects Assessment
        ii. Appendix K – Waste Acceptance Criteria Report
        iii. Appendix M – Monitoring Programme and TARP
    b. Attended a site visit to Whiterock Quarry on 30 May 2024.
    c. Reviewed further information that was provided by the applicant dated 16 August 2024:
        i. Section 6 – Groundwater and Section 9 – Hydrogeology (both dated 16 August 2024)
        ii. Appendix H – Design Drawings Set (Rev1)
        iii. Appendix M: Monitoring Programme and Trigger Action Response Plan (TARP) Draft Rev B.
    d. Considered Section 42A reports from Anthony Kortegast (landfill design), Michael Massey (contaminated land), Fleur Tiernan (surface water quality and aquatic ecology), Lucy Just (surface water quantity) and Sally Lochhead (hydrogeology).
    e. Taken into account relevant issues raised by submitters in relation to the effects I have considered in this report.
9. This report is supplementary to the Section 42A Report prepared by the CRC for the above resource consent applications. Full details of the consent applications are provided in that report.
10. Finally, this report provides conclusions on the scale and significance of potential and actual adverse and positive effects.
11. If the decision makers are of a mind to grant the application, this report provides recommendations on conditions of consent, management plans, and further

[1] Silver, M., Phelps, W., Masarik, K., Burke, K., Zhang, C., Schwartz, A., Wang, M., Nitka, A.L., Schutz, J., Trainor, T., Washington, J.W., Rheineck, B.D., 2023. Prevalence and Source Tracing of PFAS in Shallow Groundwater Used for Drinking Water in Wisconsin, USA. Environ. Sci. Technol. https://doi.org/10.1021/acs.est.3c02826

investigations and monitoring requirements that are required to ensure adverse effects can be adequately avoided, remedied or mitigated.

Description of the Existing Environment

Geologic and hydrogeologic setting

12. The applicant refers to the main geologic unit in the site area proposed for waste filling as the Whiterock Limestone. The classification of this rock unit as a limestone is consistent with GNS geological information[2,3], including the *Geological Map of New Zealand*. I agree that the rock should be considered limestone.

13. Two other surficial geologic units are present at the site: the Kowai Formation above the Whiterock Limestone and the Berrydale Greensand below the Whiterock Limestone. The Kowai Formation is a weathered conglomerate formed largely of greywacke rock[4]. The Berrydale Greensand is part of the Omihi Formation and is described as a calcareous greensand.[5] The Berrydale Greensand has only localised occurrence.

14. I agree with the applicant that the rock is likely to contain a "double porosity". This means there are two different possible "pathways" for groundwater to travel through the limestone: 1) via pore spaces and 2) via fractures and other macroscopic cavities. With void space existing at these two different scales within the rock, a fraction of the water that enters the subsurface at the site travels slowly, mostly through pore space, while a remaining fraction of the water could potentially move relatively quickly, partially or entirely through fractures or other macroscopic open spaces in the rock.

15. At the site, the hill slopes toward the Karetu River to the west, while the sedimentary layered units dip east. In places on the site, fractures are observed within the Whiterock Limestone (see Figures 1 and 2 for photographs). I note that these are observations of fractures above the water table, and as such, they do not necessarily reflect the degree of dissolution of limestone rock along fractures that are likely also present below the water table.

Presence of fractures and degree of limestone dissolution

16. The applicant considers the fractures likely to have been formed by "hinge faulting", as part of the syncline structure present onsite and to the east. It is possible that the fractures may be better classified as joints, but such a determination is difficult given the complex structural geology in the area. The GNS *Geological Map of New Zealand* shows the surface trace of an anticline ending southwest of the site. It is unclear from the geological map alone if the site is located closer to the axis of the syncline, or an adjacent anticline. Knowing the fracture locations in relation to other structural features (in addition to the syncline) is important to classifying the fractures as "hinge faults" or some other type of fracture (fault or joint). In any case, I agree with the applicant that fractures are present within the limestone, as observed onsite above the level of the proposed landfill.

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[2] Geological Map of New Zealand (interactive web app), https://www.gns.cri.nz/data-and-resources/geological-map-of-new-zealand/ (accessed 24 October 2024).
[3] Forsyth, P.J.; Barrell, D.J.A.; Jongens, R. (compilers) 2008: Geology of the Christchurch area. Institute of Geological & Nuclear Sciences 1:250 000 geological map 16. 1 sheet + 67 p. Lower Hutt, New Zealand. GNS Science.
[4] Geological Map of New Zealand (interactive web app), https://www.gns.cri.nz/data-and-resources/geological-map-of-new-zealand/ (accessed 24 October 2024).
[5] Forsyth et al., 2008.

17. Fractures could also be present at and below the level of the proposed managed landfill base. The importance of fractures is that they could form preferential pathways for groundwater flow and contaminant transport. The applicant acknowledges this in a sentence at the end of Section 4.31 (Appendix F) but does not consider the possibility further (however, I consider it further, below).

18. Where groundwater occurs within limestone, karst features such as caverns can develop from the dissolution of the limestone's carbonate minerals by naturally occurring acidic rainwater. In describing the Whiterock Limestone, the applicant mentions karst topography observed on its top surface. The presence of karst (paleo-) topography on the Whiterock Limestone is evidence that the limestone material can form karst features, given the right combination of variables.

19. Additional indications of karst features at the site include cavities visible in the limestone (Figure 2) and the weathered appearance of the rock being more common in the upper parts of recovered core from drilled bores (photographs within Appendix F). These observations suggest that some dissolution of the limestone has occurred onsite.

20. The applicant considers the Berrydale Greensand to be a confining layer, based on findings of low permeability from slug tests conducted in on-site wells. The unit is described as "silty and massive", however, examination of the bore logs describe the unit as being a calcareous sandstone. This information is not entirely consistent for purposes of assessing the potential of the unit to restrict water flow.

21. Like the Whiterock Limestone, the Berrydale Greensand may also contain fractures (important due to potential form them to form a preferential pathway for groundwater flow and contaminant transport). The phrase "high plasticity" is noted on some of the site bore logs within the Berrydale Greensand. This is cited by the applicant as a reason they consider hinge faults penetrating through the Berrydale Greensand to be unlikely[6]. However, the actual occurrence of fractures depends on several geologic factors in addition to the field observed material property. Ultimately, the presence of fractures within the Berrydale Greensand is unknown.

Groundwater flow patterns

22. Measured groundwater levels (Appendix F Table 4-2) are higher in the Whiterock Limestone than in the Berrydale Greensand for the pairs of nearby wells with one screened in each geologic unit (BH103 and BH03; BH105 and BH05). This means the hydraulic conditions for downward flow deeper into the limestone, and possibly into the Berrydale Greensand, are present.

23. The applicant constructed a groundwater flow model for the site. The model assumes that the geologic material can be represented with a single porosity and permeability (i.e., groundwater flow through pore space only, no fractures). This may be appropriate for some purposes but it will not represent travel times in groundwater to the Karetu River if a preferential flow path is present. That is, flow through fractures could carry contaminants to the river more quickly than predicted based on the model. A review of the Appendix D of Appendix F description of the groundwater flow model by my colleague Mark Trewartha is included as Appendix 1 (this document).

24. Appendix F Figure 4-11 shows a conceptual model for groundwater flow directions, which include both localised flow to the southwest and deeper regional flow to the south. I agree that there is evidence for these being the main directions of groundwater flow. However, the applicant has described the Whiterock Limestone as having "moderate permeability" and the Berrydale Greensand as having a "low permeability". It is under conditions of moderate to low permeability that fractures (in particular, widely spaced

[6] WSP s92 response Section 9 Hydrogeology, 16 August 2024 (C24C/190607)

fractures) can play an important, if not dominant, role in groundwater flow direction, velocity and contaminant transport.

Possibility of preferential flowpath(s)

25. Groundwater in limestone often flows through a combination of the rock matrix (primary porosity) and channels where rock has been dissolved along fractures or bedding planes (a type of secondary porosity). Such a hydrogeologic setting would often be referred to as "karst hydrogeology". In a fully developed karst system, additional features such as sinkholes and caverns would also be present. I do not consider the Whiterock site to be within a fully developed karst system, but it is nevertheless possible for features of karst systems to exist to varying degrees. As indicated in points 19 and 20, some karst-like features have been observed at the site.

26. Baseline groundwater monitoring results for the three monitoring wells screened within the Whiterock Limestone (BH02, BH103, BH105) show alkaline pH levels (7.6 – 8.0) and high concentrations of alkalinity (bicarbonate and carbonate anions) and calcium. With shallow groundwater in the area recharged by rainwater (typically pH 5.5 – 6.0), this indicates that some dissolution of limestone has occurred in groundwater along a flow path from the land surface to these monitoring wells.

27. Piper diagrams are a common way to visualise groundwater chemistry data and the applicant has provided one as Figure 4-9 (Appendix F). Two shallow well groundwater samples (purple colour) plot on the anion triangle (lower right) at ~60% carbonates (CO_3^{2-} + HCO_3^-), with chloride accounting for most of the remaining ~40%. In samples from wells screened deeper in the Whiterock Limestone and/or within the Berrydale Greensand, carbonates are ~90% or more of all anions. The applicant has noted that deeper groundwater is "more carbonised and mineralised" compared to shallow groundwater, but does not discuss the implication that, somewhere within the depth range of the monitoring wells that show the carbonate content variation, limestone is being dissolved by groundwater. I consider that more dissolution with depth is consistent with the possibility of dissolved feature(s) being present within the limestone, with one possible feature being a dissolved channel along a (former) fracture.

28. In their work to characterise the subject site, the applicant has not conducted a tracer test, which is probably best practice to identify and characterise preferential flow paths[7,8]. While powerful in characterising groundwater transport times, tracer tests do have limitations. The applicant has stated[9] "transport times are likely to be too long at this site (i.e. multiple years to record break through) to undertake a meaningful tracer test". While I agree with this, if preferential flow is present, the transport time will inherently be shorter. In any case, a tracer test was not conducted. This means that the possibility of undetected preferential flow paths remains.

Baseline groundwater quality

29. The applicant has conducted two rounds of baseline sampling of groundwater (and surface water) (Appendix C of Appendix F). This revealed that nitrate nitrogen ranges from not detected to below 2 mg/L in all but one monitoring well, while concentrations of 9.6 and 8.0 mg/L were detected in samples from BH02. It therefore appears that background nitrate nitrogen in site groundwater is generally less than 2 mg/L, but the

[7] Domenico, P.A. and Schwartz, F.W., 1998. Physical and Chemical Hydrogeology (2nd edition). John Wiley & Sons, Inc., New York. p. 231-236.
[8] Goldscheider, N., 2015. Overview of Methods Applied in Karst Hydrogeology. In: Stevanovic, Z., Editor, Karst Aquifers—Characterization and Engineering. Springer International Publishing, Heidelberg. https://doi.org/10.1007/978-3-319-12850-4_4
[9] WSP s92 response Section 6 Groundwater, 16 August 2024 (C24C/190589)

occurrence of the higher nitrate concentrations at BH02 has not been adequately explained. Possible explanations include a localised source near the well (but a specific one has not been indicated) or fracture flow from offsite (fertiliser and/or urine on fields) toward the well.

30. The same well, BH02, has the highest ammoniacal nitrogen groundwater concentrations in the baseline sampling. The concentrations are 0.79 and 0.87 mg/L in BH02 samples, while the next highest concentration is 0.31 mg/L. Ammoniacal nitrogen was not detected in five of the eight groundwater wells. Similar to nitrate nitrogen in BH02 (see previous point), background levels appear low, nondetectable in this case, with some unexplained higher levels.

31. The two rounds of baseline sampling also included several types of organic compounds, including: PAHs, organochlorine pesticides, phenolics, phthalates, total petroleum hydrocarbons, halogenated benzenes, volatile organic and semi-volatile organic compounds. However, it did not include BTEX compounds (benzene, toluene, ethylbenzene, total xylenes) or PFAS (per- and polyfluoroalkyl substances). For both BTEX compounds and PFAS, there is a chance of low levels being present in the environment and also a risk of them being contaminants at higher levels from landfilling activities.

Assessment of Actual and Potential Effects on the Environment

Dewatering

32. Because some of the waste may be placed below the water table, the landfill design includes lowering of groundwater levels by gravity drainage through underdrainage pipes. I consider that this is a realistic strategy for dewatering while the site is actively managed. Based on the topographic relief between the Karetu River and the base of the proposed landfill of about 15 m, it is unlikely that the dewatering activity will deplete Karetu River streamflow. It is also unlikely that there will be an effect on the ability to take water from the closest active offsite well, BW23/0559.

Leachate contaminants

33. The applicant provides median contaminant concentrations in leachate from another landfill (Tonlyn site in Gisborne) that they consider to be a proxy for the waste types in their own proposal. The leachate concentrations (Appendix F Table 5-3) include several inorganic elements/compounds at higher concentrations than the respective MAV in the Drinking Water Standards are: *ammoniacal* nitrogen (NH_4-N) 16 x *nitrate* nitrogen MAV (ammoniacal nitrogen will likely convert to nitrate nitrogen in oxygen-rich water), arsenic 14 x MAV, chromium 3.5 x MAV, manganese 3.5 x MAV, boron 2.5 x MAV.

34. I consider these concentrations to be possible for the waste type but it is important to remember that there is variation between waste streams. Therefore, while the contaminant concentrations above may be indicative, the actual concentrations would depend on the accepted waste materials.

35. Importantly, the greater the amount of soil that would be accepted from contaminated sites, the higher the contaminant levels are likely to be. In his report, Dr Massey reasons that “clean” and “moderately” contaminated soils may not comprise a large portion of the waste stream at the proposed landfill at Whiterock, leaving soils with risk of higher contaminant levels as one of the major materials that would be accepted. This presents a possibility that levels of heavy metals (particularly arsenic, chromium, lead and manganese) in leachate could be higher than those presented by the applicant in

Appendix F Table 5-3 and used for estimating contaminant concentrations in the Karetu River under the leachate leakage scenarios.

36. The only one of these compounds that can chemically degrade is nitrate, and it only undergoes chemical degradation under reducing conditions, which are not expected in the receiving environment. Therefore, I consider ammoniacal and nitrate nitrogen to be persistent. Furthermore, heavy metals do not chemically degrade. While a few recent studies have reported some chemical degradation of PFAS, most studies have been done under engineered conditions. There is no consistent evidence of PFAS chemically degrading under common environmental conditions.

37. Ammoniacal nitrogen is often associated with decomposable organic wastes that are not proposed to be accepted for this landfill. The applicant considers that since organic wastes will not be accepted, that it is unlikely that the ammoniacal nitrogen level in Appendix F Table 5-3 will occur. However, polyurea is proposed to be used as sidewall liner. Over time, polyurea is likely to release ammoniacal nitrogen through degradation. Thus, potential for high ammoniacal nitrogen in leachate remains.

38. The list of contaminants considered in the Appendix F Table 5-5 dilution calculations is incomplete. Additional contaminants that could be present in the leachate include per- and polyfluoroalkyl substances (PFAS); volatile organic compounds (VOCs) including benzene, toluene, ethylbenzene and xylenes (BTEX); pesticides; and polyaromatic hydrocarbons (PAHs). Of these, I consider that the combined concentrations of PFOS and PFHxS (both part of the PFAS chemical group) are likely to be present in leachate above the drinking water MAV, and possibly PFOA also. It is also likely that BTEX compounds will be present in leachate above the drinking water MAV, with the likely main source of BTEX compounds being contaminated soils.

39. Carpets and gypsum wallboard are materials known to contain high levels of PFAS and that are likely to be present in construction and demolition waste. The applicant has indicated that these will be prohibited items, but they will still face practical challenges in attempting to sort these materials out of the waste stream. Additional construction and demolition waste materials that have been found to contain PFAS include concrete (total detected PFAS compounds ~3 micrograms per kilogram, or µg/kg), asphalt pavement (~2 µg/kg), asphalt shingles (~17 µg/kg) and construction and demolition debris fine particles (~39 µg/kg) [10]. While these are lower than the levels of PFAS in carpet (~190 mg/tonne) and gypsum wallboard (~82 mg/tonne) reported in the same study[11], the question regarding the proposed acceptance of some types of construction and demolition waste is not whether PFAS will be present, but how high the concentrations of PFAS in the accepted waste would be.

40. The concentrations of total detected PFAS compounds in the previous point are generalisations for sub-categories of waste based on a study in the USA. I am not aware of any studies documenting concentrations of PFAS in New Zealand construction and demolition waste. As use of PFAS in New Zealand likely goes back to the 1960s (following worldwide use patterns), almost any construction and demolition materials may contain PFAS.

41. Depending on how successful C&D waste sorting would be in practice at keeping high risk materials (discussed above) out of the landfill, a considerable range of PFAS concentrations in the waste is possible. On the one hand, if C&D waste sorting is successful at keeping out the highest risk materials, the PFAS concentrations in

[10] Liu, Y., Lin, A., Thompson, J., Bowden, J.A., Townsend, T.G., 2024. Per- and polyfluoroalkyl substances (PFAS) in construction and demolition debris (CDD): discerning sources and fate during waste management. Journal of Hazardous Materials 472, 134567. https://doi.org/10.1016/j.jhazmat.2024.134567

[11] Concentrations estimated from Figure 2 of the study cited immediately above

leachate may be low enough that they do not pose a risk to the surrounding environment. On the other hand, construction and demolition waste is a risk for high PFAS levels. A closed landfill in Australia that had received only construction and demolition waste was found to have contaminants in leachate at the following concentrations: PFHxS 1200 nanograms per litre (ng/L), PFOS 800 ng/L, for a combined 2000 ng/L (29x the MAV of 70 ng/L).[12] Furthermore, evaluation of PFAS concentrations in samples from at least 27 landfills in Australia indicates that PFAS are ubiquitously present in leachate, and that leachate from construction and demolition waste likely contains higher PFAS levels than leachate from municipal solid waste.[13,14]

Risk of leachate traveling through groundwater to the Karetu River under normal operating conditions (Scenarios 1 and 2)

42. Scenarios 1 and 2 (Appendix F, Section 5.2.4) for water quality effects in the Karetu River address leakage through the liner under normal operating conditions. Under the assumption that the Karetu River flow condition assessed (0.0246 m^3/s) is accurate and limited to flows equalling or exceeding this value, I am satisfied with the applicant's conclusion that no exceedances of Water Services Regulations 2022 drinking water standards (Maximum Acceptable Values) are to be expected. This is limited to Scenarios 1 and 2.

43. Scenarios 1 and 2 are based on leachate leakage rates of 176 L/ha/day (474 L/day for the entire landfill footprint) and 287 L/ha/day (776 L/day), respectively. In his report on landfill engineering design, Mr. Kortegast considers likely leachate rates to be lower, in the range of 1 to 50 L/ha/day. Adopting these rates would decrease the expected contaminant concentrations under Scenarios 1 and 2.

44. However, the flow condition of 0.0246 m^3/s is an estimate of mean annual low flow, and may be overestimated, as discussed in the report by Lucy Just. The lower the flow in the Karetu River, the less dilution the river will provide and higher the concentrations of any contaminants carried to the river from the landfill. This includes a possibility of above-MAV levels of contaminants from the landfill, at times when flow in the river is critically low, also subject to amount of leachate leakage and offsite migration pathway.

Risk of leachate traveling through groundwater to the Karetu River under a larger amount of leakage (Scenario 3)

45. Assuming the same PFAS concentrations in leachate (PFOS 800 ng/L, PFHxS 1200 ng/L) cited point 42, I use the calculation methodology described in Appendix F Section 5.2.4. I noted that this combines a scenario with waste contaminant levels toward the high end of the possible range with leakage Scenario 3, also the highest leakage scenario provided by the applicant. Under this combination of conditions, I estimate that combined PFOS and PFHxS concentrations in the Karetu River in Scenario 3 would be 14 ng/L (6 ng/L PFOS + 8 ng/L PFHxS), which is 20% of the MAV of 70 ng/L in the New Zealand Water Services Regulations 2022.

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[13] Gallen, C., Drage, D., Kaserzon, S., Baduel, C., Gallen, M., Banks, A., Broomhall, S., Mueller, J.F., 2016. Occurrence and distribution of brominated flame retardants and perfluoroalkyl substances in Australian landfill leachate and biosolids. Journal of Hazardous Materials 312, 55–64. https://doi.org/10.1016/j.jhazmat.2016.03.031

[14] Gallen, C., Drage, D., Eaglesham, G., Grant, S., Bowman, M., Mueller, J.F., 2017. Australia-wide assessment of perfluoroalkyl substances (PFASs) in landfill leachates. Journal of Hazardous Materials 331, 132–141. https://doi.org/10.1016/j.jhazmat.2017.02.006

46. The Australian National Health and Medical Research Council (NHMRC) has recently proposed[15] a downward revision of the PFAS levels in the Australian Drinking Water Guidelines 2018, which were used for first including PFAS in the New Zealand Water Services Regulations in 2022. The same calculated Karetu River concentration for PFOS from the previous point (i.e., 6 ng/L) is above the draft guideline level of 4 ng/L recently proposed by the Australian NHMRC in consideration for revision of the Australian Drinking Water Guidelines. This would have implications if the New Zealand MAVs for PFAS were revised in the future.

47. The calculated Karetu River water concentrations mentioned in the two previous points serve as a warning of the contaminant levels that may be reached or exceeded if the applicant's controls to prevent acceptance of high PFAS materials are not successful.

48. Appendix F Table 5-5 lists arsenic as "BD" for below detection for all three scenarios. The exact formulas for the dilution calculations are not specified but I performed the calculations based on the text description in Appendix F Section 5.2.4: the result I get for arsenic in Scenario 3 is 1 µg/L, which is the same as the detection limit listed next to "Karetu River baseline concentrations". Therefore, I consider that it would be more accurate to list arsenic in *Scenario 3* as approximately at the detection limit of 1 µg/L (i.e., 10% of the MAV of 10 µg/L).

49. In summary, concentrations of contaminants including (but not limited to) PFHxS, PFOS and arsenic could rise to within an order of magnitude of drinking water MAVs if Scenario 3 level leakage were to occur. Risk factors for higher contaminant levels (including ones that could exceed MAVs) in the Karetu River include: 1) acceptance of high amounts of contaminated soils and/or construction and demolition materials with high PFAS levels and 2) occurrence of Karetu River flow conditions lower than the NIWA estimate used in the contaminant concentration calculations.

Post-closure period

50. The proposal includes capping the landfill after closure. This will reduce, but not eliminate, downward water infiltration from rainfall. It is realistic to expect that this measure will reduce the volume of new leachate that forms but it may not eliminate leachate. The proposed dewatering may diminish in effectiveness beyond the time when the site is actively managed. Over decades to centuries, there is a possibility that the underdrainage could become clogged with debris and/or chemical precipitates, diminishing its ability to prevent groundwater from rising into the waste. If groundwater were to enter the waste, even temporarily, additional leachate would be generated.

51. If the engineering controls mentioned above (capping to prevent rainwater from entering from above, underdrainage to prevent groundwater from entering from below) were to not be successful in decades or centuries following closure, leachate could migrate to the Karetu River. How much leachate would depend on the leakage mechanism(s). Some possible mechanisms of leakage as the landfill ages are discussed by Mr. Kortegast.

52. Precursor PFAS are fluorinated compounds that can be slowly converted in the environment (including in landfills) to mobile compounds such as PFOA, PFHxS and PFOS (Appendix 2). The proportion of precursor PFAS compounds out of all PFAS

[15] Australian Drinking Water Guidelines - Public Consultation on Draft Guidance for Per- and Polyfluoroalkyl Substances (PFAS) - NHMRC consultation hub - Citizen Space (accessed 31 January 2025).

present in construction and demolition waste was estimated at 79% in one study.[16] A high percentage of precursor PFAS in the waste is likely to delay release, with an implication that releases of PFOA, PFHxS and PFOS occur over an extended period of time. Guidance from the U.S. organisation Interstate Technology and Regulatory Council, a program consisting of environmental experts from U.S. state and territorial environmental agencies, states[17]:

> *Landfills containing sources of PFAS may continue to release PFAS to leachate at slow by relatively steady rates for decades following initial placement.*

53. As mentioned above (point 37), other contaminants likely to be present in waste proposed to be accepted will either not chemically degrade (for example, metals) or exhibit a range of chemical degradation behaviours. One of those is nitrogen from polyurea (sidewalls) and organic wastes, which is likely to transform to ammonium and eventually to nitrate, which is typically persistent in the environment. BTEX compounds may also persist for a few decades post closure, but will chemically degrade, eventually.

Downgradient groundwater users

54. Environment Canterbury well records show the following four existing domestic wells in the area:

    a. BW23/0559, located about 300 m downstream of the proposed landfill and less than 30 m from the Karetu River. Due to its depth (3.44 m) and proximity, I consider that this well is hydraulically connected to the Karetu River and likely to draw river water.

    b. To the south-southeast of the proposed landfill, there are three additional wells (approximate straight-line distance from the proposed landfill site in parentheses): BW23/0549 (3.1 km), BW23/0677 (3.9 km) and BW23/0783 (4.2 km). Bore logs indicate that these wells are screened in gravels. Those gravels could be either the Kowai Formation (see point 14) or younger river gravels. In the unlikely case that there were a component of groundwater flow to the south-southeast (not part of the conceptualisation of main flow directions, but in not totally excludable based on collected site data), under a scenario of major liner failure, there could be a very low risk to these domestic wells.

Consideration of Submissions

55. The submission by Nigel Coughlan (C24C/287629) provides comments from an environmental professional living in the area, on a range of aspects of the proposal. I agree with the majority of Mr. Coughlan's statements for topics within my expertise on groundwater and contaminants such as PFAS. I generally agree with the following statement by Mr. Coughlan about the risk of a groundwater pathway from the proposed landfill to the river:

> *Aquifers themselves are so complex and difficult to accurately delineate that leachate contamination may only become apparent some distance from the source. Leachate*

[16] Liu, Y., Lin, A., Thompson, J., Bowden, J.A., Townsend, T.G., 2024. Per- and polyfluoroalkyl substances (PFAS) in construction and demolition debris (CDD): discerning sources and fate during waste management. Journal of Hazardous Materials v. 472. https://doi.org/10.1016/j.jhazmat.2024.134567

[17] The Interstate Technology & Regulatory Council Per- and Polyfluoroalkyl Substances Team, September 2023. PFAS Technical and Regulatory Guidance Document (Section 2.6). https://pfas-1.itrcweb.org/ (accessed 29 November 2024)

does not necessarily migrate fan-like from a landfill, therefore even closely spaced monitoring wells may not enable detection of a narrow plume of leachate exiting the site.

56. Three Waters infrastructure data[18] do not show there being any reticulated water infrastructure (drinking water, wastewater or stormwater) extending to Whiterock. In the absence of reticulated drinking water supply, common methods of water supply include direct surface water takes, rainfall harvesting and domestic wells. Figure 2 of the submission by White Rock Community Incorporated (C24C/232539) indicates that there are three domestic wells present on properties adjacent to the Karetu River, approximately 2 km downstream from the proposed landfill site. These unregistered domestic wells may draw water from the Karetu River. There is a possibility that any adverse effects on water quality in the Karetu River would also be relevant to the water quality from these domestic wells.

57. Numerous submissions[19] express concern about freshwater becoming contaminated. Some of these additionally note that the Karetu River is a source of drinking water for area residents. As discussed above, the quality of the Karetu River as a drinking water source could be compromised under the conditions considered in Scenario 3 (depending on factors discussed above).

58. Several submissions[20] also comment on risks of placing a landfill above limestone. This is a valid concern for reasons detailed earlier in my report, especially the potential for flow both through fractures (in limestone, these can be enlarged over time by rainwater, which is acidic) and pore space ("double porosity", discussed in points 15 and 26). Under any scenario of leakage through the landfill liner, an implication of the double porosity is that there could be one fraction of the leachate that reaches the Karetu River quickly (flow through fractures) and another fraction of the leachate that does not move quickly, remaining in the pore space within the limestone. There is a possibility that leachate slowly exiting the pore space could present a long-term source of remaining leachate to the Karetu River. The scale of the contamination, both the "fast" (fracture flow) and "slow" (pore space) fractions, will depend on the extent and magnitude of liner failure.

59. Two submissions[21] show pictures of what are reported to be calcite crystals found at Whiterock Quarry, including stalactites reportedly from a cavern (Madeline Fee C24C/224064). In my opinion, the photographed geologic materials are likely to be calcite that was re-deposited, after groundwater became oversaturated from dissolving limestone. The photographs of these materials reportedly from Whiterock Quarry adds to the limited evidence of limestone dissolution, presented earlier within the section *Description of the Receiving Environment*. The implication of limestone dissolution is that if it is extensive, there is risk of groundwater flow and contaminant transport along preferential flow paths.

60. Some submissions (e.g., H. Webb C24C/224076 and C24C/224102, J. Webb C24C/216599) express concern about leachate leaking through the liner and dissolving limestone. Generally speaking, landfill leachate pH can vary over a wide range, from acidic to alkaline. The actual pH will depend on the composition of accepted waste, with organic wastes being a risk factor for low pH while concrete would be likely to raise the

[18] Layer "Canterbury Three Waters Data" from Canterbury Maps and partners and licensed for reuse under the CC BY 4.0 licence.
[19] For example: Charlie Browne C24C/204425, Danielle Pinion C24C/205677, Jennifer Armstrong C24C/207628.
[20] For example: Megan Burridge C24C/213071, Maxwell Jason Banks C24C/222519, Lucille Guinevere Knight C24C/224158.
[21] Madeleine Fee C24C/224064, Owen Joris Meijer C24C/231003

pH. The lower the pH of the leachate, the greater the risk of it contributing to limestone dissolution.

61. The submission by Nickie White (C24C/207078) raises the question of how "forever chemicals" will be contained beyond the timeframe of the landfill liner. The phrase "forever chemicals" has been used since at least 2018 as a less technical way to refer to PFAS chemicals. Based on the discussion of Scenario 3, above, I consider the concern about the design lifetime of the landfill liner to be a reasonable and important one.

Conclusions and Recommendations

62. Although some site characterisation has been done, it is not as complete as it could be. In particular, a tracer test has not been conducted (point 29) to check for the possibility of relatively quick preferential flowpaths within the limestone. If this uncertainty is a key point in decision making, I recommend a tracer test still be conducted to check for the possibility of a preferential flow path to the Karetu River and demonstrate monitoring well network coverage and connectivity to the area where waste is proposed to be landfilled.

63. Overall, I consider the risk of impacts on the receiving groundwater environment to be low under normal operating conditions. However, if there were a major failure of the landfill liner, there would be a high risk of some contaminants traveling through groundwater to the Karetu River, potentially resulting in concentrations in the river above acceptable thresholds, including New Zealand drinking water standards.

64. The applicant has chosen to propose siting a landfill on top of fractured limestone rock, on a hillslope next to a river that is used for drinking water supplies (White Rock Community Incorporated, C24C/232539). The applicant acknowledges that some amount of leachate is expected to leak through the liner, so the question becomes not if, but how much, the surrounding environment will be affected. As a result of the site choice, extensive monitoring of groundwater and surface water, and at least a contingency for sampling of drinking water supplies, will be needed if confidence is to be provided on the magnitude of offsite effects.

65. I recommend that at least two rounds of baseline sampling (i.e., prior to any waste acceptance) still be conducted for BTEX compounds and PFAS in groundwater and Karetu River samples. While I agree with the applicant that these are unlikely to be present in groundwater onsite and surface water near the site, unlikely is not the same as impossible. Furthermore, they are very likely to be in the waste and leachate, so it is important to obtain baseline site data with regard to these contaminants.

66. In the s92 response to questions on groundwater (C24C/190589), the applicant indicates plans to use a laboratory method with limit of reporting of 0.01 µg/L (i.e., 10 ng/L) for most PFAS. Regarding limit of reporting, the PFAS National Environmental Management Plan[22] states:

> *The sensitivity of PFAS analysis should be matched to the decision-making requirements. Consequently, it may not always be appropriate to select the lowest cost analysis available from analytical service providers.*

67. Among the five laboratories accredited for PFAS testing by International Accreditation New Zealand (IANZ), four of the five offer a reporting limit of 1 ng/L for PFHxS, PFOS and PFOA (in some cases at a marginally higher cost compared to a "screen" method with reporting limits of 10 ng/L or 25 ng/L). To allow for early detection and time for

[22] National Chemicals Working Group of the Heads of EPA Australia and New Zealand, PFAS National Environmental Management Plan 3.0 - DCCEEW (accessed 5 March 2023).

response actions, I recommend that consent conditions specify a limit of reporting of no higher than 1 ng/L for the analytes PFHxS, PFOS and PFOA for all freshwater samples. The proposed PFAS reporting limit of 10 ng/L for the analytes PFHxS, PFOS and PFOA is sufficient for leachate testing.

68. Construction and demolition waste comes with a risk of high PFAS levels. The applicant has indicated that carpets and gypsum wallboard (two of the highest risk waste types for PFAS) are planned to be excluded (note, Dr Massey recommends related conditions to specify prohibited items in conditions), proposes low (0.1 micrograms per kilogram) screening criteria for selected PFAS in soils, and also refers to the waste types to be accepted as "inert". Taken together, I consider these points to indicate an intention on the part of the applicant to sort out wastes containing more than incidental levels of PFAS. To that end, I recommend screening criteria for construction and demolition wastes, in addition to soils, in consideration of the widespread presence of PFAS in construction and demolition wastes. I recommend a limit of 10 micrograms per kilogram (parts per billion, ppb) total PFAS for non-soil wastes. This recommended limit is 10x higher than the limit Dr Massey recommends for soils (1 microgram per kilogram), to allow for incidental PFAS levels in recognition of the widespread presence of PFAS in construction and demolition waste. For a graphical representation of study findings that I used to develop this recommendation, see Appendix 2, Figure 2.

69. For determination of "total PFAS", I recommend use of a laboratory method for solid materials that includes the following compounds (at a minimum): PFOA, 8:2 FTS and 10:2 FTS (both can be precursors of PFOA), PFHxS, PFOS and seven known precursors of PFOS (i.e., PFOSA, N-MeFOSA, N-MeFOSE, N-EtFOSA, N-EtFOSE, N-MeFOSAA, N-EtFOSAA. The acronyms I use are the same as those in the PFAS National Environmental Management Plan 3.0[23] Table B3, which lists common laboratory analytes and specifies Chemical Abstracts Service registry numbers as unambiguous identifiers. I recommend that a limit of 10 micrograms per kilogram apply to the sum of all compounds listed above. The analysis should be done at a laboratory accredited by IANZ for PFAS testing.

70. The functionality of the underdrainage is something that can be monitored and evaluated during operation. I recommend requiring a maintenance schedule, regular inspections (using cameras where people cannot access), and periodic evaluation of system performance. The main purpose of these activities could be to consider any improvements that could be made to increase the longevity of the system after site closure. The purpose would be to reduce the risk of groundwater rising to the level of the liner and potentially into the waste.

71. I concur with the applicant's recommendation to install new groundwater monitoring wells outside of the proposed landfill footprint, as detailed in Appendix M Revision B. It is likely that more will be learned about site groundwater conditions over time, in particular from the installation and monitoring of these wells. To incorporate new knowledge into the monitoring program, I recommend periodic review (e.g., once every three years) of the monitoring program. The consent holder could be required to have a suitably qualified and experienced practitioner conduct and submit each periodic review to Environment Canterbury for review and approval of any recommendations.

72. Appendix M Table C lists proposed new groundwater monitoring wells as "upgradient" or "downgradient" in relation to the proposed landfill location. However, due to the limestone geology and potential for fracture flow, I consider these designations to be educated guesses only, rather than known groundwater flow directions. I do not

[23] National Chemicals Working Group of the Heads of EPA Australia and New Zealand, PFAS National Environmental Management Plan 3.0 - DCCEEW (accessed 5 March 2023).

recommend basing any monitoring decisions on the "upgradient" and "downgradient" designations.

73. I have read and concur with recommendations by Dr Michael Massey on how consent conditions could incorporate key trigger values, responses and mitigation measures. My next three points are meant to be read and considered in conjunction with those of Dr Massey.

74. I do not recommend the use of standard deviations and trends within the triggers and action response (TARP) framework. Although it may appear at first glance that these are objective criteria, the applicant has not defined how trends would be calculated, which could allow for subjective application of criteria. Similarly, application of standard deviations is only valid if concentrations are normally distributed (which is often not the case for environmental data) and sufficient number of samples are considered. If trends and standard deviations were to be included in consent conditions or the TARP, this would defer subjective choices on how they are applied to after the consent is granted.

75. Rather than use of standard deviations and trends in the TARP, I recommend use of hard limits on all water quality measurements listed as "Leachate Leakage Toxicants" in Appendix M, Table D. For most contaminants, I recommend 20% of the MAV for early warning trigger values (similar to the applicant's Level 2), which should result in increased monitoring (locations and frequency) until the reason is well understood. I recommend that 50% of the MAV be used as a value at which mitigation actions be taken (similar to the applicant's Level 1).

76. In the case of NH4-N in groundwater, I recommend the following hard limits: 0.47 mg/L (1.5 times the highest baseline value in Appendix F, excluding currently unexplained levels from BH02) as an early warning trigger and 0.93 mg/L (3 times the highest NH4-N groundwater baseline value, excluding BH02) for as requiring mitigation.

77. The "hard limits" listed in the previous two points would provide an unambiguous basis for determining whether the activity is compliant. On the other hand, the currently proposed use of standard deviations and trends within the TARP framework is ambiguous, and risks subjective choices in application.

78. For setting trigger levels for PFAS, I recommend consideration of the Australia National Health and Medical Research Council's (NHMRC) 2024 proposal to lower the Australian Drinking Water Guideline levels for PFAS, in addition to the existing New Zealand MAVs. The existing New Zealand MAVs[24] for PFOA and PFHxS + PFOS are set equal to the Australian Drinking Water Guidelines 2018[25]. However, those Australian guidelines are subject to regular reviews. As stated by the Australia NHMRC in December 2024, "the findings of the NHMRC review have resulted in proposed changes to health-based guideline values based on new evidence."[26]

79. I recommend that consent requirements for monitoring include a framework that maximises changes for early detection of leachate, but also is comprehensive enough to check for any effects of leachate that have slipped through the first monitoring points without being noticed. I recommend the following hierarchy (for items *i*, *ii*, and *iii*, all leachate leakage indicators and leachate leakage toxicants, including organics, listed in Appendix M Table D):

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[24] Water Services (Drinking Water Standards for New Zealand) Regulations 2022 (SL 2022/168) Schedule Drinking Water Standards for New Zealand – New Zealand Legislation (accessed 25 February 2025).

[25] Australia National Health and Medical Research Council, Australian Drinking Water Guidelines | NHMRC

[26] Australia National Health and Medical Research Council, NHMRC Statement: Per- and polyfluoroalkyl substances (PFAS) in drinking water (accessed 12 February 2025).

i. Leachate sampling (operational standard sampling no less frequent than monthly for toxicants list)

ii. Groundwater sampling: considering potential for preferential flowpaths and seasonal variation, I recommend that operational standard sampling is no less frequently than quarterly for all parameters detected in leachate. I acknowledge that the applicant recommends annually for organics in Appendix M, however, conditions could include a contingency to reduce to annually if organics are not detected above the relevant drinking water MAV (or additional relevant limit for PFAS, as discussed in the previous point) in quarterly samples.

iii. Surface water sampling (no less than four times annually, twice yearly at times of low flow in the Karetu River and two additional events under higher flow conditions, including all leachate leakage indicators and leachate leakage toxicants listed in Appendix M Table D)

iv. Drinking water sampling (at a minimum, a contingency to sample supplies if detections in Karetu River downstream surface water samples more than 10% greater than the upstream location, including every compound listed in Appendix M for which a Water Services Regulations MAV exists)

80. Further to my recommendations *i* and *ii*, above, I recommend operational standard sampling frequencies of quarterly for both leachate and groundwater for the list of "leachate leakage toxicants" (Appendix M, Table D). While this would be a higher frequency for groundwater than proposed in Appendix M, *Revision B*, groundwater flow patterns may vary seasonally as influenced by groundwater recharge away from the landfill footprint.

81. While groundwater sampling should be viewed as the first opportunity to notice if there is a problem with leachate being released into the environment, in evaluation of surface water results, the applicant should regularly consider the possibility of leachate leakage reaching the Karetu River without first being detected in groundwater (especially dry weather sampling). In addition to NH4-N, compounds that can serve as leachate indicators include PFAS, BTEX, arsenic, chromium, copper and zinc. I recommend analysis of all surface water samples with the full list of leachate toxicants. Response actions for detections above upstream control sample should be no less robust than those for detections of leachate contaminants in groundwater.

82. In Appendix M, Monitoring and Trigger Action Response Plan (TARP), trigger levels for toxicants are based on ANZG DGV ecological values. However, considering that the Karetu River is used for drinking water supply (points 57 and 58) downstream of the landfill, I recommend that trigger levels are set based on human health drinking water guidance, for compounds for which the MAVs are lower than ecological criteria.

83. If any contaminants are detected in groundwater monitoring wells or downstream surface water samples at 50% of the respective MAV, I recommend that the consent holder provide quarterly monitoring of domestic drinking and stock water sources from shallow private wells (and, potentially, surface water intakes) within 500 m of the Karetu River. Quarterly monitoring could be ended after two years of data showing that all compounds are below 50% of respective MAVs in groundwater monitoring wells.

Figures

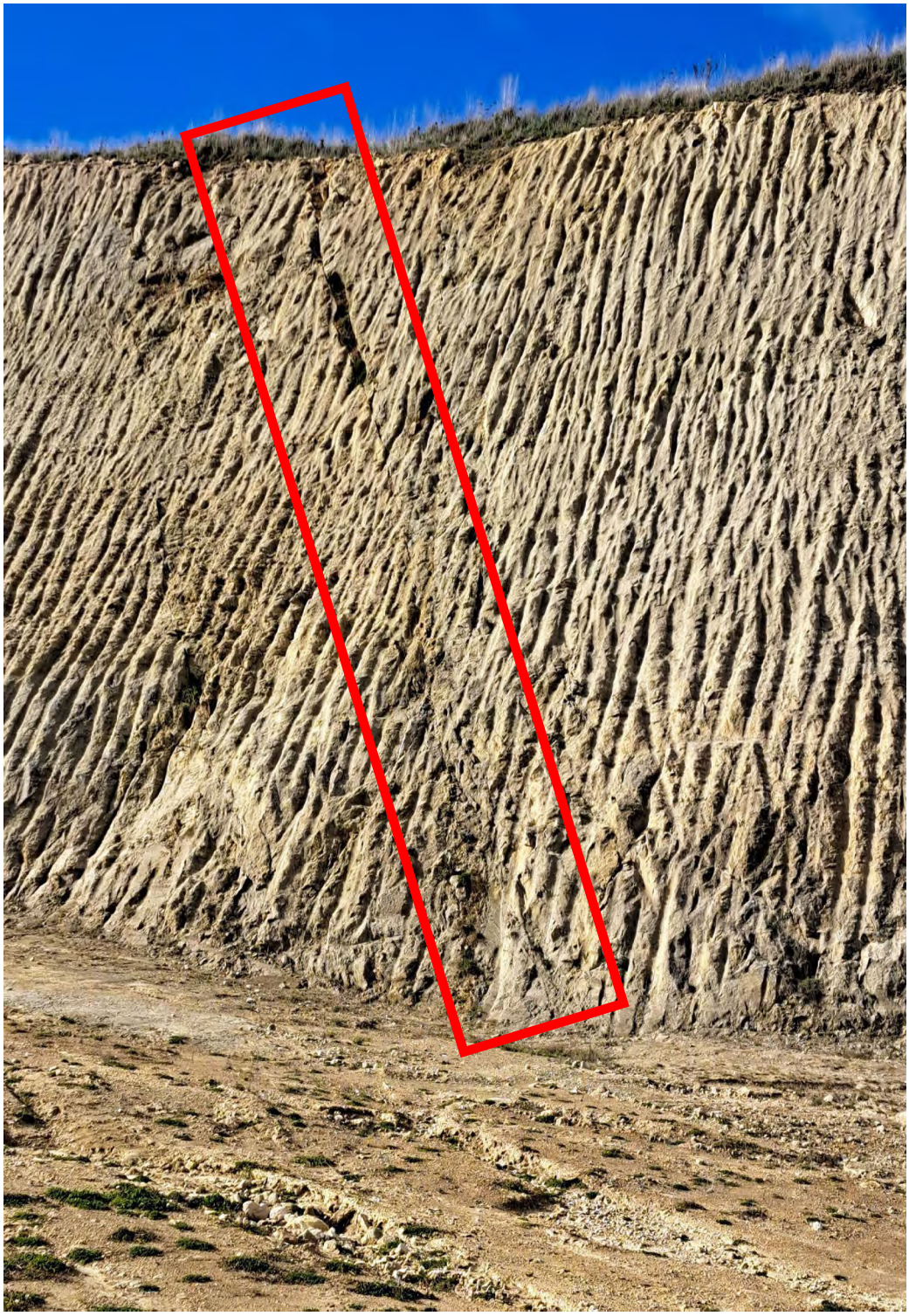


Figure 1. A likely fracture is visible (within the added red box) along the face of a limestone escarpment >10 m high. Vertical striations visible on the escarpment face may be an effect of quarrying equipment. Photograph taken during site visit 30 May 2024. It is likely that this specific fracture is present above the water table year-round, fractures below the water table could have more dissolution of limestone along them.



Figure 2. A likely fracture is visible (within the added red box) along the face of a limestone escarpment >15 m high. Two possible hollow cavities are seen (orange boxes). Vertical striations visible on the escarpment face may be an effect of quarrying equipment.

Appendix 1: Review of groundwater flow model by Mark Trewartha

Memo

Date	2 December 2024
To	Katie Nagy
CC	Matt Silver, Michael Massey
From	Mark Trewartha

Re: Whiterock Limestone Quarry

I have reviewed Appendix F Groundwater and Surface Water Effects Assessment. The appendix provides some information about the model construction. I've also had an opportunity to discuss the model and purpose in the application with Brent Hamilton (WSP) and Eric Van Nieuwkerk (WSP).

Based on my conversation with the consultants and what is presented in Appendix F:

1. I agree with the consultant that modelling has been taken as far as reasonably possible with the existing limitations (highlighted by consultant in Appendix F).

2. I currently don't have access to the model files (MODFLOW), so I have not reviewed the model itself. Based on my conversation with the consultants, there isn't anything in the application or proposed conditions (i.e. we don't have to monitor this because of model results) that is based solely on the model/model results. Based on this, a full review of the model (model files, datasets, etc.) is considered unnecessary at this time. The model is what it is, a general numerical representation of the hydrogeologic setting (conceptual model) based on existing but limited data.

Because of the lack of site data and model uncertainty, I do not recommend model results be used as stand-alone evidence for decision making regarding issuance of the consent or consent conditions.

Attachments:

File reference: (SharePoint or TRIM)

Appendix 2: Supplementary information on per- and polyfluoroalkyl substances (PFAS)

84. Two important members of the PFAS group of chemicals are perfluoroalkyl acids (PFAAs), such as PFOA, PFOS and PFHxS, and PFAA "precursors". Precursors are larger molecules that, under common environmental conditions transform into PFAAs (additional explanation and an illustrative figure provided in Appendix 2). PFAAs, however, are stable end products and persistent in the environment. There is no clear evidence of any further degradation of PFAAs in the environment.[27]

85. Precursors are present in PFAS formulations produced since about 1960, in diverse uses including but not limited to fluoropolymers, industrial and consumer products and firefighting foams designed for flammable liquid fires.[28] This includes polymer and non-polymer formulations used in building and construction materials.[29]

86. Section 9.3.1 of the PFAS National Environmental Management Plan 3.0 states "The characterisation of pathways and receptors should consider the likely or possible presence of a range of PFAS, including precursors". That document's glossary defines precursors as "a substance from which another substance is transformed".

87. Consideration of precursors, even if only conceptually, is important because consumer and building products often contain larger, more complex molecules that can transform in the environment into end products such as PFOA, PFHxS and PFOS. Implication is that release of the environmental end products can be delayed, and that reliance on concentrations of environmental end products alone (e.g. for screening of materials to accept) can underestimate the total amount of PFAS present.

88. Figure 1, below, illustrates one example of a precursor and the typical environmental end product it transforms into. The figure above is simplified in that the arrow labelled "transformation reactions" lumps multiple transformation reactions together; a current understanding of the full chemical transformation pathway is depicted in Figure 3B of a review paper in the journal Science written by U.S. EPA authors.[30] It is important to realise that N-EtFOSE is only one example of a precursor, but numerous additional precursors of PFOS exist. Similarly, there are also numerous precursor chemicals of PFHxS and PFOA.

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[27] Evich, M.G., Davis, M.J.B., McCord, J.P., Acrey, B., Awkerman, J.A., Knappe, D.R.U., Lindstrom, A.B., Speth, T.F., Tebes-Stevens, C., Strynar, M.J., Wang, Z., Weber, E.J., Henderson, W.M., Washington, J.W., 2022. Per- and polyfluoroalkyl substances in the environment. Science 375, eabg9065. https://doi.org/10.1126/science.abg9065

[28] Prevedouros, K., Cousins, I.T., Buck, R.C., Korzeniowski, S.H., 2006. Sources, Fate and Transport of Perfluorocarboxylates. Environ. Sci. Technol. 40, 32–44. https://doi.org/10.1021/es0512475

[29] The Interstate Technology & Regulatory Council Per- and Polyfluoroalkyl Substances Team, September 2023. PFAS Technical and Regulatory Guidance Document (Section 2.5). https://pfas-1.itrcweb.org/ (accessed 29 November 2024).

[30] Evich, M.G., Davis, M.J.B., McCord, J.P., Acrey, B., Awkerman, J.A., Knappe, D.R.U., Lindstrom, A.B., Speth, T.F., Tebes-Stevens, C., Strynar, M.J., Wang, Z., Weber, E.J., Henderson, W.M., Washington, J.W., 2022. Per- and polyfluoroalkyl substances in the environment. Science 375, eabg9065. https://doi.org/10.1126/science.abg9065

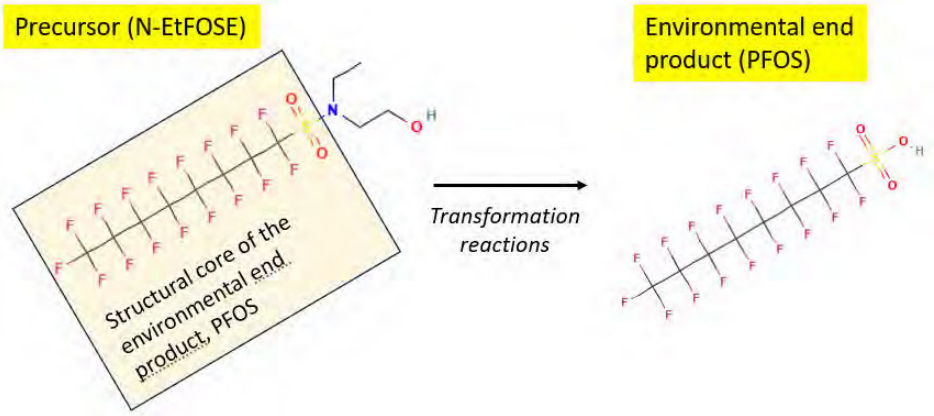


Figure 1 (of Appendix 2). An example of a transformation reaction from a precursor PFAS to an environmental end product PFAS. Chemical structure illustrations are from the U.S. Environmental Protection Agency's *Comptox* chemicals dashboard.

89. Figure 2 shows concentrations of PFAS in construction and demolition debris (CDD) from a study in the United States. The applicant has listed carpets and gypsum drywall as prohibited waste types. Dr Massey has recommended also prohibiting carpet padding, which I concur with. My recommended limit of 10 micrograms per kilogram (equivalent to ng/g) is 100x higher than the applicant's proposed limit for PFAS in contaminated soil, and 10x higher than Dr Massey's proposed revision of that limit.

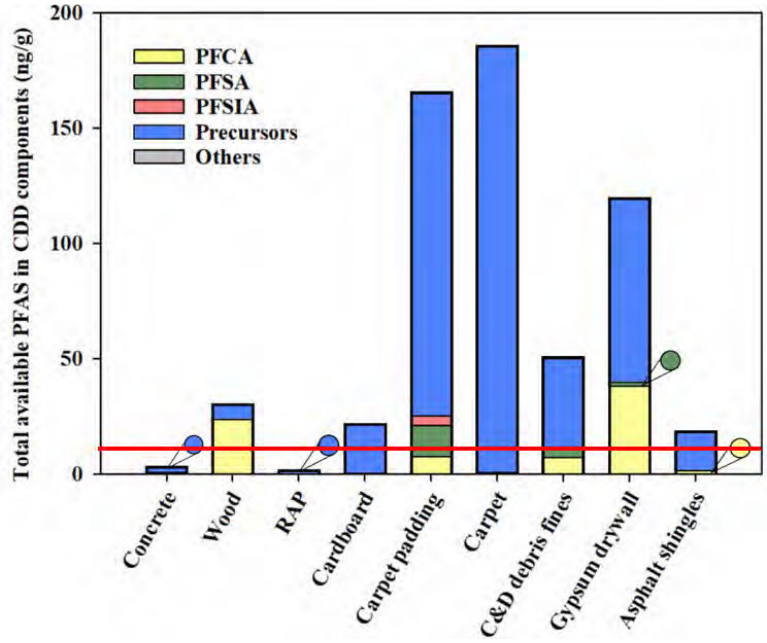


Figure 2 (of Appendix 2). PFAS levels in construction and demolition waste from the Liu et al. (2024) study[31], with a red line added at 10 ng/g (equivalent to micrograms per kilogram). The red line reflects my recommendation of a 10 micrograms per kilogram limit for PFAS in accepted construction and demolition wastes. "RAP" stands for reclaimed asphalt pavement.

[31] Liu, Y., Lin, A., Thompson, J., Bowden, J.A., Townsend, T.G., 2024. Per- and polyfluoroalkyl substances (PFAS) in construction and demolition debris (CDD): discerning sources and fate during waste management. Journal of Hazardous Materials 472, 134567. https://doi.org/10.1016/j.jhazmat.2024.134567

Appendix 6: Tonkin + Taylor, Landfill Engineering s42A report, prepared by Anthony Kortegast

Before the Independent Hearing Panel appointed by the Canterbury Regional Council

IN THE MATTER OF The Resource Management Act 1991

AND

IN THE MATTER OF Application CRC 243699 to 243707, 150 to 176 Quarry Road, Loburn

Section 42A Officer's report

Report of Anthony Paul Kortegast (Tonkin & Taylor Ltd).

1 Introduction

1.1 Background

1 This report forms part of the Canterbury Regional Council's [commonly referred to as **ECan**] audit of the Assessment of Environmental Effects (AEE) provided by Protranz International Limited (Protranz) (the applicant). Protranz proposes to operate a limestone quarry and processing plant, and to establish a **Class 3 Managed Fill** (landfill) that will also accept contaminated soils that meet the Class 1 leaching criteria, at the existing Whiterock Quarry located at 150 to 176 Quarry Road, Loburn, North Canterbury.

2 The application states that the landfill will receive inert and sorted construction and demolition (C&D) waste and other specific inert wastes: stated to be only contaminated soils, but there are no specifics as to the proportionality of C&D wastes to contaminated soils. It is stated that putrescible waste and organic will not be accepted at the site other than at trace levels: <2% of the total.

3 Protranz has applied to ECan for the resource consents required for the establishment and operation of the proposed landfill. This report has been prepared in support of ECan's assessment of the following resource consent applications:

- CRC243700: To use land to deposit waste.
- CRC243705: to discharge stormwaters, groundwater, solid waste and leachate, and water treatment chemicals to land and water.

4 Tonkin & Taylor Ltd (T+T) has been engaged by ECan to undertake a number of aspects of technical review of the application lodged by Protranz in support of its resource consent applications. Initial review of the engineering aspects of the proposal was provided by my colleague Mr Anthony Bryce. Owing to personal circumstances, I assumed the role of landfill engineering and design reviewer for T+T and ECan in relation to this matter, effective December 2024.

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5 My report adopts the bulk of Mr Bryce's findings, but also considers further information since received, questions subsequently raised by ECan, and submissions. The purpose of this Technical Report is to set out the overall findings of our technical review of Protranz's landfill design to supplement the ECan Section 42A report and inform a decision on the resource consent applications.

6 This report provides the decision-maker with information and advice related to the actual and potential effects of contaminant discharges to land, groundwater, water and air from the proposed activities.

1.2 Qualifications

7 I am a senior environmental consultant and Technical Director at Tonkin & Taylor. I have over 40 years' experience in the solid waste field covering the design and construction of landfills, waste transfer stations, hazardous waste containment facilities, compost facilities, industrial waste fills, and recycling and materials recovery facilities. These include some of the largest and most modern landfills in the Asia-Pacific region such as the Redvale, Silverstream and Kate Valley landfills in New Zealand, and the Bukit Tagar mega-landfill in Malaysia.

8 I hold the following qualifications, memberships and certifications:

- Bachelor of Science.
- Bachelor of Engineering (honours).
- Master of Environmental Engineering Science (UNSW).
- CPEng, Int PE.
- Fellow, Engineering NZ.
- Fellow, Engineers Australia.
- EPA appointed Environmental Auditor (Industrial Facilities, Victoria (*appointed pursuant to the Environment Protection Act 2017*).
- Life Member Waste Management Institute NZ.
- Member NZ Geotechnical Society.
- Member Solid Waste Association of North America (SWANA).
- Member WMRR (Australia).

9 Over my career I have been involved with all aspects of landfill development and licensing, operations, lateral and vertical expansion, closure and aftercare, and the development of landfill financial assurances (Bonds). I have carried many projects related to waste facility planning and disposal economics, as well as landfill and waste facility concept planning, through to detailed design and peer review. Altogether I have been involved with more than 150 waste projects throughout New Zealand, Australia and in Malaysia, the Philippines, Tuvalu, Fiji, Hong Kong and Vietnam.

10 In the past I have been a guest lecturer in solid waste and landfill engineering at the Universities of Auckland and Canterbury and I have authored a number of technical papers in the field of solid waste and landfill engineering. I have visited solid and liquid waste treatment facilities throughout Europe, the USA, Australia, the Pacific Islands, New Zealand and Asia, including a large number of both conventional and specialist solid inert, putrescible and industrial landfills, Waste to Energy plants, ash handling facilities, Materials Recovery Facilities (MRFs) and compost facilities. I have visited many of the world's large, referenced waste facilities and hence have a good understanding of international "benchmarks" in terms of landfill design and operation.

11 In New Zealand I was the principal designer or principal reviewer for more than 20 significant landfill developments, and I have been involved in consent reviews, design, or advisory roles

for many others. I have assisted the NZ Ministry for the Environment (MfE) with the preparation of key landfill technical publications, acting as principal author for the precursor documents to the current Land Disposal Guidelines (CAE Guidelines).

12 Of particular note was my involvement in the Kate valley project in Canterbury. I developed confidential siting studies related to the Canterbury regional landfill proposal. I have particular knowledge of the landfill engineering and hydrogeological setting in Canterbury as I during the late 1990s/early 2000s was the principal consultant leading the search for a site that was ultimately selected as the regional putrescible (MSW) landfill at Kate Valley, North Canterbury. This involved me extensively in region-wide studies of suitable geology for Type 1 landfill siting, the assessment of regional seismic risk and associated landfill design parameters, waste transport and road access considerations, and various other aspects relevant to landfill siting and design in the region.

13 Subsequently, I was responsible for developing the Kate Valley consent design and for the primary landfill engineering evidence presented at the initial council level hearing and later to the Environment Court. I was then further involved as the Project Director and lead engineer for the detailed design of the initial phases of the project as well as ancillary works such as the on-site dams.

14 I have been extensively involved in assessing and reviewing landfill design and consent applications and have prepared and presented expert evidence related to landfill matters at consent hearing level and in the Environment Court in New Zealand and in VCAT (Victoria) and the Supreme Court in Victoria. Relevant example projects include:

- I reviewed design issues and provided remediation design advice of designed upgrades related the Redruth landfill (Timaru) and a number of other South Island landfills as well as the Silverstream Landfill (Upper Hutt), the Omaranui Landfill (Hastings), and the Bluegums Landfill in Marlborough.
- I was a technical reviewer and expert witness for ECan in relation to engineering aspects of the consent applications by Woodstock Quarries for a proposed landfill operation (2023).
- I was a technical reviewer and expert witness for ECan in relation to aspects of the financial assurances (Bonds) provided for the Hurunui Windfarm and the Central Plains Water scheme.

15 I have been involved in a senior review or advisory capacity on many waste projects where landfill siting and design were key considerations. My involvement in these projects has often included strategic advice in relation to landfill siting, containment/barrier system design, buffer zone and separation distance issues, and the mitigation of potential LFG and groundwater contamination risks.

1.3 Code of Conduct and Conflict of Interest declaration

16 I have read the Environment Court's Code of Conduct for Expert Witnesses contained in the Court's Practice Note of 2023. I have complied with that code in preparing this report and agree to comply with it in providing information or opinion to the Hearing Panel in relation to this matter. The aspects of the application addressed in my report are within my area of expertise and I have considered and stated all material facts known to me which might alter or qualify the opinions I express.

17 I have no commercial relationship with the applicant.

1.4 Scope of Report

18 This report is prepared under the provisions of Section 42A of the Resource Management Act 1991 (RMA). This section allows a council officer or consultant to provide a report to the

decision-maker(s) on a resource consent application made to the council and allows the decision-maker(s) to consider the report at the hearing. Section 41(4) of the RMA allows the decision-maker(s) to request and receive from any person who makes a report under Section 42A *"any information or advice that is relevant and reasonably necessary to determine the application".* This report is supplementary to the Section 42A Report prepared by Environment Canterbury for the above resource consent applications.

19 To inform this report on the consent applications I have:

a) Considered the relevant sections of the assessment of effects on the environment (AEE) submitted by the applicant, including the following technical appendices:

- **Appendix H – Design Drawing Set (Rev1):** Prepared by WSP, Revision 0, dated 18 March 2024. Updated to Revision 1, dated 6 August 2024 (referred to as the Drawings).
- **Appendix J – Landfill Design Report:** Prepared by WSP, Revision 0, dated 25 March 2024 (referred to as the Landfill Design Report).
- **Appendix K – Waste Acceptance Criteria Report:** Prepared by WSP, Revision 1, dated 16 February 2024 (referred to as the Waste Acceptance Report).
- **Appendix L – Site Management Plan:** Prepared by Protranz, DRAFT Revision A, dated 27 March 2024. Updated to DRAFT Revision B, dated 23 August 2024 (referred to as the Site Management Plan).
- **Appendix R – Containment Risk Assessment:** Prepared by WSP, Revision 0, dated 15 March 2024.

b) Considered further information that was provided by the applicant, including the following technical appendices:

- **Section 1 – Landfill Design: Response to ECan RFI:** Letter prepared by WSP, dated 16 August 2024.
- **Appendix Y – Proposed Conditions (Rev1):** Prepared by WSP, dated 23 August 2024[1] Only those conditions proposed for consent applications CRC243700 and CRC243705 have been reviewed in the context of this landfill design review.

c) Considered relevant design guidance documents, specifically: **Technical Guidelines for Disposal to Land**, WasteMINZ, September 2023. I have also considered other regional guidance such referenced in the design report, namely: **Best practice Environmental Management: Siting, design, operation and rehabilitation of landfills,** EPA Victoria Publication 788.3, August 2011 (the [Victorian] landfill BPEM). This latter document is relevant as it provides useful guidance on various landfill design and performance objectives, and specific design features.

d) Taken into account relevant issues raised by submitters in relation to the effects I have considered in this report.

20 This technical review addresses the aspects of the application related to **landfill engineering and waste containment**. While the Site Management Plan (SMP) is one of the documents listed above, I have not undertaken a detailed review of the SMP. However, I have considered it in the context of the overall consent application. The SMP will be subject to further review before finalisation and approval if consents are granted. Similarly, it is not within the scope of this review to consider the technical and commercial merits of the proposal such as demand for such a waste disposal option and its appropriateness in a regional context and hence the

[1] I note these are recorded in the document as 23/08/2023.

associated benefits/disbenefits of developing such a landfill as set out in Appendix T of the application – the Wider Benefits and Site Selection report prepared by Protranz.

21 In this report I provide conclusions on the scale and significance of adverse and positive effects of the proposal. If the decision-makers are of a mind to grant the application, this report provides recommendations on conditions of consent, management plans and aspects of the design that warrant further review prior to design finalisation.

22 My colleagues visited the site and surrounding receiving environment with ECan and Waimakariri District Council staff on 30 May 2024. The purpose of the site visit was to become familiar with the site operations, its location, the receiving environment and the application in an overall landfill engineering sense. Mr Bryce has provided me with his records of the site visit and briefed me fully on his conclusions ahead of preparation of this report.

2 Overview of the proposal

2.1 Wastes proposed to be accepted

23 The application states that the site will receive selected (sorted) construction and demolition (C&D) waste and that this material will constitute **managed fill** aligning with **Class 3** landfill waste acceptance criteria. However, the application also proposes that the landfill will accept contaminated soils provided the TCLP[2] limits for waste acceptance at a **Class 1** landfill are met. It is also stated that the landfill will not accept any significant amounts of putrescible waste or Municipal Solid Waste (MSW): these types of waste significantly increase the biochemical loading in landfill leachate, as do some C+D waste components such as plasterboard and treated timber.

24 The application states that the waste material accepted shall meet the definition of a Managed fill as described in the WasteMINZ (2023) Guidelines, i.e., only include materials that meet the definition of sorted/inert C&D Materials and soils, including:

- Cleanfill (non-contaminated soils, rocks, gravel, sand, clay and other natural materials).
- Inert C&D wastes including:
  - Reinforced or unreinforced concrete, concrete blocks.
  - Site clearance and excavation materials (including soils, clays, rocks).
  - Bricks, pavers and ceramics.
  - Tiles and pipes made of clay, concrete or ceramics.
  - Roofing products (corrugated iron, steel, steel coated tiles).
  - Fibreglass.
  - Vehicle tyres, rubber.
  - Flooring products (underlay, vinyl/linoleum, clay tiles).
  - Wire, wire rope, wire netting.
  - In-organic insulation products.
  - Non-recyclable glass.
  - Non-recyclable steel and aluminium fittings (cable track, spouting).
  - Plastic materials and items associated with C&D activities (including plastic bags, pipes, gutterings, building wrap).
- Waste Containing Asbestos (with conditions).

[2] TCLP – Toxicity Characteristic Leaching Procedure: a standard test developed by the US Environment protection Agency to determine the levels of leachable organic and inorganic chemical species in leachates at landfills.

25 I note that some of the above materials can prove problematic even in Type 1 landfills – particularly tyres, which are usually required to be shredded into pieces measuring < 250mm prior to acceptance; and bulky wastes in general. The application states that the landfill is to be designed and constructed in accordance with WasteMINZ (2023) Technical Guidelines for Disposal to Land, with a liner design equivalent of a Class 1 Landfill. Based on this "liner upgrade" Appendix K of the application sets out proposed overall Waste Acceptance Citeria (WAC) and identifies the types of C&D and specific inert wastes including contaminated soils that are proposed to be disposed of at the site. However, no detail is provided of the assessed overall waste mix or total contaminant loading beyond the application stating that a "mix" of Class 3 and Class 1 landfill wastes could be accepted, provided proposed contaminant total concentrations and/or leachability limits are met.

Landfill classification

26 The site is proposed as a **Class 3** landfill as defined in the ***WasteMINZ (2023) Technical Guidelines for Disposal to Land*** (the DTL Guidelines) which set out the required design criteria for the various classes of landfill in New Zealand.

27 A Class 1 equivalent liner is proposed in order to provide a higher level of hydraulic containment than would be provided at a Class 3 facility. The application notes that the WasteMINZ (2023) Guidelines provide WAC for a Class 3 managed fill for a select range of inorganic and organic contaminants including metals, some hydrocarbons and some pesticides and states that these WAC have been adopted as ***screening*** criteria for the landfill. The application states that for chemicals where Class 3 WAC have not been derived, then because the facility is proposed to be constructed with a Class 1 equivalent liner, then Class 1 WAC based on TCLP limits have been adopted as the basis for assessing the suitability of waste for acceptance at the landfill.

28 The application states that given the intent to operate the facility as a Class 3 facility (it is inferred that C+D waste and soil will be the dominant waste stream components) and with the limited acceptance of organic matter and the additional engineering controls proposed that the adoption of the TCLP based limits applicable to Type 1 sites is considered to provide a highly conservative approach for waste acceptance.

29 Discussion is also provided on the use of total contaminant concentration values as an alternative method of demonstrating compliance with the TCLP limits for Class 1 Landfills. However, ***the overall composition of the waste stream that will be accepted remains uncertain*** as does the nature of the contaminant controls and that will apply. Protranz proposes total concentrations (e.g., metals, hydrocarbons) as a means of assessing potential toxicity as a proxy for TCLP limits based on a combination of a default assumptions adopted in the WasteMINZ (2023) Class 1 criteria, with higher factors to apply to contaminants with inherently low chemical leachability. A process to develop new WAC for new contaminants, in the event this becomes necessary within the life of the landfill is also outlined and it is stated that it is intended that this process sits within the Landfill Management Plan, so that new WAC can be added (and presumably existing criteria amended) as needed without triggering the need for a change of consent condition.

30 In summary, the proposal is for a ***"hybrid"*** facility with an indicated weighting towards inert and soil-like materials but ***including an unspecified proportion of waste with leachable contaminants at levels that would otherwise require disposal at a Type 1 landfill facility***. As noted above, ***the application is not specific on the overall waste stream makeup or the detail of waste stream controls that would apply.*** The proportion of contaminated soil waste and hence the makeup of the overall waste steam remains unclear. ***Hence the degree of risk that the waste mass as a whole could pose is also unclear as is the actual landfill classification that should apply.***

2.2 Landfill size and volume

31 The total landfill footprint area is approximately 4 ha. The landfill is proposed to be developed in two stages as quarrying in parts of the landfill are completed and will have an airspace volume of approximately 500,000 m^3. With an anticipated annual waste placement of 30,000 tonnes and compaction to 1.2 tonnes/m^3 the applicant expects the landfill to have an operating lifespan of approximately 20 years. Overall, this makes the site a small landfill by today's standards.

3 Description of the receiving environment

32 The receiving environment is described in the Application, with detail relevant to landfill design provided in technical appendices D, E, F and J (the site investigation, groundwater, stormwater/drainage, and design assessments).

33 Climate is an important consideration in relation to the potential for leachate and landfill gas generation. The application states that the median annual average rainfall measured at Fox Creek weather station was 1,059 mm per year, which is higher than many areas of the Canterbury Plains and Christchurch. However, rainfall is generally higher in the winter months and hot summers / summer winds will be a factor.

34 The DTL Guidelines note that Class 3 Managed Fills should be sited in areas of **appropriate geology, hydrogeology and surface hydrology** and that as contaminated materials (in accordance with specified limits) may be accepted, an environmental site assessment is required in respect of geology, stability, surface hydrology and topography. Monitoring of accepted material is required, as are operational controls, and monitoring of surface water and groundwater.

35 This report does not assess site selection and need. In relation to the overall engineering suitability of the site, I have reviewed Appendix R – Containment Risk Assessment and this was also the subject of assessment by my colleague Mr Bryce at an earlier stage. I consider that the risk assessment has identified an appropriate range of risks and that the landfill design adequately addresses these risks based on the assumed waste stream composition.

36 The relevant New Zealand design reference is the **Technical Guidelines for Disposal to Land** (WasteMINZ 2023) which sets set out key criteria for siting a landfill. For the type of landfill proposed these include avoidance of:

- High permeability underlying soils or fractured rock.
- Geothermal, karst areas or active faults.
- Effects on drinking water aquifers.
- Flood plains, water supply catchments, estuaries, marshes and wetlands.
- Particularly environmentally sensitive areas.

37 The risks associated with these siting factors are addressed by the appropriate technical experts (geological, hydrogeological, geotechnical, hydrology, ecology). However, in relation to engineering of the landfill and associated containment system, the relative suitability of the site setting needs to be balanced with the overall level of risk associated with the types of materials that are proposed to be disposed of.

38 The nature of the underlying geology at any landfill site is a fundamental influence on design, for the following reasons:

- It affects consideration of the containment philosophy of the design (by this I mean how the liner design is approached on an overall basis).
- It determines the materials readily available for the liner, cover and final cap elements.
- It is a fundamental determinant of overall landfill stability and settlement criteria.

39 The nature of the underlying geology at any landfill site is a fundamental influence on design, for the following I note that there are significant differences between the proposed site and the Kate Valley site in relation to the natural containment provided by the underlying geology. At Kate Valley, the underlying geology is favorable for landfill construction and provides good natural containment over most of the footprint. The soft sandstone and siltstone rock which forms the bulk of the subgrade is hundreds of meters thick. The presence of a great thickness of underlying low permeability siltstone and silty sandstone means that the site provides good natural containment and attenuation to back up engineered liner systems.

40 This contrasts with the limestone geology at the Whiterocks site, which is generally not considered to be a suitable setting for a Type 1 or Type 2 landfill owing to the possible presence of zones of high subgrade permeability owing to fractures or erosion features such as karst erosion, which can cause foundation instability and compromise the effectiveness of an engineered landfill containment system. The Landfill Design Report at Section 2.2 notes the possibility of encountering karst erosion features in the limestone geology beneath the site. The design report notes that karst (limestone dissolution) features, if encountered, can be mitigated in this case by sub-excavation and backfill. I consider there would need to be approval by ECan (likely via the peer reviewer – refer Section 6) of any proposed remediation works to ensure the landfill cells are constructed over a viable, stable foundation.

41 The site does offer some degree of basal containment owing to the presence of the underlying Berrydale Greensand, which is reported to be a massive, silty, glauconitic sandstone with a permeability in the order of 10^{-7} to 10^{-8}m/s, which is relatively low.

42 Based on the information available I consider that in terms of natural containment the proposed site is not ideal in terms of its underlying geology. However, it could likely be engineered to suit a landfill disposing of ***low risk materials*** with engineering of a landfill liner and leachate management system generally as proposed. However, as the landfill will be located over what overall is a moderately permeable underlying geology with short flow paths to groundwater and surface water receptors, natural containment cannot be relied upon to limit contaminant migration. Hence effective environmental risk management is dependent upon:

- **Ensuring effective control of the incoming waste stream** to ensure this remains aligned with design assumptions.
- **Ensuring a high standard of liner construction** (including foundation preparation).
- **Maintaining effective control of leachate generation and minimisation of leachate head** long term.
- **Effective on-site stormwater management** to minimise leachate generation.
- **Progressively capping the site** as cell areas are completed.
- **Putting in place effective monitoring and environmental management processes, including peer review of design and operation**.

4 Assessment of effects on the environment

4.1 General

43 To mitigate the risk of leachable contaminants in the leachate at the site that could derive from the contaminated soil component of the waste stream in particular, the applicant proposes that the landfill be engineered with a ***Class 1*** landfill liner system to provide an appropriate level of environmental containment.

44 Given that accepting waste with leachable chemical contaminant limits allowable at a Class 1 landfill is proposed, I consider that this is an appropriate approach for the reasons detailed below.

45 The site will not be a standard Class 3 landfill. It is proposed that the site will accept contaminated soils that meet Class 1 landfill leachability criteria. Hence the design incorporates additional levels of engineering and management controls to manage any increase in risk associated with the acceptance of a contaminated soil component in the waste stream.

46 As stated in the DTL guidelines, a Class 3 (Managed Fill) site accepts ***only*** **clean fill and controlled fill**. This may also include minor material with contaminant concentrations in excess of controlled fill limits i.e., minor organic or inorganic contamination. However, in general the material acceptable at a Class 3 site will not contain putrescible or reactive materials that when deposited may result in the generation of significant leachate or landfill gas. In this regard I note that at Class 3 sites the DTL guidelines envisage relatively small quantities of biochemically weak leachate and low levels of methane being generated because the waste stream is dominated by relatively inert materials.

47 As a consequence, under the DTL Guidelines a Class 3 Landfill is lower down the hierarchy of required environmental controls such as the standard of engineered liner and cap barriers because a Class 3 site usually accepts only waste materials of relatively low environmental risk. In this case the waste stream is stated to be "sorted" C+D waste and soils and that the waste stream is expected to be dominated by soil, concrete and rubble with minor timber and plastic. Hence the waste stream should contain only small amounts of gypsum waste (derived from plasterboard) and little organic material.

48 However, as I have noted above, there is a significant degree of uncertainty over the eventual makeup of the overall waste stream that would be accepted and hence the level of engineering risk.

49 In the following paragraphs I comment on various aspects of the landfill design based on the final design proposal being considered following the application and s92 information request process.

4.2 Landfill liner

50 The proposed landfill bottom liner design aligns with a standard Class 1 landfill liner composite design and comprises (from the top down):

- A separation geotextile *(this is to reduce contamination of the underlying drainage layer by preventing fines from migrating downwards from the overlying waste).*
- 300 mm drainage aggregate *(to collect and convey leachate to the leachate drainage system).*
- Cushion geotextile *(to reduce the risk of the overlying leachate drainage aggregate puncturing the geomembrane).*
- 1.5 mm HDPE geomembrane (smooth and textured on the floor and textured both sides on the internal landfill walls *(the primary leachate barrier).*
- 600 mm compacted cohesive soil with permeability (k) <1 x 10^{-9} m/s *(this supports and acts with the geomembrane to provide a "composite" barrier effect).*
- Grading fill.

51 A minimum liner slope of 2% and a maximum of 33% is specified, which is consistent with acceptable landfill design practice. There are small areas (approximately 650 m^2) where a steep wall lining system is proposed. This will steep wall side liner comprises (from the top [waste side] down):

- Selected soil wastes placed above the protection geotextile *(to reduce geomembrane puncture risk).*
- Cushion geotextile *(to reduce geomembrane puncture risk).*
- 1.5 mm HDPE geomembrane, single side textured *(the primary barrier).*

- Sprayed polyurea *(an engineered liner component designed to provide backup to the geomembrane).*
- Shotcrete *(to smooth the subgrade surface).*
- Prepared limestone rock surface with shotcrete infills as required.

52 A groundwater underdrainage system will be installed below the base liner, with several discharge locations, to limit potential groundwater levels that may develop after landfill construction. If required, this will enable flow from this underdrainage system to be monitored to confirm the effectiveness of the leachate management and extraction and the performance of the liner system over time.

4.3 Leachate collection

53 The site is located in an area with approximately 900 - 1,100 mm of annual rainfall. As the sidewall liner gradients are relatively steep, the risk of lateral leachate migration is low and in practice the main barrier component that needs to be considered is the floor liner. The sidewall liner represents a relatively minor seepage path, and the sidewall liner design provided, although unconventional, is likely to prove an effective barrier for leachate.

54 The base liner includes leachate collection and extraction. Leachate will be collected within a 300 mm thick leachate drainage blanket layer (gravel with 20 – 40 mm particle size range) and a perforated HDPE pipe system and drained by gravity to a leachate pond outside the landfill footprint. The leachate collection system will be designed such that the head of leachate on the lining system does not exceed 300 mm. Leachate will be removed from site by tanker trucks for disposal at a municipal wastewater treatment site. Tanker trucks will be loaded from a bunded hardstand area.

55 Stormwater management measures will be implemented to limit the lined catchment open to waste filling to 7,000 m^2 prior to establishing a full lift of waste across the floor of a landfill stage. This is aimed at minimising the volume of leachate to be managed and minimising the head on the liner.

56 The leachate pond will be lined with a double liner system with a leakage detection layer between the double liners. The pond has been sized based on predictions of leachate volumes determined from HELP modelling and assuming that the road is closed and preventing leachate removal for a 14 day period. A freeboard of 1.5 m between the nominal maximum operating level and the pond crest level is also proposed and noted that the valve at the landfill leachate outlet pipe can be closed in an emergency. The Landfill Design Report and proposed consent conditions also describe pumping from the leachate pond back into the waste (leachate recirculation) as a measure to balance seasonal leachate flows.

4.4 Landfill gas management

57 The applicant has assumed that the landfill, being Class 3, will not require a landfill gas collection system. I agree that the rate of landfill gas generation will likely be low. However, depending on moisture conditions in the waste and waste composition, minor landfill gas, including hydrogen sulphide, may be generated.

58 As discussed in the report of Mr Chilton (Air Quality) a s92 request was made regarding the presence of gypsum wallboard materials in the waste stream. The applicant's response confirmed that gypsum wallboard materials and biosolids will be prohibited in the waste stream.

59 Based on my experience at other similar sites, controlling moisture levels in the waste is also key to effective management of landfill gas at C+D and inert waste sites. Provided moisture levels in the waste mass remain reasonably low and the waste stream is appropriately controlled (i.e., organic waste and gypsum quantities are controlled), then landfill gas

generation (including hydrogen sulphide) is likely to represent a low risk. I note that the site could add landfill gas capture in the future should this prove necessary, and the final cap design could readily incorporate sub-cap landfill gas capture if required.

4.5 Final cap

60 The final capping system will comprise (from the top down):

- 150 mm thick topsoil layer *(with grass).*
- 500 mm thick subsoil layer *(the growth layer).*
- 600 mm thick low permeability layer ($k < 1 \times 10^{-9}$ m/s) *(a clay cap to manage long term rainfall infiltration).*

61 Given the relatively low annual rainfall at the site and the overall nature of the climate, the proposed cap design when combined with the predominantly soil-like nature of the accepted wastes, is likely to prove effective in managing long term infiltration and leachate generation rates can be expected to remain low over the long term.

4.6 Summary comments on the design

62 The consent design has been prepared to a good level of detail and is considered appropriate for the waste stream proposed to be accepted. Initial engineering comments were made on the original design and generally these have been addressed, or will be addressed in the final design, which I propose will then be peer reviewed. Provided the final design and landfill operation are subject to peer review design and operational changes can be made if considered necessary in the future. However, overall, I consider the design is appropriate in relation to the risk posed in managing the waste stream proposed to be accepted.

4.7 Engineering and environmental risk

63 As I have noted above, the site will be reliant on engineered systems to contain the waste, leachate and any minor landfill gas that may be generated. In relation to the risk of engineered systems failing and leachate entering groundwater or surface water, the following are the main risk factors:

- Defects in the liner and related liner leakage.
- Excessive leachate head.
- Long term liner degradation.
- Earthquake and seismic displacement resulting in liner rupture.
- Landfill fire risk or deep seated hotspots that result in damage to the liner system .

64 I will now address each of those risks from an engineering perspective.

4.8 Defects in the liner (poor construction)

65 This is a standard consideration when designing and developing a landfill. In this case the site overall is small and the individual cell areas are of limited area. This risk can be mitigated through good liner detailing and appropriate Manufacturing Quality Assurance (MQA) on the liner geomembrane in particular as well as good Construction Quality Assurance (CQA) as the geomembrane is deployed.

66 Most defects in geomembrane liners occur during installation or as a result of machinery damage when placing the leachate drainage blanket. Increasingly these types of defect risk are mitigated by using electrical leak detection surveys of the completed base liner and drainage blanket. This allows even very small defects to be detected and repaired prior to any waste being placed. Given the sensitivity of the receiving environment, this would be a prudent step in this case. This step is also particularly critical in and around the leachate sump.

67 If a leak detection survey is undertaken, then it can be expected that residual defects in the liner would meet industry best practice and number no more than a few minor defects (each perhaps 1 to 5 cm^2) per hectare of liner. As the total base liner area is less than 4 ha, the expectation is that the completed and tested liner should contain between 0 and 12 defects.

68 Overall liner advective leakage rates (direct flow through the liner) are controlled by defects, the location of the defect, the presence of wrinkles, ***and the leachate head present at the defect.*** If there is no leachate head at the defect, there can be no leakage. Similarly, if there are no geomembrane defects there can be no direct leakage even with wrinkles present.

69 However, it is recognised that in a typical landfill liner there is usually a combination of some defects and some wrinkles. The extent of wrinkles can be controlled during construction to a significant extent. However, some will remain and over the long term (typically at least hundreds of years), some degradation of liner integrity will occur in and around wrinkles owing to long term stress cracking. Over time this can lead to a reduction in overall barrier performance, but by that stage the landfill will be completed, stabilised and capped. Given the waste types proposed to be disposed of, the risk of long term liner degradation resulting in an environmental risk is low.

70 It is noteworthy that even as a liner degrades as a result of long term stress cracking, the liner has not "failed". Rather, it progressively becomes a less effective as an environmental barrier over a long period of time owing to localised cracking (particularly around wrinkles and folds), but in its overall effectiveness as a barrier declines only slowly and this is only of significance where leachate head is present in degraded liner locations.

4.9 Seismic rupture of the liner

71 The site is located in a geologically active area in an outcrop of limestone that is underlain by relatively soft siltstones. Hence the potential exists for fault movement near the site to induce rupture of the liner. However, this risk is low. A fault rupture is very unlikely to occur directly though the landfill footprint itself and it is more likely that movement would occur on one of the active faults in the area, the closest known of which is the Mt Lawry fault, some 1.6km to the south of the site. Fault movement could potentially result in significant shaking of the landfill area and in a worst case this could result in deformation or partial rupture of the liner. The landfill is small and in all likelihood the soil-like materials being disposed of would deform under seismic shaking and liner rupture would not occur. In a worst case, and depending on where liner damage occurred, any impacted area of liner could be exposed and repaired.

72 The 6.9 magnitude Loma Prieta earthquake that struck California in October 1989 occurred near a number of MSW (Class 1) landfills and resulted in significant shaking at several large landfill sites. Studies following the earthquake showed that liner damage was very limited with the waste mass at the sites typically deforming under the wave-energy shaking in the earthquake. In one case a tear occurred in an area of exposed liner, but this was readily able to be repaired.

73 Overall, I consider the risk of seismic shaking compromising the liner to the point where the containment system could not be managed will be very low.

4.10 Sidewall liner

74 A relatively small area of the sidewall liner is proposed to be lined with a steep liner system incorporating a sprayed polyurea component. This liner system is unconventional, and I am not aware of it having been approved for a Class 1 landfill design. Review of Drawing C204 of (Appendix H Design Drawings) indicates that the total area of steep sidewall is only a few percent of the total liner area. Drawing C302 indicates that the steep liner area is up to 7.5m high at benches and is sub-vertical. A slip layer is provided to control settlement stresses, and the base of the wall liner is drained at the floor and on the intermediate benches. Hence, I

conclude that while the design is unconventional and does not fully align with accepted Class 1 design practice, the design is acceptable for the following reasons:

- The sub-vertical liner areas will likely remain fully drained owing to the permeability contrast between the liner and the adjacent waste that is placed. This would remain the case even if the steep wall liner became locally compromised through settlement.
- There is sufficient leachate collection above and below the sidewall liner zones to manage leachate head to low levels.
- The design provides a double barrier system with a HDPE geomembrane overlying the sprayed-on polyurea liner: the likelihood of defects being present in both lining layers at the same location is low.

4.11 Leachate generation

75 In the design report (Appendix J of the application) WSP considers average leachate generation based on HELP[3] modelling is likely to be in the range 1 - 15 m^3/day for a modelled cell area of 7,000m^2 and with rainfall scaled up to the 90th percentile rainfall from the Fox Creek station (1238 mm/year).

76 The highest predicted leachate generation was approximately 50 m^3/d with the predicted annual total leachate generation averaging approximately 15 m^3/day.

77 ***I note that this is the amount of leachate that is predicted to form, not the amount that will leak through any defects in the liner***. This is because the bulk of the leachate that is formed is collected and removed via the leachate collection system. I note that for soil-like wastes that are graded to maximise stormwater runoff and diversion the HELP model is likely to over-estimate average annual leachate generation rates.

78 As a check, I have compared the forecast leachate generation with actual leachate generation rates currently being measured at Kate Valley, factored for rainfall, but assuming a similar overall climate. This assessment yields a similar estimate to the upper range predicted by WSP using the HELP model. However, at Kate Valley the waste has a higher organic and moisture content than would be the case at this site. I therefore consider the likely range of generation will be close to that assessed by WSP: that is, between 1 and 15m^3/d for the full footprint. If site stormwater diversion practices are effective during site operation the rate of leachate generation could likely be managed to the lower end of this range.

79 It is important to note that if a mid-range leachate generation rate of 7m^3/d is assumed and an average leachate drainage time across the liner of 1 day is also assumed (this is likely to be conservative), then this indicates that ***the average head on the geomembrane will be in the order of 0.1mm***. This is a minimal head noting that liner leakage assessment is based on a constant 300mm head being present on the liner. That is, the design leakage assessment that is provided in the application and that I discuss below will be very conservative.

4.12 Liner leakage rate

80 Liner leakage has been estimated by the Applicant using assumptions regarding the number of defects and wrinkles and an assumed constant 300mm leachate head. That is, the base liner is assumed to everywhere have full leachate head in the drainage blanket. Using this approach, the applicant has estimated a leachate leakage rate of between 176 and 287 L/ha/day which has been used in the effects assessment. This assumption is reasonable for wet landfills, including MSW (Class 1) sites which accept a significant proportion of wet and organic wastes and sludges. In this case the bulk of the disposed materials will be soil-like material and will

[3] Unites States EPA (Hydrologic Evaluation of Landfill Performance) [HELP] version 3.95D.

likely be placed well below field moisture capacity. Hence the assessment of the likely leakage rate is conservative.

81 At this site the main potential source of leachate will be stormwater from within the cell that can enter the waste and percolate into the waste mass. Leachate will only be generated at the base of the waste pile once field capacity is reached, or a direct seepage path is available through the waste. Provided stormwater is well managed and not allowed to saturate the waste mass and form leachate, then leachate heads on the liner in this case should be minimal (potentially close to zero). Therefore, I would expect that the design leakage rate assessment will be conservative. In practice for a well-constructed liner subject to electrical leak detection survey at this site I would expect actual leakage rates to be less than 5-10 L/ha/day.

82 In this regard I note that the Victorian Landfill BPEM sets a design performance objective for a Class 1 equivalent landfill of <10L/ha/d and for a Class 2 landfill (C&D landfill) of 1000L/ha/d. In this case, and as I have noted above, a well-constructed Class 1 landfill base liner design can be expected to have a *design* leakage rate in the order of 10L/ha/d. However, field data from actual landfills (usually Class 1 landfills accepting MSW) show that defects and elevated leachate heads often result in leakage rates being somewhat higher (30-50 L/ha/d is now accepted as being a reasonable average). However, these sites have often been constructed with no liner leak detection survey or wrinkle control and leachate head is often high. Hence comparison with these types of site is likely to overstate the leakage risk.

4.13 Liner durability and service life

83 As part of suite of evidence prepared in 2022 in relation to the Auckland Regional Landfill proposal, an independent review was undertaken by Professor Edward Kavazanjian Jr of Arizona State University. Prof. Kavazanjian is an internationally recognised expert in the field of landfill engineering and the seismic performance of landfills. As part of his review, he commented that incorporating a 1.5mm high density polyethylene ("HDPE") geomembrane for the base liner was appropriate (in that case for a Type 1 landfill) due to its high degree of resistance to chemical attack and its proven performance. Prof. Kavazanjian commented on the importance of the temperature regime in a landfill, as the actual temperature conditions are an important consideration in assessing the ***service life*** of a geomembrane. The service life is in effect, the period of time at which the liner can be considered likely to remain physically intact and effective as an environmental barrier. In this case the temperature at the level of the liner at the subject site is likely to be lower than at a Typical Type 1 site, which is a more favourable scenario.

84 Prof. Kavazanjian concluded in relation to the more severe design case at ARL that:

> ***"These recommendations should provide for a service life for the base liner i.e., a period over which the base liner system provides the intended very high level of waste containment, of at least 400 years, and potentially in excess of 750 years. In accordance with international best practice, service life is technically defined as the time period over which the mechanical properties of the geomembrane, and in particular its stress crack resistance, is at least 50% of the initial value. I note that this service life estimate assumes that the liner system is constructed in accordance with the design and construction quality control provisions in the report. "***

85 In summary, the conclusion was that an appropriately specified and well-constructed HDPE liner in a Type 1 landfill base liner application should have a service life of at least 400 years and possibly more than 750 years. This is in a Type 1 landfill situation, which would be expected to be more severe than at Whiterocks unless base liner temperatures there were

abnormally high and/or there were significant quantities of hydrocarbons/solvents present at the liner surface and that could impact on the integrity of the HDPE.

86 I also note that when a geomembrane reaches the end of its service life, this does not mean that it has failed. Rather, it means that it has degraded beyond a certain level of stress cracking resistance. That degradation will not occur everywhere, and its actual functioning as an "environmental barrier" will continue at a reduced level well beyond the point where the end of the service life is reached.

4.14 Service life of leachate collection system and groundwater drains

87 The proposed leachate collection system design is a conventional Type 1 landfill leachate drainage arrangement and hence the design is likely conservative in this case. It incorporates a separation geotextile above the leachate blanket so the drainage layer should perform well. However, actual performance is dependent on the nature of the waste stream over the long term as well as operational practice and in particular the control of stormwater and sediment. Tears in the separation geotextile can result in fines migrating down into the blanket or if stormwater is poorly managed. I also note that some C+D waste streams can cause chemical clogging of leachate drainage layers.

88 At a conventional Type 1 landfill the drainage layer is configured to ensure a working life that is at least as long as the period of landfill operation and the aftercare period. Normally that would be at least 50-100 years. However, there are examples of chemical clogging of leachate drainage layers occurring in relatively short timeframes (months to years). In some cases, these will likely have been C+D sites with high gypsum loadings. This reinforces the importance of effective waste stream controls.

89 In this case the design provides the ability to access and flush the system as is now best practice at Type 1 sites [see detail on Drawing C303 (7)]. The primary leachate drains have also been modestly increased in cross-sectional area along the main drainage lines to provide additional redundancy [see detail on Drawing C300 (E)].

4.15 Risk to groundwater

90 My expectation is that the likely overall leachate biochemical strength and contaminant levels at the site will be less on average than generated at a Class 2 C&D landfill and orders of magnitude below leachate contaminant levels at a typical Class 1 site. However, as I have noted, the site is "hybrid" design and does not align fully with the guidance for a Class 3 site. Hence a key factor in managing environmental risk is ***control of the actual waste stream being disposed of***. In this regard I have commented below on strengthening aspects of the proposed conditions of consent related to waste stream monitoring and control.

91 Noting my comments above in relation to liner MQA/CQA and the nature of the waste being disposed, my expectation is that if the site is well operated then in practice the average head on the liner should be minimal. The risk of a combination of elevated leachate heads and defects being present is relatively low. Even if a conservate leachate generation rate of 50 m^3/d/ha was assumed, this equates to only about a 1 mm average head on the liner, whereas the design leakage assumption assumes 300mm. In practice the average head on the liner is likely to be <<1 mm and the risk of significant leachate migration to groundwater through direct leakage would be minimal.

92 An issue that has been raised is the effect that leakage of leachate could have on the underlying limestone. This relates to the potential for "acidic" leachate to react with and dissolve the limestone. This risk is low, for two reasons. Firstly, as noted above the rate of leachate leakage will be low provided the landfill is well constructed and incorporates a liner leak detection survey as part of the construction. Secondly, the leachate that is generated is unlikely to be particularly acidic. Leachates at Class 1 landfill sites where there is the most data

available typically have a pH above 4.5 and usually close to neutral (pH 7). At this site, chemically the leachate will be relatively innocuous, and I would expect the leachate pH to be in the range 5 to 8 – close to neutral. A pH of above 7 is likely in the medium to long term (i.e., slightly alkaline). Even a conservatively assessed (slightly acidic) leachate pH of 4.5 is not sufficiently acidic to represent a significant dissolution risk even if there was significant leakage.

93 Recent research has shown that conventional Class 1 landfill barrier (liner) performance, particularly the performance of many geomembranes, is now being challenged by some of the persistent contaminants associated with the historical disposal of waste streams of industrial origin. Some of these chemicals may be present in contaminated soils and C&D wastes (e.g., heavy metals and the PFAS[4] group of chemicals). Liner systems are typically effective in attenuating metals and most ionic species provided leakage is controlled. PFAS poses a more significant challenge, and it is likely that some PFAS chemicals will be present in the sorted C&D waste given how ubiquitous it now is in general waste streams. However, the risk is diminished to some degree in this instance as PFAS chemicals are commonly associated with fire retardants and hence are present at greater concentrations in many landfill Class 1 (MSW) leachates as they derive from disposed materials such as carpet, textiles and automobile shredder floc (which contains car head-linings, seat materials etc that typically have high levels of leachable PFAS). It is unlikely that PFAS chemicals will degrade significantly even over a timescale of hundreds of years. These are the so-called “forever chemicals” and increasingly regulators are lowering the allowable levels of these chemicals in the environment.

94 I note that the application proposes total PFAS concentration limits and limits on waste types that could contain high PFAS levels. However, there is uncertainty in relation to PFAS risk that relates to both the waste stream and the effectiveness of engineered containment.

95 Recently published research by Professor Kerry Rowe (a recognised world authority on landfill barrier performance) has highlighted a concern that the design of some Class 1 (MSW) sites (and in other jurisdictions similar landfills or landfills designed to accept hazardous or industrial wastes), may not always adequately mitigate the risk to groundwater associated with the PFAS that is present in their leachates. This is because the allowable environmental concentrations of PFAS in groundwater are very low compared to many other chemicals, and in some jurisdictions where groundwater is used for water supply, regulators are now further reducing allowable PFAS levels in groundwater. A current conclusion is that PFAS levels in leachate correlate closely with Chemical Oxygen Demand (COD) which is largely determined by the chemically degradable component of materials the waste stream. In this case, the waste stream is unlikely to contain significant amounts of textile or other potential PFAS source wastes such as car shredder floc and hence the risk of significant PFAS concentrations being present in the leachate is low.

96 Hence while this concern is relevant, overall, I consider this is a relatively low risk in relation to this proposal for the following reasons:

- The proposed waste stream is unlikely to contain significant concentrations of PFAS or similar contaminants of concern: these chemicals can be monitored in the leachate and if required the regulator can tighten controls on the waste stream;
- COD levels in the leachate are expected to be relatively low due to the waste generally being inert and this can be monitored, along with PFAS concentrations;
- Provided surface water is well managed within the landfill area, the rate of leachate generation will be low and the head on the liner will be minimal;

[4] Per- and polyfluoroalkyl substances (PFAS): a group of chemicals that are used in firefighting foams, textile and carpet manufacture, and many consumer and industrial products owing to their anti-staining and fire-retarding properties. They are termed "forever chemicals" because they break down only very slowly.

- Assessed (design) leachate leakage rates to groundwater are based on assumptions including the quality of liner placement, the number of liner defects and the actual leachate head. In practice, and by the application of appropriate conditions which provide for peer review and electrical leak detection surveys, the site can be developed with a high quality liner that meets Class 1 requirements. Provided surface water is well managed to minimise infiltration into the waste mass and leachate drainage system is well constructed and is managed to ensure leachate levels remain low, the actual rate of migration to groundwater or surface water of both organic and inorganic contaminants should be very low – much lower than conservatively modelled in the design assessment;
- The staged nature of development provides the opportunity to augment leachate extraction with a second sump in Stage 2 should this be considered necessary by the peer reviewer or regulator;
- The groundwater underdrainage system can be monitored to confirm the effectiveness of leachate management and barrier performance over the long term and provision can be made for groundwater capture and treatment should this ever prove necessary; and
- Given the relatively low annual rainfall at the site and the overall nature of the climate, the proposed cap design when combined with the predominantly soil-like nature of the accepted wastes, is likely to prove effective in managing long term infiltration and leachate generation rates can be expected to remain low over the long term.

97 In recent presentations Professor Rowe has recommended that for a conventional landfill (i.e., a Class 1 MSW landfill site) to have low probability of an unacceptable long term impact related to PFAS migrating through a conventional landfill liner to groundwater ***then 3 or more of the following are necessary***:

1. An appropriate **electrical leak location survey** before and after the geomembrane is deployed and covered by the drainage blanket (*aimed at minimising the risk of defect-related leakage*), and/or;
2. **A high level of hydrogeologic protection and attenuation** (*good natural containment*), and/or:
3. **Excellent CQA** (*aimed at the best possible liner construction*), and/or;
4. **An extra level of engineering** in the form of a secondary leachate collection/leak detection and double composite liner system (*aimed at the ability to collect any liner leakage*).

98 The above all assumes that the waste stream has the potential to form leachate with PFAS at levels that are of concern. It also assumes conventional Class 1 landfill design, construction and operational practice. In this case the waste stream is assessed as being of much lower (but not zero) risk in relation to PFAS. Noting the cautionary guidance recently provided by Professor Rowe and because the site does not provide a high level of natural containment owing to the moderately permeable limestone subgrade geology, then the prudent approach would be:

- To require electrical leak detection as part of the CQA process.
- To routinely monitor the waste stream and leachate for PFAS and related chemical levels.
- To ensure through peer review that CQA is of an excellent standard.
- To ensure that the underdrainage system is configured to allow for monitoring and groundwater capture (if the latter were ever required).

99 Ultimately, if consents were granted, this issue would need to be addressed in the conditions of consent.

4.16 Leachate collection system

100 The leachate collection system proposed is conventional and is appropriately engineered for the liner system proposed. I note that the system currently is reliant on one leachate sump and that the system overall has long drainage paths. On Drawing C204 a second leachate sump is shown as "indicative" in Stage 2. I consider it would be prudent to include that leachate sump in the final design to reduce reliance on the long term performance of Sump 1, reduce drainage path length and add some redundancy to the system.

4.17 Landfill gas and odour

101 Provided surface water is well managed in the disposal area, the proposed landfill can be expected to generate a relatively small volume of biochemically weak leachate and little landfill gas (landfill gas is considered here to include hydrogen sulphide generation associated with C+D waste). However, because in this case a proportion of the waste stream will comprise contaminated soils with leachable contaminants at levels that are to be managed to within Class 1 landfill leachability criteria, this needs to be factored into the management of environmental risk.

4.18 Landfill fire risk

102 Fires at landfills can occur in a number of ways. Surface fires are the most common at Class 1 and Class 2 sites and can be caused by loads containing hot waste (such as ashes), chemical reactions and battery shorts. Arson (deliberately lit fires) are also a possibility, and this can be a site access and security matter. However, serious surface fires are not common and can usually be managed by conventional means. The risk of surface fire at this site should be lower than at a Class 1 or 2 site as the waste is either pre-sorted or will be dominated by soil-like materials.

103 The best available data related to landfill fire are described in *"Landfill Fires Their Magnitude, Characteristics and Mitigation"*, Federal Emergency Management Agency (FEMA), United States Fire Administration Natural Fire Data Centre, May 2002. This report, prepared by Tri Data Corporation, comprehensively documents fire risk and outcomes of landfills throughout the USA. The data drawn on do not differentiate specifically between controlled Municipal solid waste sites (landfills) and other controlled "riskier" types of site such as open dumps, C & D[5] sites and tyre dumps. Based on known ignition sources for recorded fires the following origins are identified:

- Arson 40%
- Smouldering waste ("hot" waste) 20%
- Spontaneous combustion 5%
- Other (including re-ignition, lighting, surface fire sources) 35%

104 Over the period 1990-1999 there were no more than 20 serious landfill fires in the USA, and most were at Class 1 landfills or tyre dumps. Of the known serious fires, very few were "catastrophic" to the point of causing site closure. I note that these fires occurred at Class 1 / 2 sites or tyre dumps and at the Whiterock site the risk is inherently lower owing to the generally less combustible waste stream that is proposed for disposal.

105 Another possibility is a deeper seated smoulder or fire, with the potential to impact on the liner system. Again, the proposed waste stream is likely to be lower in combustible material than a usual Class 2 C&D site, so the risk of internal combustion should also be lower. Daily operations monitoring should include monitoring for signs of landfill fire or internal "hotspots"

[5] C&D – Construction and Demolition waste sites.

and the Site Management Plan should address the mitigation of landfill fires or hotspots should these ever develop.

4.19 Stormwater management

106 "Dirty" stormwater will be diverted to two sediment retention ponds on site prior to discharge. Where possible clean stormwater will be kept separate from "dirty" water. Water contacting waste will be treated as leachate. The Drawings show a series of cap drains for controlling sheet runoff from capped areas.

107 In response to a s92 request for further information the applicant advised that temporary stormwater systems will be designed for a 5% AEP storm and permanent systems will be designed for a 1% AEP event. As addressed in the evidence of Mr Cochrane, appropriate guidance for the design of erosion and sediment controls is available in the MfE/WasteMINZ Technical Guidelines for Disposal to Land. I consider that adoption of this guidance is appropriate, and I comment on this in relation to the consent conditions.

4.20 Aftercare Period

108 It has been common practice in New Zealand to adopt a nominal 30 year aftercare period at both Type 1 and Type 2 landfills. This is generally considered open-ended, and the assigning of a nominal 30 year period has in some cases related to the maximum term of the consent that could be granted. The length of the aftercare period is not "finite" or able to be "predetermined". It is recognised that aftercare may need to continue for a longer period at sites where leachate and/or landfill gas production is ongoing or other environmental factors preclude the site becoming fully stabilised.

109 In this case the materials proposed to be disposed of are stated to be of low organic content and environmental risk. It is anticipated that the rates of leachate and landfill gas production will be low. Hence there is the expectation that a 30 year aftercare period should be sufficient. However, that cannot be assured or pre-determined and will need to be assessed as the landfill develops and nears closure. The actual nature of the waste that is disposed of at the site and how well the site is managed during its operation will determine how quickly the site stabilises and the length of the aftercare period required.

Ultimately it will be the regulator who determines when the formal (consented) aftercare period can cease and any residual discharges from the site can be safely released to the environment.

5 Consideration of submissions

110 A large number of submissions have been received in relation to the Application, most of which are in opposition. To focus my review, I have structured my comment in relation to the submissions by topic as there are common themes to the submissions, in line with the nature of a landfill consent application.

111 I have prioritised the technical aspects of the submission by Transwaste Canterbury Ltd (TCL) as it is the major landfill facility operator in the region. TCL has detailed knowledge of both the regional context of the proposed facility as well as a good understanding of landfill facility operation under the current regulatory environment. I then address the general technical issues raised by other submitters.

5.1 Submission of Transwaste Canterbury Limited

112 Transwaste Canterbury Limited (TCL) operates the Kate Valley Landfill that was established as a Class 1 facility to service the Canterbury Region. That site has now been in operation for approximately 20 years. Here I address only the technical aspects of TCL's submission.

113 TCL's submission states that if consents for the Whiterocks facility were granted, then the consent conditions should include a financial assurance (bond) to provide security to the consent authority (and hence the community) in the event of default by the consent holder. This is consistent with the consent conditions for Kate Valley and current practice for private sector landfill developments in New Zealand and elsewhere. I support the requirement for a financial bond and the consent conditions proposed by the Applicant provide for provision of a bond in general alignment with the requirements that apply at Kate Valley.

114 TCL has submitted that the consent duration should be 20 years (in line with the Application for 500,000m^3 of waste disposal over 20 years) to provide certainty to the local community. I have not commented on the submission in relation to the duration of consent as this is not part of my technical review scope.

115 The TCL submission states that a site selection process in accordance with prescribed selection processes should have been followed to protect the environment from potential adverse effects associated with the disposal of fill material or waste materials to land, and that in this regard the Application does not follow best practice process as outlined in the Technical Guidelines (i.e., the WasteMINZ Disposal to Land Guidelines, 2023). Providing a needs analysis or comment on the site selection process was not part of my review brief, but I have nevertheless provided some contextual comment on this matter at paras 34 - 42 of this report as I consider it is relevant to the overall technical assessment.

116 The TCL submission states that the design and construction of the facility should be site-specific and incorporate best (design) practice based on an assessment of actual and potential effects on the environment, and that this requires technical evaluation of (among other things) landfill gas management and odorous compounds. I consider these matters have been adequately addressed in the design package and a design has been developed that aligns with the risk profile of the waste that is proposed to be accepted at the site and the current technical guidance that applies. I have commented on these technical aspects in my report and suggested amendments to the proposed conditions where necessary to ensure this is the case.

117 TCL considers that appropriate Waste Acceptance Criteria (WAC) should be developed and should include a list of prohibited wastes in alignment with the proposed class of landfill. As I have noted in Section 4, control of the waste stream is key to managing risks to the environment at this site, should consents be granted and development proceed. The proposed consent conditions provide for the preparation of waste acceptance and exclusion criteria as part of a Site Management Plan (SMP) with the objective being to control the waste stream being accepted. in Section 6 I have commented on aspects of the conditions of consent relevant to this issue.

118 TCL considers that it should be a consent requirement appropriate Management Plans should be prepared and approved before commencement of the consent and not be used as a means in the future of 'amending' the activity as proposed, without a formal consent application. TCL in its submission outlines what the management plans should cover. I support the thrust of this submission point and have commented on this in Section 6 in relation to the peer review and oversight aspects of the proposed conditions of consent, as well as the ability to amend WAC without consent amendment being required.

119 TCL has submitted that ongoing monitoring should be carried out to determine baseline environmental conditions before development, and then to assess the effects on the environment during site development, operation, and aftercare. This aspect of the submission is addressed in the reports of other experts.

5.2 General submissions

120 There is a high degree of commonality on the landfill technical design and environmental protection aspects of submissions in opposition to the proposal. These cover many of the usual concerns raised in relation to the engineering of landfills and include:

- Site suitability and the degree of natural containment provided (with reference to the underlying limestone geology)
- Groundwater contamination risk
- Liner and barrier integrity, performance and durability including the risk of seismically induced deformation or rupture as well as (assessed) acidic leachate and limestone interaction
- Leachate generation, leachate chemistry and associated risk to groundwater
- Stormwater and sediment management
- Waste acceptance
- Landfill gas and odour
- General landfill management concerns such as fire, dust and traffic.

121 In the body of my report, I have addressed each of the technical submission issues that has been raised. I have not repeated this analysis here but rather I have focussed on the technical appropriateness of the application and where proposed conditions of consent may require amendment to ensure that all of the technical issues raised by submitters and that have potential to give rise to significant environmental effect are being adequately managed.

122 Other issues such as how effective control of the waste stream can be assured, and the reliability of the landfill operator have also been raised. As I note below some of these aspects of general concern can be managed by competent, independent peer review and the requirement for peer reviewer approval of amendments to any aspect of the design and operation of the facility, including to the waste acceptance criteria, with ultimate approval of any changes by the regulator. I consider that maintaining effective control of the overall waste stream make-up is a key risk control measure in this case.

123 As I have set out in my report, the general detailing of the facility and the nature of the C+D component of the waste stream proposed to be accepted and to form the bulk of the waste fill material are such that the facility should represent a relatively low engineering and environmental risk. Provided the facility is well constructed and well managed ***and provided there is tight control of the waste stream to align with the design context adopted***, the risk to the environment can likely be adequately managed.

6 Comments on conditions of consent

124 The applicant has proposed conditions for the consents applied for. It does not form part of my brief to assess the conditions in detail. In the event that consents are granted I recommend amending of some of the consent conditions (as proposed) as well as adding an additional condition to provide for peer review and change oversight. Adding such a condition is aimed at mitigating the technical concerns raised by submitters in relation to matters such as the landfill design and construction, and the day to day operational management and oversight of the site.

125 Of particular note for landfill design, proposed Conditions 53, 54 and 55 of CRC243705 require that the landfill be designed by a suitably qualified and experienced Chartered Professional Engineer and that the design be subject to an independent peer review by a reviewer approved by Canterbury Regional Council. I support these requirements. However, I consider that to provide assurance that ongoing engineering and waste stream controls have oversight and remain effective, that peer review should be an ongoing process, with the peer reviewer

to provide an annual review report to the regulator commenting on the landfill annual report independently verifying waste stream compliance, reviewing leachate and monitoring data and providing an assessment of landfill performance in relation to the consent requirements.

126 The proposed conditions require that the Consent Holder be responsible for a minimum post-closure aftercare period of ten years and that a separate Landfill Closure and Aftercare Plan must be provided within five years of the first deposition of waste in the landfill and an update the plan every five years thereafter. I would recommend that this condition be strengthened to align with a more likely aftercare period of 20-30 years, or until such time as discharges to the environment are deemed by the regulator to be minimal.

127 The risk associated with some contaminants, including emerging contaminants of concern such as the PFAS family of chemicals, can be effectively managed through setting appropriate waste acceptance criteria and providing effective on-site management and control of the accepted waste stream. This, when coupled with appropriate monitoring of actual leachate quantity and chemical composition over time through peer review oversight will be key to risk management in combination with the Class 1 landfill barrier design adopted. If necessary, adjustments could be made in the future.

128 In the event consents are granted, I recommend that the conditions related to setting waste stream controls and review processes receive particular attention. This is essential to ensure that the overall waste stream aligns with the intent that the facility operates and is assessed as being a Class 3 site, with limited quantities of contaminated soils within set concentration/TCLP limits. This is aimed at ensuring that the waste stream composition remains within the range envisaged if consents are granted and that this remains the case over the life of the facility as this is an essential risk control measure.

129 Consent CRC243705 proposed condition 46 states that “the cohesive soil material to (be) used for the liner must be tested to show that it meets the standard of low permeability…” This is ambiguous and could imply a laboratory test on a recompacted sample of soil. A more appropriate approach would be to undertake a test on a core-cutter sample from the in-situ liner material to capture actual construction compaction achieved. Normally this level of detail is not included in a consent condition but in a peer reviewed CQA plan. If this condition is to be included, it should be amended to make it clear that the test should be undertaken on a field compacted sample.

130 For Consent CRC243705 proposed condition 49 c, the word “approximately” should be deleted and replaced with “a minimum of”, the requirement being that the freeboard should be a minimum of 1.5 m, not approximately 1.5 m.

131 The applicant has proposed a condition (Consent CRC243700 Condition 32) to address the possibility of subgrade improvements being necessary. However, the condition is not specific about the remediation works to be undertaken which are described as including grouting, an unspecified depth of excavation and replacement with engineered fill or increasing the thickness of the soil liner above the features. Ultimately there needs to be approval by the peer reviewer and/or ECan of any proposed remediation works and that this condition should be modified to include a peer review/design review step and then ECan approval. Furthermore, geological inspections of trimmed base grade should form part of annual reporting requirements specified in proposed Conditions 52 and 92.

7 Conclusions and recommendations

132 In conclusion, having reviewed the application, the precursor review and associated s92 requests, the response to the s92 requests, the Landfill Design Report and supporting documentation listed above and the proposed consent conditions and subject to the comment and recommendations on consent conditions as set out in this report, I consider that the engineering design presented for the proposed Whitrock Landfill meets or exceeds

current accepted landfill design standards for a Class 3 facility. Aspects of the engineering design align with Type 1 landfill requirements which potentially enables a limited range of wastes not normally allowable for disposal at a Class 3 site to be accepted without significantly increasing environmental risk. However, this broadening of the waste range requires close control to ensure that the overall waste stream remains predominantly Class 3 landfill waste material.

133 The above conclusion is predicated on two key stipulations which should be reflected in the final consent conditions, should consents be granted, as follows:

1. The design being appropriately detailed and the landfill constructed and managed to a high standard. This should involve continuous peer review oversight of the design, development and ongoing management of the site by a person competent in that role.
2. The waste stream must be subject to effective controls and associated monitoring to ensure that the physical and chemical properties of the wastes disposed align with the intent that the waste materials disposed of at the site are predominantly of low risk (Class 3) and hence that the overall (mixed) waste stream properties do not compromise the long term integrity of the containment system as proposed and hence represent a greater environmental risk than assessed. This will require continuous peer review oversight backed by an effective waste stream monitoring and testing programme that should also be subject to regular peer review.

Report prepared by:

Anthony Kortegast

Senior Environmental Engineering Consultant and Technical Director

Tonkin & Taylor Ltd

07 March 2025

Appendix 7: Tonkin + Taylor, Stormwater Management s42A report, prepared by Peter Cochrane

Before the Independent Hearing Panel appointed by the Canterbury Regional Council

IN THE MATTER OF The Resource Management Act 1991

AND

IN THE MATTER OF Application CRC 243699 to 243706

Section 42A Officer's report

Report of: Peter Cochrane (Tonkin & Taylor Ltd)

1 Introduction

1.1 Background

1 Protranz International Limited (Protranz) proposes to operate a limestone quarry and processing plant, and to establish a Class 3 Managed Fill (landfill) that will also accept contaminated soils that will meet the Class 1 landfill leaching criteria, at the existing Whiterock Quarry in Loburn, North Canterbury. Protranz has applied to Canterbury Regional Council (ECan) for a range of resource consents required for the establishment and operation of the proposed landfill.

2 Tonkin & Taylor Ltd (T+T) has been engaged by ECan to undertake a technical review of the stormwater management report lodged by Protranz in support of its resource consent applications.

3 This purpose of this Technical Report is to set out the findings of our Technical Review of Protranz's stormwater management to support a Section 42a report and inform a decision by ECan on the resource consent applications.

4 The following documents submitted by the Applicant have been considered as part of this technical review:

- **Appendix C – Stormwater Management Report:** Prepared by WSP, Revision 1, dated 26 March 2024 (referred to as the Stormwater Management Report).
- **Appendix F – Groundwater and Surface Water Effects Assessment:** Prepared by WSP, Revision 0, dated 15 May 2024 (referred to as the GW & SW Effects Assessment).
- **Appendix G – Ecological Impact Assessment:** Prepared by WSP, Revision 0, dated 12 February 2024 (referred to as the Ecological Impact Assessment).
- **Appendix H – Design Drawing Set (Rev1):** Prepared by WSP, Revision 0, dated 18 March 2024. Updated to Revision 1, dated 6 August 2024 (referred to as the Drawings).
- **Appendix J – Landfill Design Report:** Prepared by WSP, Revision 0, dated 25 March 2024 (referred to as the Landfill Design Report).

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- **Appendix L – Site Management Plan:** Prepared by Protranz, DRAFT Revision A, dated 27 March 2024. Updated to DRAFT Revision B, dated 23 August 2024 (referred to as the Site Management Plan).
- **Appendix M – Monitoring Programme & TARP (Draft Rev B):** Prepared by WSP, dated March 2024. Updated to Revision B, dated August 2024.
- **Appendix X – Objectives and Policies Assessment:** Prepared by WSP, Revision 0, dated 27 March 2024.
- **Appendix Y – Proposed Conditions (Rev1):** Prepared by WSP, Revision 0, dated 27 March 2024. Updated to Revision 1, dated 23 August 2024 (referred to as the Proposed Conditions).
- **Section 7 – Surface Water Quality: Response to ECan RFI:** Letter prepared by WSP, dated 16 August 2024.
- **Section 8 – Stormwater Management: Response to ECan RFI:** Letter prepared by WSP, dated 16 August 2024.
- **Whiterock Landfill Post Lodgement Response to ECan RFI Section 1** – LAND dated 16 August 2024.
- **Whiterock Landfill Post Lodgement Response to ECan RFI Section 8** – SWM dated 16 August 2024

5 This technical review has been undertaken by Peter Cochrane, Principal Consultant at T+T. Peter has reviewed the aspects of the application relating to stormwater management. This report has been prepared in accordance with T+T's contract with ECan, dated 23 September 2024.

1.2 Code of Conduct and Conflict of Interest declaration

6 While not required for a Council hearing for a resource consent application, I have read the Environment Court's Code of Conduct for Expert Witnesses contained in the Court's Practice Note of 2023. I agree to comply with that code when giving evidence to the Hearing Panel in this matter. All my evidence is within my expertise and I have considered and stated all material facts known to me which might alter or qualify the opinions I express.

7 I confirm that the issues addressed in this brief of evidence are within my area of expertise, except where I state I am relying on what I have been told by another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

8 I have no commercial relationship with the applicant, other than in my role as an expert in relation to this application.

1.3 Qualifications

9 I have Masters' degree in earth sciences, with over 30 years' experience in water management, including the management of stormwater from landfills. I have undertaken technical reviews of class 1 landfill consent applications for Smooth Hill for Otago Regional Council and Puke Coal for Waikato Regional Council. From 2015 to 2022 I led Christchurch City Council's closed landfill monitoring and management contract. Prior to 2015 I had led the consenting, design of monitoring and remedial works for Hamilton City Council's closed landfills. I have assisted the Department of Conservation with options to manage erosion of the Ocean Beach landfill and inundation and erosion of the Little Tahiti closed landfill. I also have experience in the operation of managed fills including sludge and solid waste landfill for Carter Holt Harvey at Kinleith, Envirofert, and IH Weddings in northern Waikato. I have

appeared as an expert in Council Hearings, the Environment Court, District and High Court on landfill related matters.

2 Description of the proposal

10 The proposed Whiterock Landfill will discharge stormwater to land and surface water from the proposed ongoing quarrying site activities and from the construction and operation of a Class 3 landfill that will also accept contaminated soils that will meet the Class 1 landfill leaching criteria.

2.1 Quarrying and processing of limestone

11 The site will continue to quarry and process limestone, including the production of burnt lime (CaO) via a coal fired lime kiln. The storage, processing and handling of these materials has the potential to influence the quality of stormwater.

12 The site previously handled and stored urea (a potential source of nitrogen in stormwater). The Applicant has confirmed that this operation has ceased. However, in my experience the quality of stormwater from unpaved surfaces where urea has been handled will be influenced by this activity even after the activity has ceased. Stormwater quality from the quarry processing area may reflect this past activity and have elevated nitrogen concentrations.

13 Parts of the site's quarry processing area on the true left bank of the Karetu River are subject to flooding with inundation from the River. The Stormwater Management Report discusses the repair of a bund on the left-hand side of the River to prevent inundation, however there are no details on what these repairs would entail, or its proposed level of service. The potential adverse effects on flooding from the repair of the bund are not addressed.

14 Flooding is also modelled in the vicinity of the proposed bridge and its approaches. However, the modelling presented in the Stormwater Report is insufficient to assess whether access to the site would be restricted during periods of flooding either over the bridge site, or its approaches or off-site at other points along Quarry Road.

15 We understand that the discharge of stormwater from the limestone quarry and processing site, includes:

- Directly from roof surfaces to the Karetu River.
- From the limestone processing and storage to two existing decanting earth bunds and then to two discharge points to the Karetu River.
- The discharge of stormwater from the access road and proposed bridge deck to the Karetu River.
- The discharge of stormwater from a haul road table drain to an existing grass lined channel, prior to its discharge to the Karetu River.

16 These activities will result in stormwater containing sediment, metals from roof runoff and other exposed metal surfaces, potentially having high pH from lime production, and possibly elevated nitrogen from the previous storage of urea. Because the proposed treatment devices (decanting earth bunds) will contain stored stormwater, there is the potential for the water stored in these devices to warm-up during dry weather. This could lead to initial discharges having elevated temperatures and low dissolved oxygen levels when they initially discharge to the Karetu River, when they begin to discharge following rainfall.

2.2 Landfill construction and operation

17 Stormwater will also discharge from the landfill site during its construction and its operation. In summary, the applicant proposes to discharge stormwater to land and surface water from the proposed landfill including:

- From a temporary sediment retention pond for the Stage 1 earthworks phase of landfill construction to the Karetu River.
- From a sediment retention pond to the Eastern Boundary Watercourse.
- From a sediment retention pond to the Karetu River.
- From a clean stormwater diversion to the Eastern Boundary Watercourse
- From a clean stormwater diversion to land north of the overburden site.
- From the access road and proposed bridge deck to the Karetu River.
- From a haul road table drain to an existing grass lined channel, prior to its discharge to the Karetu River.

18 The Applicant proposes to manage stormwater during construction of the landfill through the implementation of standard erosion and sediment control measures.

19 Once the landfill is operational, the Applicant proposes to manage stormwater that contacts waste as leachate and divert that to its leachate management system.

20 Wash water from a proposed truck wash will discharge to the site's proposed leachate system.

21 These activities will result in stormwater containing sediment and potentially elevated temperature being discharged to land and surface water. However, there is a risk that stormwater becomes contaminated from landfill waste coming on to and being disposed of at site, which has the potential to introduce other contaminants[1].

22 I recognise that there will be other diversions and potential discharge points required to manage stormwater during earthworks to construct and develop the landfill over the proposed term of the consent. These will be managed via an erosion and sediment control plan that will be updated and implemented to reflect these changes, which is standard practice in my experience.

23 Apart from references to the WasteMINZ Guidelines' principles for stormwater management, there is little information provided in the Design Report, Drawings or Site Management Plan, other than drawings showing the layout of key stormwater treatment and conveyance features. However, the layout in my opinion seems reasonable, providing sufficient area on site for the construction of ponds, diversion drains that would meet the design parameters set out in WasteMINZ Guidelines and included for reference.

2.3 Stormwater treatment

24 The Applicant proposes the management of stormwater through the implementation of a range of measures as set out in ECan's toolbox for erosion and sediment control. These measures have primarily been developed for earthwork construction sites to manage sediment discharges and are normally temporary to short term in nature.

25 In response to a request for further information about the applicability of these measures for an ongoing processing and landfilling operation, the Applicant accepted that some elements of the design would require the use of more robust materials and construction techniques. This is a reasonable response and means that some elements of the stormwater system will require specific design.

26 The Applicant has recognised that stormwater may require additional treatment (with coagulants and flocculants for instance) to meet its proposed discharge standards for sediment. This is to be managed via the development and implementation of a water treatment management plan. The Applicant has proposed consent conditions that, in the

[1] This risk is usually managed through careful diversion of stormwater to avoid contamination, good site management practices in and around the landfill, careful monitoring of stormwater quality prior discharge, and the ability to divert or store contaminated stormwater on-site.

event that stormwater treatment is needed to manage sediment, will require it to prepare a plan and provide that to the Council for its acceptance.

3 Assessment of effects of stormwater discharges on surface water

3.1 Approach to assessment

27 There is little information in the way of specific effects assessment in the application. Rather, the Applicant is relying on standard stormwater control methods for managing sediment discharges from earthworks, and controls on the generation of zinc.

3.2 Suspended sediment

28 In Section 4.3.2 of the Stormwater Management Report, the Applicant proposes to comply with suspended sediment conditions that are in the Land and Water Regional Plan Rules (LWRP) that authorise the discharges of stormwater as permitted activities. The Stormwater Management Report states:

The LWRP has separate permitted activity (PA) rules for construction-phase stormwater and stormwater (operation) discharges. It is understood that some conditions on both rules cannot be met, and a discharge permit is required. These PA rules do have the same limits and standards that apply to TSS and visual clarity. Both PA rules requires the concentration of TSS in the discharge from the quarry/landfill sediment discharges from ponds to not exceed 100 g/m^3 except when the background total suspended solids in the Karetu River is greater than 100 g/m^3 in which case the Schedule 5 visual clarity standards in the LWRP would apply.

29 The Stormwater Report does not specify which permitted activity rules it refers to. However, Table 8 of the Assessment of Effects Report references Rules 5.94B and 5.97 (which in turn references Rule 5.95) of the RLWP.

30 Rule 5.94B and 5.95 have the same conditions that:

- Restrict the maximum allowable discharge to 1% of its 5-year flood flow, and
- Requires compliance with Schedule 5, and
- Restricts discharges to less than 100 g/m^3 of total suspended sediment unless concentrations in the receiving water are greater, in this case the visual clarity requirements in Schedule 5 take effect.

31 While the Applicant has commented that stormwater may not meet the relevant PA requirements for suspended sediment, the rules themselves deal with a wider range of effects that are not clearly addressed in the Application or supporting documentation. It is possible that reliance on total suspended sediment by itself may not achieve the water quality outcomes set out in Schedule 5.

3.2.1 Chemical treatment

32 The Applicant has proposed the use of coagulants and flocculants to manage sediment in stormwater and has proposed Conditions 19 of CRC 243704 and 36 of CRC 243705 to enable the use of treatment chemicals if required.

33 There are a range of chemicals that can be used to reduce sediment concentrations in water, and in most cases their appropriate use has little impact on water quality. However, under some situations the use of aluminium (in the form of poly-aluminium chloride for instance) could result in elevated concentrations of dissolved aluminium, that are above receiving water guidelines for the protection of freshwater.

34 Should the use of coagulants and flocculants containing Al be proposed, it should also include monitoring of dissolved aluminium in the treated stormwater, and a condition to ensure the concentrations of dissolved aluminium do not adversely affect water quality.

3.3 Metals

35 The Applicant identified zinc from building materials as a potential contaminant and proposed painting of unpainted galvanised steel surfaces and the use of building cladding materials that do not leach metals, to reduce zinc loads in stormwater. This proposal is included as a consent condition.

3.4 LWRP water quality objectives

36 The Land and Water Regional Plan (LWRP) sets out relevant standards for surface water quality for Hill-fed Lower water bodies, such as the Karetu River and Eastern Boundary Watercourse. These standards include temperature, pH, changes in visual clarity and colour, dissolved nitrogen and phosphorus concentrations and toxicant concentrations[2].

37 Of these parameters, the Applicant has assessed effects on suspended solids and zinc (as a toxic contaminant). Effects associated with changes in temperature, pH, nitrogen, and toxicants other than zinc have not been assessed.

3.4.1 Temperature and dissolved oxygen

38 The decanting earth bunds, and sediment retention ponds proposed by the Applicant have the potential to heat-up stored stormwater and /or become depleted in dissolved oxygen (DO) during dry periods, and discharge relatively warm water with low DO levels in response to a rainfall event.

39 There are no controls that I can see in the application or the Applicant's response to a s92 request for further information that provides certainty that these potential adverse effects can be avoided, or the relevant LWRP standard for a change in temperature can be met.

40 While there are no controls for DO for stormwater in the LWRP, the discharge of stormwater would need to ensure that DO levels do not fall below 7.5 mg/L in the Karetu River or Eastern Watercourse beyond the proposed reasonable mixing zone[3].

3.4.2 pH

41 There is the potential for high pH levels in runoff from the quarry processing area as a result of the production and storage of lime (CaO). This material has the potential to result in very high pH (pH of 12.5) when discharged to surface water. Discharges of a high pH can impact on the metabolism of fish, or result in damage to gills, eyes or increase the toxicity of other contaminants (ammonia in particular).

3.4.3 Nitrogen

42 Even with the removal of urea storage, it is likely that stormwater runoff would still have elevated nitrogen levels in stormwater and these levels could still warrant monitoring. Long - term monitoring may not be required but should be sufficient to demonstrate that the residual effects of urea storage and handling on stormwater quality have sufficiently diminished that surface water quality will be protected.

[2] Refer to Appendix B for a copy of Table S5A

[3] This is the one-day minimum for the B Attribute band set out in the National Policy Statement on Freshwater Management 2020. DO concentrations below this level may result in short term minor impacts on sensitive organisms.

3.5 Summary

43 It would be useful for the Applicant to provide an explanation on how stormwater is to be managed to enable to the Hearings Committee to satisfy themselves that should they grant the consent, that all of the relevant surface water quality objectives set out in the LWRP would be able to be met.

3.6 Reasonable mixing

44 The Applicant has recognised that downstream of stormwater discharge points there will a reach of the watercourse where the discharge will mix with and be diluted by existing surface water flows. It is possible that in this area of mixing, surface water quality may not be able to meet relevant receiving water standards, including those set out in Schedule 5 of the Land and Water Regional Plan.

45 In section 4.3.2 of the Stormwater Management Report the Applicant assessed a zone of reasonable mixing of 21.3 m for the Karetu River but in its proposed consent condition, sought a zone of reasonable mixing of 40 m for the Karetu River and the Eastern Boundary Watercourse.

46 This inconsistency for the Karetu River needs to be resolved by the Applicant prior to the hearing of this application by the Hearings Panel, and determination of a zone of reasonable mixing of 40 m for the Eastern Boundary Watercourse should be justified by the Applicant.

3.7 Flooding

47 Flooding is modelled to affect the lower quarry processing part of the site under extreme conditions (greater than a 50-year return period accounting for climate induced changes in rainfall depth and intensity). Flooding may impact a storage shed and potentially impinge on the crusher and processing building in the quarry processing area, and while there is no information on flood depth or velocity that help inform the significance of this inundation[4], the potential effects of flooding could be managed through pro-active site management measures, such as moving stored materials to higher ground and/or through the repair or re-construction of the site's current bund.

48 The flood modelling appears to indicate that the proposed right-hand abutment of the bridge and access road approach to the bridge would be inundated in a 50-year return period event. However, the modelling presented does not show the full extent of flooding of this part of the site or immediately off-site, so the effect of flooding on access to the site is uncertain. It would be helpful for the Applicant to provide further detail on this, and any conditions proposed to ensure reasonable access to the site is maintained during periods of flooding.

49 The consent conditions propose a minimum bridge deck level above a 5% annual recurrence interval (or 20-year return period), which appears low in comparison to standards for other bridges. The minimum level proposed does not extend to include approaches to bridge to enable safe access and egress.

50 As discussed previously, the Stormwater Report comments on the repair of the bund to prevent inundation, however there are no details on what these repairs would entail, or its proposed level of service. The potential adverse effects on flooding from the repair of the bund are not addressed.

51 All of these matters would need to be addressed to provide certainty to the Hearings Panel that potential adverse effects from flooding can be adequately managed.

52 It is unlikely that fluvial flooding would be a concern for the landfill itself, including stormwater and leachate ponds, as this part of the site is relatively elevated, but if it remains a

[4] Other than the delineation by Waimakariri District Council of a high flood hazard zone for a 200-year return period event.

concern for the Hearings Panel this concern could be addressed by consent conditions that set minimum levels for construction of this infrastructure to ensure that any vulnerable elements are above modelled inundation levels.

4 Monitoring plan

53 The monitoring plan has proposed trigger levels for pH, temperature and electrical conductivity for stormwater. These are relevant parameters to measure for stormwater from a landfill, quarry and processing activity[5]. However, there are a range of other parameters as discussed in Section 3 that are not proposed to be monitored. It would be helpful for the Applicant to set out their reasons why they are not monitoring these parameters.

54 Monitoring of stormwater in the Monitoring Plan refers only to *Sediment Retention Ponds*. However, there are stormwater discharges from decanting earth bunds and building roofs as shown in the Stormwater Management Layout Drawings (C206 & C207), and these should be included in the monitoring plan for completeness.

55 The Monitoring Plan is unclear on the frequency of stormwater monitoring that is being proposed.

56 For the class of landfill proposed by the Applicant (Class 1 landfills of medium to large scale and Class 3 landfills), the WasteMINZ guidelines recommends continuous monitoring of stormwater ponds prior to discharge (a copy of the relevant section of the WasteMINZ guidelines is provided in Appendix B). This is to ensure that the quality of stormwater is acceptable before it is discharged.

57 It would be useful for the Applicant to clarify whether it intends to undertake continuous monitoring of stormwater quality to bring it into line with the guidelines and increase the scope of monitoring to include other stormwater discharge points, and other contaminants.

58 Finally, the monitoring plan's list of actions in the event that a trigger level is exceeded does not appear to include an action to cease the discharge stormwater if it is occurring. This is discussed in more detail in Section 5.

5 Proposed consent conditions

59 I have reviewed draft consent conditions proposed by the Applicant particularly for:

- CRC 243704 which authorises the discharge of construction phase stormwater for a term of 10 or 15 years (the proposed consent conditions mention both terms).
- CRC 243705 to authorise the discharge of stormwater from the operation of a limestone quarrying and processing activity and landfill to land and surface water for a term of 35 years.

60 CRC 243704 suggests that all construction activities would be completed within 10 or 15 years (the term of the consent). This should be confirmed by the Applicant, as it suggests that there would be no earthworks, or other construction activities from year 10-15 until the expiry of the consent term for CRC 243705.

61 Condition 4 of CRC 243704 proposes a maximum total suspended solids concentration of 100 g/m^3 for stormwater, except in situations where the total suspended solids concentrations in receiving waters are above 100 g/m^3. As outlined previously, this condition may not achieve the water quality standards set out in Schedule 5 of the Land and Water Regional Plan for the Karetu River and Eastern Boundary Watercourse.

62 Condition 11 of consent CRC 243704 requires the design of all erosion and sediment control measures to be prepared by a suitably qualified and experienced practitioner (SQEP) with

[5] Electrical conductivity to check for potential contamination of leachate, pH for site operations including lime production, and temperature to make sure that initial stormwater pond discharges do not thermally impact surface water quality.

experience in erosion and sediment control, rather than landfill design and operation. Should the Hearing Panel be of the view to grant consent, I recommend additional wording to that condition to require experience with erosion and sediment control *and landfill design*.

63 Consent CRC 243705 sets out limits for discharges of stormwater over the full term of the consent (35 years).

64 Condition 5 of CRC 243705 prohibits the discharge of stormwater from building materials that contain copper and *painted* (my emphasis) galvanised sheet material. This condition is presumably to minimise the discharge of copper and zinc from the site. However, the proposed control on painted galvanised sheet leaves it open to the potential for unpainted galvanised materials (which will produce more zinc than a similar painted sheet product) to be used. I suspect that this is a typographical error, and suggest the Applicant clarify their reasoning for this condition or amend their draft proposed condition accordingly.

65 Conditions 7 & 8 of CRC 243705 refer to construction phase stormwater. This consent as I understand addresses discharges to surface water over the life of the landfill and for a requested term of 35 years. In this context, the term *construction phase* may be interpreted to apply only to excavation and earthworks for the construction of the landfill or any new stage, rather than the management of ongoing discharges during its operation as a landfill. I consider that it is more accurate for Conditions 7 and 8 to refer to *stormwater* rather than *construction phase stormwater*. Again, it would be useful for the Applicant to confirm this is the intent of the consent or otherwise clarify their reasoning to restrict these conditions only to the construction phase of the landfill.

66 Condition 8 of CRC 243705 proposes a maximum total suspended solids concentration in stormwater of 100 g/m^3, except in situations where the total suspended solids concentrations in receiving waters are above 100 g/m^3. I have discussed the Applicant's reasoning for taking this approach earlier in Section 3.2 and consider that compliance with this condition may result in some of the water quality outcomes sought for the Karetu Stream and Eastern Boundary Watercourse as set out in Schedule 5 to the LWRP not being met.

67 If the discharge of suspended sediment is greater than 100 g/m^3, then the Monitoring Plan proposes the following actions: *If safe and practicable, measure exceedance parameters at a location in the receiving waterway upstream of the discharge point. If TSS in waterway < than SRP value, check water clarity and colour downstream of discharge and compare to resource consent limits.* There is no corresponding consent limit proposed for changes in water colour.

68 Furthermore, none of the responses to trigger levels seek to stop the discharge of stormwater while further investigations or remedial works are carried out.

69 Conditions 37 to 39 of CRC 243705 set out design standards for stormwater channels, including requirements to design these systems to take account of climate change. Condition 38 refers to the WasteMINZ Technical Guidance for Disposal to Land (2023)[6]. The relevant section of this Guideline (pages 49 and 50) is provided in Appendix A to this report. The performance standards set out in the WasteMINZ Technical Guidelines are applicable for managing stormwater from the operational phase of the landfill and should be used in preference to those set out in ECan's Toolbox for erosion and sediment control.

70 Conditions 37 to 39 appear only to apply to the management of stormwater from *final capped* (Condition 7) or *completed landfill surfaces (Condition 8).* The wording of these conditions gives rise to a potential gap between this consent, which appears to address completed landfill surfaces and CRC 243704 which appears to be related only to the construction of the landfill. In other words, the consent conditions as I read them are potentially silent on the management of stormwater discharges from the landfill during its operation.

[6] These guidelines are also cited in response to a request for further information on landfill design (WSP ref LAND004B – page 5 Whiterock Landfill Post Lodgement Response to ECan RFI Section 1 – LAND 16 August 2024

71 The Applicant should clarify the scope and coverage of consent CRC243705. In the meantime, I have assumed that consent CRC 243705 relates to the operation of the landfill over its design life, including the management of stormwater in and around the active landfill face, clean water diversions, access roads etc, and including parts of the landfill that have intermediate cover on them, or are finally capped.

72 Condition 54 of CRC 243705 (and repeated elsewhere in other consents) proposes an independent peer review of the haul road and final capped landfill surface. This condition appears to exclude the opportunity for independent peer review of other elements of the stormwater design including other drainage channels and stormwater treatment ponds.

6 Submissions

73 I have reviewed the submissions database provided by ECan that summarises the submission topics and have read a number of submissions in full where they relate to my assessment and raise specific issues that require a response.

74 I have also read late/missing submissions provided by ECan in February 2025.

75 The main topics raised through submissions were uncertainty of what is proposed, effects on surface water quality, and flooding. I believe most of these matters are addressed in my assessment.

76 Ngāī Tūāhuriri has submitted its concerns related to stormwater management including:

- Sampling during stormwater events (rather than dry weather).
- Current quarry processing area management and improvements to site activities (in addition to painting roofs, stopping of urea storage).
- Support for a fuller assessment of activities in Site Management Plan.
- Lack of clarity in Stormwater Management Plan.

77 The scope of stormwater management activities in the Site Management Plan are of a general nature but cover the main types of hygiene activities that I would expect for a site of this type. However, my experience is that managing the quality of stormwater runoff from unsealed quarry processing site is difficult to achieve without a very high level of intervention including structural measures such as sealing or covering key contaminant generating areas (lime storage, coal and ash storage), and at present there is no monitoring of stormwater that is proposed that would demonstrate that these management activities would be sufficient. This is an aspect of the Stormwater Management Plan that requires further explanation from the Applicant.

78 Whiterock Community Inc raised its concerns that there is insufficient design of the stormwater system for the Hearings Panel to understand the proposal, and construction of the bund on the western boundary of the site. In general, the level of documentation provided on the engineering design presented is consistent with other resource consent applications that I have reviewed. Should consent be granted, I would expect that a detailed stormwater design would be prepared, and that normal practice would be for the design to be independently peer reviewed. I would expect consent conditions that would require the submission of a detailed design for independent peer review, prior to being accepted by the Consent Authority. In most respects this application achieves this, however, the extent of peer review for the stormwater elements of the landfill design appears to be restricted to the design of haul road and final capped surfaces. Should the Hearings Panel be of a mind to grant consent, I would recommend that peer review includes all elements of the stormwater design related to the landfill.

79 There is very little detail in the application on proposals for the bund on the western boundary of the limestone processing area. In my experience an application of this nature would normally include design parameters to outline its proposed level of protection and an

assessment of the potential effect of construction of the bund on flood levels (as its construction will reduce the floodplain extent in extreme events).

80 Mr Lucas Hodgson cited heavy rainfall or flooding, resulting in contamination of stormwater. As stated previously it is unlikely that fluvial flooding (from the Karetu River) will affect stormwater infrastructure draining the landfill. The design and operation of the stormwater system in accordance the WasteMINZ guidelines will be able to manage extreme rainfall events on the site landfill itself, and should the Hearings Panel wish, specific minimum levels for all landfill stormwater infrastructure could be included in consent conditions.

81 Several other submitters including Rachel Paulette Woodcock, Andrea Martin, Ruby Annabel Gill-Clifford raise their concerns about the contamination of stormwater running over landfill materials and into River. It is standard practice to design systems to divert clean water around any active landfill area. Where there is the potential for stormwater to come into contact with waste, it is then regarded as leachate, which in this case will need to be disposed off-site as leachate. These objectives are covered in Section 3.3 of the Stormwater Report and addressed in my recommendation for Hearings Panel to consider conditions that include specific performance standards on the capacity of the stormwater management system, an improved level of testing of stormwater to that set out in the Monitoring Plan, and more certainty in the Monitoring Plan on actions to divert or halt the discharge of stormwater in the event of contamination.

7 Conclusions

82 The proposed approach taken to managing stormwater is reasonable for a site of this nature, and if implemented and maintained diligently in accordance with the Application and supporting documentation, should be able to effectively manage potential adverse effects on surface water in the Karetu River.

83 Effects on the Eastern Boundary Watercourse are less certain, largely because the size of this water body is small relative to potential stormwater discharges. This is a matter that the Applicant should address either prior to or during any hearing.

84 The level of design provided with the Application for the landfill is reasonable at this stage. But I would expect that detailed design of stormwater elements for the landfill would be subject to independent peer review (should the Hearings Panel be of a mind to grant consent) prior to construction.

85 There are two main elements of the Application that require more substantive consideration by the Applicant:

- The effect of flooding on the limestone processing area, access to and from the site and potential effects of the repair of the site bund and construction of the bridge on upstream flood levels and on access to the site are not well understood. This needs to be matter that is addressed in more detail either prior to or during the hearing.
- Proposed consent conditions for stormwater discharges, monitoring and response plan, including consideration of:
  - Reasonable mixing for both the Karetu River and Eastern Boundary Watercourse.
  - The monitoring of stormwater discharge points other than ponds draining the landfill.
  - Effects of temperature from sediment retention ponds and decanting earth bunds on water quality.
  - Management of high pH and nitrogen from the processing area.
  - Assessment and management of water quality parameters set out in Schedule 5 other than suspended sediment.

- Management responses to exceedances in trigger levels.

- While none of these gaps are of themselves significant, a more comprehensive and integrated monitoring plan that is consistent with consent conditions is required to enable the Hearings Committee to make an informed decision on the application.

Report prepared by:

Peter Cochrane

Principal Consultant

Tonkin & Taylor Ltd

7 March 2025

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Appendix A Rule 5.95 :LWRP and Policy 4.13

5.95 The discharge of stormwater, other than into or from a reticulated stormwater system, into a river, lake, wetland or artificial watercourse or onto or into land in circumstances where a contaminant may enter a river, lake, wetland, or artificial watercourse is a permitted activity, provided the following conditions are met:

1. The discharge is not from, into or onto contaminated or potentially contaminated land; and
2. The discharge is not into:
   (a) a water race, as defined in Section 5 of the Local Government Act 2002; and
   (b) a wetland, unless the wetland is part of a lawfully established stormwater or wastewater treatment system; and
   (c) a waterbody that is Natural State, unless the discharge was lawfully established before 1 November 2013; and
3. The discharge does not result in an increase in the flow in the receiving waterbody at the point of discharge of more than 1% of a flood event with an Annual Exceedance Probability of 20% (one in five year event); and
4. The discharge meets the water quality standards in Schedule 5 after reasonable mixing with the receiving waters, in accordance with Schedule 5; and
5. The concentration of total suspended solids in the discharge shall not exceed:
   (a) 50 g/m^3, where the discharge is to any spring-fed river, Banks Peninsula river, or to a lake except when the background total suspended solids in the waterbody is greater than 50 g/m^3 in which case the Schedule 5 visual clarity standards shall apply; or
   (b) 100 g/m^3 where the discharge is to any other river or to an artificial watercourse except when the background total suspended solids in the waterbody is greater than 100 g/m^3 in which case the Schedule 5 visual clarity standards shall apply; and
6. The discharge to water is not within a Community Drinking-water Protection Zone as set out in Schedule 1; and
7. The discharge does not occur where there is an available reticulated stormwater system.

Appendix B Schedule 5 Water quality objectives LWRP

Table S5A

Water quality class	DOC*	Temperature	pH	Visual clarity	Colour	DIN*	DRP*	*E. coli**	Toxicants
	Change shall be less than (mg/l)	Average change shall not exceed (°C)	Shall be between (no units)	% change shall not exceed	% change shall not exceed (Munsell units)	Shall be less than (mg/l)	Shall be less than (mg/l)	95% of samples shall be less than (*E. coli** per 100 ml)	Shall not exceed the concentration specified in Table s5B for the relevant level of protection (see note below)
Rivers and artificial watercourses									
Alpine-upland	2.0	2.0	6.5 – 8.5	20	5	0.08	0.005	260	99%
Alpine-lower						0.18	0.007	550	95%
Hill-fed – upland				20	5	0.21	0.006	260	99%
Hill-fed – lower						0.47	0.006	550	95%
Hill-fed – lower – urban						0.47	0.006		90%
Lake-fed				20	5	0.21	0.003	260	99%
Banks Peninsula				35	10	0.09	0.025	550	99%
Spring-fed - upland				20	5	0.10	0.007	260	99%
Spring-fed - lower basin				35	10	0.47	0.010	550	95%
Spring-fed - plains				35	10	1.50	0.016	550	95%
Spring-fed - plains - urban				20	5	1.50	0.016	550	90%
Lakes						TN*	TP*		
Large high country lakes	2.0	2.0	6.5 - 8.5	20	5	0.073	0.004	260	99%
Small to medium high country lakes						0.16	0.009	260	99%
Coastal lakes and lagoons						0.340	0.020	550	95%
Artificial – on-river						0.016	0.009	260	99%
Artificial – other						0.340	0.020	260	95%

Key to Abbreviations
DOC = Dissolved organic carbon
DIN = Dissolved inorganic nitrogen
TN = Total nitrogen
DRP = Dissolved reactive phosphorus
TP = Total phosphorus
E. coli = Escherichia coli

Appendix C WasteMINZ Guidelines

wasteMINZ

5.5 Surface Water and Stormwater Management

Objectives: Maintain separation of stormwater from waste/leachate

Minimise leachate generation by preventing infiltration of surface water into the waste

Prevent surface water contamination by sediment and leachate

Minimise potential for erosion of the liner system during waste placement

Minimise potential for erosion of intermediate or final capping systems

Prevent uncontrolled off-site discharges

Design of surface water management systems should consider the following:

- Interception drains surrounding the active landfill/fill area to prevent overland flow from entering the active landfill/fill area.
- Rainfall falling on the active landfill area should be collected and managed as leachate via the leachate collection, treatment and disposal system.
- Rainfall run-off from slopes outside and above the landfill/fill should be intercepted and diverted to watercourses. These diversion drains/channels may require invert protection to prevent scour, and/or lining to prevent leakage into the landfill/fill.
- Drainage channels or drains constructed on the completed landfill/fill surface should be designed and constructed to accommodate settlement, minimise or eliminate erosion, and cope with localised design storms.
- Completed landfill/fill areas and areas of intermediate cover should be contoured to direct stormwater into drains leading away from the active filling area and working face.
- Permanent or temporary access roads should be designed to prevent them acting as stormwater channels that may direct water into the landfill/fill.

Depending on the circumstances, temporary surface water management systems typically should be designed for at least a 1-in-10 year storm (10% annual exceedance probability [AEP]) and permanent systems for a 1-in-100 year storm (1% AEP).

Any stormwater that has been diverted from the filling site is likely to carry a high silt load and should be treated in sedimentation ponds prior to discharge. This is usually a consent requirement.

Sedimentation ponds should be developed prior to discharge of surface waters to natural streams or rivers and hence are required early in the construction process. Ponds and traps should be designed to ensure easy maintenance and cleaning. Monitoring (including testing) of discharges from retention devices may be required, depending on the class of landfill/fill. Refer to **Section 8** for detail.

wasteMINZ

In summary, surface water drainage systems for landfills/fills should contain provision for diversion, retention and testing of surface water and stormwater. Retention and testing requirements for Class 5 Clean Fills should be assessed on a site-specific basis. See **Table** 5-2 for surface water and stormwater drainage requirements for each landfill/fill class.

Table 5-2 Summary of Minimum Surface Water and Stormwater Drainage Requirements

Class	1	2	3	4	5
Diversion	Yes	Yes	Yes	Yes	Yes
Retention e.g., sedimentation ponds	Yes	Yes	Yes	Yes	Site Specific
Testing	Yes	Yes	Yes	Yes	Site Specific

Table 8-3 Surface Water Sampling Frequency

Class	1 Large[1]	1 medium[1]	1 Small[1]	2	3	4	5
Sediment ponds[2]	Continuous or prior to discharge	Continuous or prior to discharge	Site specific	Continuous or prior to discharge	Continuous or prior to discharge	Continuous or prior to discharge	Continuous or prior to discharge
Up-gradient	3 monthly	3 – 6 monthly	6 monthly	6 monthly	6 monthly	Site specific	NA
	Leachate indicators	Leachate indicators	Leachate indicators	Leachate indicators	Leachate indicators	Leachate indicators	
Down-gradient	3 monthly	3 – 6 monthly	6 monthly	6 monthly	6 monthly	Site specific	NA
	Leachate indicators	Leachate indicators	Leachate indicators	Leachate indicators	Leachate indicators	Leachate indicators	

Note: [1] Large landfill: > 50,000 tonnes per annum; medium landfill: between 10,000 and 50,000 tonnes per annum; small landfill: < 10,000 tonnes per annum.
[2] A decision on discrete vs. continuous sampling and testing should take into account landfill size and environmental sensitivity.

Appendix 8: Tonkin + Taylor, Geotechnical s42A report, prepared by Clive Anderson

Before the Independent Hearing Panel appointed by the Canterbury Regional Council

IN THE MATTER OF The Resource Management Act 1991

AND

IN THE MATTER OF Application CRC 243699 to 243706

Section 42A Officer's report

Report of: Clive Kenneth Anderson (Tonkin & Taylor Ltd)

1 Introduction

1.1 Background

1 Protranz International Limited (Protranz) proposes to operate a limestone quarry and processing plant, and to establish a Class 3 Managed Fill (landfill), that will also accept contaminated soils that will meet the Class 1 landfill leaching criteria, at the existing Whiterock Quarry in Loburn, North Canterbury. Protranz has applied to both Waimakariri District Council (WDC) and Canterbury Regional Council (known colloquially as ECan) for a range of resource consents required for the establishment and operation of the proposed hybrid Class 1/Class 3 Managed Fill (landfill).

2 Tonkin & Taylor Ltd (T+T) has been engaged by WDC to undertake a technical review of the geotechnical and slope stability assessments lodged by Protranz in support of its resource consent applications.

3 The purpose of this Report is to set out the findings of our Technical Review of Protranz's geotechnical and slope stability assessments to support a Section 42A report and inform a decision by WDC and ECan on the resource consent applications.

4 The following documents have been considered as part of this technical review:

- **Appendix E – Geotechnical Assessment:** Prepared by WSP, Revision 3, dated 19 March 2024 (referred to as the Geotechnical Assessment).
- **Appendix F – Groundwater and Surface Water Effects Assessment:** Prepared by WSP, Revision 0, dated 26 March 2024.
- **Appendix H – Design Drawing Set (Rev1):** Prepared by WSP, Revision 0, dated 18 March 2024. Updated to Revision 1, dated 6 August 2024 (referred to as the Drawings).
- **Appendix J – Landfill Design Report, Section 6: Geotechnical:** Prepared by WSP, Revision 0, dated 25 March 2024 (referred to as the Landfill Design Report).

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- **Appendix Q – Slope Stability Assessment:** Prepared by WSP, Revision 1, dated 20 February 2024 (referred to as the Slope Stability Assessment).
- **Section 2 – Geotechnical Engineering: Response to ECan RFI:** Letter prepared by WSP, dated 16 August 2024.
- **RC245076 – 150 Quarry Road Section 92 Response, Section 3 – Geotechnical Engineering:** Letter prepared by WSP, dated 23 August 2024.
- **Those submissions received by CRC and WDC** that mention concerns about geotechnical aspects of the project.

5 This technical review has been undertaken by me, a Senior Principal Geotechnical Engineer at T+T. I have reviewed the aspects of the application relating to the geotechnical and slope stability assessments. This report has been prepared in accordance with T+T's letter of engagement with WDC, dated 22 May 2024.

6 The geotechnical assessment (Appendix E) focusses on identifying the key geological features external to the landfill body in the surrounding rocks and soil. Other than the landfill capping it does not discuss specifics of the landfill body design. That is reported elsewhere in the applicant's proposal.

7 The content of this report focuses on the key geotechnical issues, pertaining to the project consenting process arising from the applicant's geotechnical assessment. Where specific aspects of the geotechnical assessment have not been discussed it can be taken that I did not have any particular concern or disagreement with the applicant's geotechnical assessment and/or design.

8 I have considered the submissions that raise concerns about the geological conditions at the White Rock Quarry site. Several common concerns about the geological conditions have been raised by submitters. These are dealt with by responding to the specific issue raised rather than addressing each submission.

9 I visited the site and carried out a walkover of the quarry and its immediate surroundings on 25th June 2024.

1.2 Qualifications

10 I am a Principal Geotechnical Engineer with Tonkin & Taylor Ltd with 41 years of post-graduate experience working as a geotechnical engineer. My specific qualifications are:

1) NZ Certificate of Engineering (Civil);
2) Batchelor of Engineering (Civil) (Honours) from the University of Canterbury;
3) Master of Science in Soil Mechanics and Engineering Seismology (with Distinction) from the Imperial College, London University;
4) Diploma of Imperial College;
5) Diploma of Technology Management from Deakin University;
6) Chartered Professional Engineer (NZ);
7) Fellow of Engineering NZ.

11 My relevant experience encompasses a wide range of geotechnical projects within NZ, Australia, Singapore and Indonesia. Specific experience that is relevant to this project includes:

1) Assessment of a new museum that Whale Watch proposed for the Kaikoura Peninsula which required the assessment of the karstic limestone that is part of the local geology.

2) Assessment of the risk posed by karstic limestone to a sub-sea tunnelling project in Singapore. This assessment included engagement of a subject matter expert on karstic limestone from the University of Malaysia. I commissioned a sea based geophysical survey

of the seabed limestone searching for evidence of karstic features that may have developed prior to submergence following the most recent ice age and the subsequent sea level rise.

3) Provision of expert geotechnical evidence to changes to the Christchurch District Plan.

4) Review of Resource and Building consent applications for both Christchurch City and Whangarei District Councils. In Christchurch many of the building consent applications required review of future earthquake effects on land. In Whangarei District my consenting work has included providing advice on the risk of underground coal mine collapse to existing and new houses built above the disused mines.

5) Following the Kaikoura Earthquake in 2016 I was peer reviewer of the designs of the rockfall mitigation works above the railway and highway north and south of Kaikoura. NZTA was reliant on my design and report sign-off for the assurance that the works on the steep rock slopes had been designed to the required standard and defined risk criteria.

6) Design of the proposed 100 m high Cypress Coal mine highwall at Stockton, West Coast of New Zealand. This highwall design was impacted by high groundwater levels that required drainage and the regional scale Mt William Fault that intersected the highwall. Mining of coal was to take place at the base of the steep highwall.

7) Provision of expert geotechnical evidence in numerous legal disputes which has included mediation hearings and trials in the High Court.

8) I have carried out or supervised the investigations and analysis of the stability of numerous slopes in rock and soils. Notable projects include the investigation and stabilisation of the very large landslides adjacent to Lake Dunstan behind the Clyde Dam, analysis of a large-scale slope failure in rock on the Paiton Power Project in Indonesia plus numerous smaller slopes ranging residential sites impacted by storms to rock slopes routinely encountered along NZ's highways. My role on the Paiton Power project included service as an expert geotechnical witness in the International Court of Arbitration in London.

9) Assessment and design of the light industrial development sited on top of the landfill at Musgrove Close, Christchurch. The landfill comprised 5 – 6 m depth of uncontrolled building demolition waste from buildings demolished in Christchurch in the 1960's then dumped into a disused gravel pit. Groundwater rose and fell within the debris seasonally. A low permeability soil cap was placed on top of the debris to minimise surface water entry. Testing of the contaminants within the landfill material was carried out as part of the Council requirements for approval of the new industrial estate. Surcharging was placed on the cap to accelerate settlement of the landfill material. Dynamic compaction was used to consolidate the landfill below the access road. Settlement of the soil cap was monitored and the results served as inputs to the design of the sewage and stormwater systems and the access road. Lightweight industrial buildings capable of dealing with settlement were then built over the landfill. One heavy building, with a landfill gas control system, was piled through the landfill to the underlying gravels. All buildings and the services have performed satisfactorily to date.

10) I am currently both an author and reviewer of the Slope Stability Geotechnical Guidance Series being developed for use on NZ projects by the New Zealand Geotechnical Society.

1.3 Code of Conduct and Conflict of Interest declaration

12 I have read the Environment Court's Code of Conduct for Expert Witnesses contained in the Court's Practice Note of 2023. I have complied with that code in preparing this report and agree to comply with it in providing information or opinion to the Hearing Panel in relation to this matter. The aspects of the application addressed in my report are within my area of expertise and I have considered and stated all material facts known to me which might alter or qualify the opinions I express.

13 I have no commercial relationship with the applicant.

1.4 Scope of the Report

14 This report is prepared under the provisions of Section 42A of the Resource Management Act 1991 (RMA). This section allows a council officer or consultant to provide a report to the decision-maker(s) on a resource consent application made to the council and allows the decision-maker(s) to consider the report at the hearing. Section 41(4) of the RMA allows the decision-maker(s) to request and receive from any person who makes a report under Section 42A "*any information or advice that is relevant and reasonably necessary to determine the application*".

15 This report is supplementary to the Section 42A Report prepared by Environment Canterbury (ECan) for the above resource consent applications. Full details of the consent applications are provided in that report.

16 To carry out this audit of the consent applications, I have:

- Considered the relevant sections of the assessment of effects on the environment (AEE) submitted by the applicant, including its technical appendices.
- Reviewed further information that was provided by the applicant on 16 August 2024 in response to Section 92 questions.
- Taken into account relevant issues raised by submitters in relation to the effects I have considered in this report.
- Read the Section 42A reports prepared by Ms Sally Lochhead (Hydrogeology) and Mr Tony Kortegast (Landfill Engineering and Waste Containment).
- Read the Section 42A report of Matthew Silver of Canterbury Regional Council focused on groundwater and leachate issues.

2 Description of the Proposal

17 The proposed Whiterock Landfill will be formed within the void left by extraction of limestone for lime production which has been occurring since the 1950's. Limestone extraction is set to continue. The quarry has produced significant quantities of soil overburden which is proposed to be reused within the proposed landfill operation.

18 The application is for a Class 3 Landfill (Technical Guidelines for Disposal to Land, WasteMINZ 2023) to receive construction and demolition (C&D) waste, contaminated soils, controlled fill and clean fill. The fill material will include asbestos containing materials (ACM). It is understood that degradable organic materials will be prohibited. The applicant proposes contaminated soils with TCLP[1] limits for Class 1 Landfills (WasteMINZ 2023) be accepted at the landfill.

[1] Toxicity Characteristic Leaching Procedure: a standard test developed by the US Environment protection Agency to determine the levels of leachable organic and inorganic chemical species in leachates at landfills.

19 I understand from Mr Kortegast's Section 42A report (Section 2.1) that given the proposed mix of materials to be disposed at White Rock Quarry that the landfill (if consent is granted) is better termed a hybrid Class 1/Class 3 Managed Landfill.

20 The total landfill footprint is about 4 ha. The completed landfill volumes is about 500,000 m^3.

21 The design drawings (Appendix H) and report (Appendix J) show the landfill will have a Class 1 landfill engineered liner based on the proposed acceptance of contaminated soils with TCLP limits for Class 1. The purpose of the Class 1 liner is to minimise the risk of leachate leakage through the liner. The design requires the collection of leachates above the Class 1 liner which then flows into a leachate collection pond prior to removal off-site to a waste water treatment plant most of the time. Recirculation of the collected leachate within the waste is proposed if climatic conditions allow.

22 The landfill will be constructed in two stages, each stage with similar phases comprising earthworks, installation of the underdrainage system, landfill bottom liner, and a leachate collection system. The construction of the leachate pond forms part of Stage 1.

23 Before the landfill body is constructed the WSP Preliminary design drawings show that prior to building the engineered lining system the quarry void will be shaped so that the drainage of leachates at the base of the future landfill flows along the top of the liner towards a leachate pond to be built immediately beyond the southern end of the landfill body. The intended gradient of the liner is 1 V to 50 H or 2 % toward the leachate sump.

24 The landfill lining system itself comprises, amongst other elements, a 600 mm thick low permeability cohesive soil (i.e. clay) layer plus a 1.5 mm thick HDPE liner immediately on top of the soil layer. These two elements form the long-term primary containment system to prevent the loss of leachate out through the fill base into the wider environment. Leachate that reaches the landfill base will flow along the top of the HDPE liner through a 300 mm thick aggregate layer or one of the perforated leachate collection pipes placed at up to 25 m centres within the aggregate. From there it will flow into the leachate storage pond for collection.

25 An underdrainage system will be installed below the lining which is designed to intercept groundwater in natural ground below the landfill body and divert it away to either the Karetu River or into the leachate storage pond (if the water is contaminated). One of the design criteria for this system is to maintain natural groundwater levels to no higher than 1 m below the lining base.

26 The applicant has undertaken a field investigation program which has included a site walkover by experienced engineering geologists and a program of subsurface exploration by two test pits and nine boreholes. The investigation locations were the overburden spoil piles, the groundwater system(s), the quarry itself and the river crossing. Rock and soil samples gathered from the test pits and boreholes were tested in the laboratory.

27 The scope of geotechnical investigations is considered appropriate for the consenting phase of the project to define the potential long-term environmental effects of the landfill.

28 The geotechnical report contains recommendations at Appendix E Section 6.1 for the end of quarrying final "pit slopes". I endorse the proposed bench heights of 15 m maximum coupled with benches of 8 m minimum width from both stability and safety perspectives.

3 Key Aspects of the Geotechnical Environment

29 The quarry geology comprises a sequence of Tertiary age sandstones/limestone/siltstone rocks. This sequence forms a south plunging syncline with mining of the exposed limestone taking place on the western limb of the syncline. Bedding within the limestone dips down from west to east. No active faults have been mapped within the site and the nearest known major regional scale faults are 2 to 4 km away.

30 Subvertical joints perpendicular to the quarry highwall are spaced at about 30 to 40 m intervals along the highwall and may be a series of small, localised, normal and reverse faults with up to 5 m movement on them. Joints in the quarry face that run sub-parallel with the face have led to wedge failure mechanisms where they intersect with other joints and the small faults.

31 The local faults within the quarry have uplifted the limestone 30 to 50 m but the lack of any faulting through the surface loess soil layer indicates an absence of fault movement since the loess was deposited by westerly winds 10,000 to 20,000 years ago.

32 Signs of highwall/quarry face movement, in response to the quarrying process, have been recorded. These include tension cracks subparallel to benches in the highwall and batter instability where unfavourably oriented faults or joints occur. Water erosion of the fine sandstone of the Tokama Siltstone as runnels down the face has occurred.

33 Excavated overburden soils above the limestone resource have been stockpiled in a loose condition nearby with side batter slopes of about 30°. Some areas of instability of these slopes have occurred possibly triggered by local seepage.

34 Site groundwater observations are not presented in detail within the applicant's geotechnical report (Appendix E). This is presented in Appendix F (Groundwater and Surface Water Effects Assessment) and has been addressed in ECan's Section 42A report, and in T+T's Hydrogeology Technical review report[2] by Sally Lochhead. Consequently, I do not present any detailed assessment of the groundwater system in this report.

35 My examination of Figure 4-4 and Table 4-2 in the Appendix F report indicates that a simple model of the groundwater flow could be as follows:

- 1) Groundwater heads in the Whiterock limestone and underlying Berrydale Greensand are at about 225 m (NZVD).
- 2) The topographical RL of the Karetu River alongside and below the existing quarry void is about 210 m (NZVD).
- 3) Therefore the shortest flowpath (about 200 m long based on Figure 4-4) for fugitive leachate would be directly through the limestone and greensand rocks directly into the Karetu River if a suitable flow path through the rock mass is available. This would be the most conservative assumption for assessing the impact of any leachate discharge into the wider environment beyond the landfill.

36 There are existing shallow landslides external to the quarry, one of which is about 30 m wide and 100 m east of the quarry. This may have moved toward the quarry in the period 2010-13 based on the applicant's assessment of Google Earth images.

4 Environmental Effects arising from the Geotechnical Assessment

37 Movement on the observed small-scale faults within the quarry is unlikely during the life of the landfill. There is no evidence of movement on these faults since the overlying loess soils were deposited following the end of the last ice- age about 12,000 years ago (Ref Appendix E Section 5.1.2). Therefore, a loss of contaminants caused by short fault rupture of any containment structure is unlikely during the life of the landfill.

38 I consider now the concerns expressed by submitters about faults in the area:

- Some submitters expressed concern about the potential for nearby large fault movement to damage the landfill. If local movement did occur on a fault that passed through the landfill, then damage could occur to the containment liner but as I state

[2] Tonkin & Taylor Ltd (2025). *Section 42A Officer's Report of Sally Elizabeth Lochhead*, March 2025, T+T Ref. 1094013.0001.

above I agree with the applicant that the available evidence indicates that this is very unlikely.

- The normal response to the potential for large scale fault movement within the quarry walls is to ensure that the likelihood (or probability) of movement on these faults is acceptably low.
- However, in Section 5.1.2 (Discontinuities) of the WSP Geotechnical Report March 2024 it states that the expected return period of movement on the known active faults in the region is believed to be "*in the order of hundreds of thousands of years*". This statement appears to be in error as the Mt Lawry Fault 2km from the quarry is mapped as a fault offset and monocline fold offsetting the Q2 glacial outwash surface which is bracketed at 10,000 to 25,000 years old. The Mt Lawry Fault is defined as a definite fault awareness zone on Canterbury Maps and described as offsetting an estimated 18,000-year-old landform in GNS Science report 2012/236 (General distribution and characteristics of active faults and folds in the Waimakariri District North Canterbury).
- These long-estimated time periods since fault movement on nearby active faults and small-scale faulting in the quarry indicate an acceptably low probability of direct fault rupture during the expected life of the landfill which I acknowledge will be in perpetuity.

Therefore, based on the above long time periods between fault movements, I conclude that the likelihood of any nearby fault damaging the proposed landfill is acceptably low.

39 The impact of the wedge failure mechanisms on the landfill design was queried during my initial review of the application. The applicant's response states that the wedge failures are "*relatively uncommon*", of "*small volume and do not significantly affect the overall stability of the slopes. The wall liner detail can accommodate any small-scale wedge failures that occur following slope cutting*". I observed these potential failure mechanisms during my site visit on 25 June 2024 and ***based on my geotechnical experience and engineering judgement I concur with the applicant***.

- Some submitters are concerned that "unstable" limestone rock could damage the containment liner. The unstable areas of the limestone rock mass noted in the geotechnical assessment by WSP, if not removed by trimming and excavation of the rock batter, can be stabilised directly by using rock bolts and shotcrete, or similar stabilising technique designed to prevent post construction movement of the rock and damage to the containment liner.

40 The applicant proposes to cap the landfill using currently stockpiled overburden soils. The WSP Landfill Design Report states that subsoil drainage may be included within the cap soil lining. The long-term capped landfill slope angles were queried under Section 92 and the applicant has responded stating that the final, long-term landfill slopes will be *"up to 3H:1V (approximately 18°)*". Despite a request for stability analysis results for the landfill cap, in terms of the factor of safety a response to this part of the question was not provided. However, using an infinite slope failure mechanism for the landfill cap, sloping at no more than 18°, I assess that the factor of safety for a dry slope (i.e. landfill cap) should be about 1.8 and for a fully saturated slope I assess the factor of safety could drop to about 0.7. ***Consequently, it will be important for the design of the final landfill cap to ensure that seepage water pressures are kept to a low level to prevent cap failures that could expose the underlying landfill materials***. ***This will require consideration of the ability of the low permeability spoil proposed as the landfill cap to retain and hold water within it along with the consequent implications for instability. This will necessitate incorporating specific drainage into the cap lining design. I note that this is proposed on the design drawings (Drawing C301) but with a cap thickness 1.5 m thick careful design of the drainage system will be required to preserve long term cap stability. I also note that Section 12.3.2 Cap***

subsoil drainage in the Appendix J Landfill Design Report may not be provided in final design. If that is the case, then the applicant will need to provide adequate geotechnical assessment to confirm that this drainage element is not required given my simple stability assessment results provided above.

41 Review of Appendix Q – Slope Stability Assessment sets out the stability analyses for the landfill body along with the chosen seismic ground motions. The landfill is assigned a nominal life of 100 years for the stability analyses and an Importance level 3 is assigned. This level requires the use of ground motion parameters of equivalent to a return period of 1000 years to be used in assessing stability. The stability analyses indicate that acceptable factors of safety are present for moderate shaking levels but that movement of the landfill body of up to 180 mm may occur along leachate containment system for the 1000-year design earthquake ground motions. If that movement occurred cracking of the containment system may occur. Subsequent observations of the leachate and under lining drainage system for any changes in leachate flows would be required to check for evidence of containment damage.

42 A Section 92 query was raised about the potential for existing landslides to move further and enter the quarry area (Appendix E Section 5.5). The applicant's response states that they believe the likelihood of that occurring to be low on the basis that the slope between the landslide and quarry is "*considerably flatter*" than the slope that the landslide has previously moved on. The applicant further states that the quality of the Google Earth images is sufficient to identify other landslide features such as tension cracks and hummocky ground. No evidence was found in those images of large-scale deep-seated landslides affecting the site***. I have examined the same Google images, visited the site and I concur with the applicant's assessment of local landslide risk to the proposed landfill area.***

43 The applicant proposes to reuse the site won materials during landfill operations and for landfill capping. Laboratory testing of two samples of the stockpiled soils indicate a low recompacted permeability of less than 10^{-9} m/s. A trial fill of these material is proposed. I note that the Appendix I (Vehicle Movement Calculations and Materials Balance Summary) indicates that of the 174,000 m^3 of site won materials about 164,000 m^3 will be reused on site with 6,200 m^3 of topsoil either reused from onsite or imported for a total soil requirement of 170,000 m^3. Consequently, there will only be a margin of 4000 m^3 (or 2 %) of surplus soils currently available. Therefore, should the available volume of soil for reuse within the quarry limits not eventuate then additional vehicle movements associated with importing the shortfall will be required. ***This is an issue that warrants further discussions regarding the applicant's proposal for refining what the impacts of that situation might be and how likely it is to occur. A contingency source for capping materials may need to be identified in case there is a shortage.***

5 Other Geological Issues Raised by Submitters

44 This section sets out my response to other geological issues raised by submitters but not explicitly dealt with in previous sections.

45 ***Earthquake Shaking Risk*** The landfill will have a design life of 100 years with an importance level of 3 which means it needs to resist the effects of earthquake ground motions with an average return period of 1000 years. The probability of the design ground motions occurring during the 100-year life of the landfill is about 10 %, or 1 in 10. Consequently, steep interfaces around the old quarry rock walls and over lying landfill could experience downward movement i.e. settlement or lateral movement of the landfill materials which may damage the containment liner. ***Therefore, the design of the liner will need to ensure that damage from downward movement on the steep quarry walls cannot occur and that any movement of the landfill body along the core.***

46 ***Karstic Limestone*** is formed when slightly acidic freshwater dissolves limestone over long time periods (1000's of years), to develop surface and subsurface features that form by the exploitation of existing rock defects such as bedding, joints and faults to provide open, locally high permeability pathways for fluid flow. Cave systems are the ultimate expression of this process. This is a concern to some submitters.

47 Geological study of the limestone rock (Appendix E Sections 5) and indicates that weathering led to development of minor (i.e. surface erosion features and not passages and caverns) forms of paleo karst topography on the upper limestone surface before deposition of the overlying Tokama Siltstone about 23 Million years ago. There is no indication of further karstic features developing in the limestone rock around the current White Rock Quarry since it was tectonically uplifted from a shallow sea floor over the past approximately 2 Million years. Observations by professional geotechnical engineers and engineering geologists have not found any such features. I did not see any such features on my site visit. Neither is there any evidence of collapse features on the ground surface around the quarry. Collapse features, often termed tomos, are commonly associated with the collapse of passages and caverns within karstic limestone.

48 However, I acknowledge that some submitters (O Meijer and Duncan Mackintosh) have pointed out that they are aware of evidence of karst features that have been found during the quarry life. It appears that these features were small in scale. ***It is my opinion, based on my reading of their submissions, that the features they observed were more likely than not to be small in scale and able to be rectified, if they are found, with good engineering design to preserve the integrity of the lining system. Therefore, the applicant's design should contain a contingency detail to fill/seal/drain any small karst features that are discovered. The landfill design report (Appendix J) acknowledges the potential for karst features to be found. If unexpectedly large karstic features were found on subsequent quarrying, then a reassessment of the containment design would be required.***

49 ***Porous Limestone*** Some submitters expressed concern about the limestone being porous and/or able to be eroded by acidic leachate that escapes from the landfill containment system.

Limestone can indeed be a porous rock due to its nature as a sedimentary rock formed from the deposition and cementation of the remains of marine organisms like coral and shells.

50 The porosity of limestone is determined by both primary and secondary porosity. Primary porosity is related to the depositional characteristics of the rock itself, such as the spaces between grains in a sedimentary rock. Secondary porosity is related to the post-depositional changes to the rock, typically connected with dissolution processes, fracturing or weathering over time, resulting in features like vugs (small cavities), joints, or fissures.

51 The limestone observed in the White Rock Quarry walls is a relatively massive muddy (micritic) limestone with poorly developed bedding and widely spaced persistent defects (20 to 30 m spaced small scale faults). The paleo karst features in the top of the limestone may result in higher secondary porosity than the main mass of the limestone. As such the overall porosity is relatively low compared to the range for the overlying Kowai Conglomerates and the underlying Karetu Silica Sands. I understand that this is reflected in the groundwater modelling that has been undertaken and reviewed in the evidence of S. Lochhead.

52 As noted in T+T's Landfill Technical review report[3], the landfill assessment indicates that large volumes of leachate are considered unlikely, and that leachate is unlikely to be acidic. Refer to the Section 42A report of A.P. Kortegast for more information.

53 For the proposed landfill there are two features which will counteract the natural porosity of the limestone and any concerns of submitters of an attack by acidic leachate.

[3] Tonkin & Taylor Ltd (2025). *Section 42A Officer's Report of Anthony Paul Kortegast*, March 2025, T+T Ref. 1094013.0001.

54 The first is the containment system which I understand will be robustly designed to reduce the risk of leakage of any leachate from the landfill encountering the underlying limestone. I summarised the water barrier features of this system in Section 2 above. If that system were to fail in a catastrophic manner and, if large, ongoing quantities of acidic leachate were able to encounter the limestone, then it would be possible for the limestone rock to chemically weather by a process known as dissolution. In this process the acid leachate would react and dissolve the alkaline calcium carbonate limestone increasing both the rocks porosity and permeability.

55 The second feature is that the leachate is unlikely to be acidic as set out by my colleague in Mr Kortegast's Section 42 A report.

56 ***Large Scale Landsliding*** One submitter expressed concern that landsliding on the scale seen along the Kaikoura Coast following the Kaikoura Earthquake in November 2016 might occur at White Rock Quarry. Strong locally centred earthquake shaking is likely to cause instability of some slopes in the White Rock Quarry area and possibly of the Quarry highwalls themselves.

57 However, the scale of catastrophic instability leading to large rockfalls on the Kaikoura Coast cannot be repeated at White Rock for the following reasons:

- The rock mass around the Quarry is not as intensely fractured nor standing as high as the slopes along the Kaikoura Coast so similar volumes of failure material into the quarry following strong shaking cannot develop. The rock slopes along the Kaikoura Coast are up to 300 m high whereas the highwalls around the White Rock Quarry are in the order of 40 to 50 m high.
- Failures around White Rock Quarry are more likely to be discrete rock blocks from the highwall. Small scale instability features are noted in the geotechnical assessment such as wedge and bench failures. In Section 4 on Environmental effects, I have noted the need for the landfill designer to consider stabilising these features to prevent damage to the containment system. If that is done properly then that process should reduce the likelihood of earthquake induced failure of the remnant quarry highwalls.
- As the landfill develops, its mass, resting against the supporting slopes, should increasingly create a stabilising effect against highwall failures. As a consequence the likelihood of a large-scale highwall failure, triggered by strong earthquake shaking, should progressively decrease with time as the landfill volume increases.
- Seismically generated movement of the landfill itself will be limited by its containment within the quarry void at the end of quarrying. I commented on the landfill body assessment above.

58 ***Leakage of Leachate into the wider Environment***

Many submitters have expressed concern about the potential for leachate to flow through the base of the landfill if the containment lining leaked for any reason. Some of the potential causes of leaks that concerned submitters included earthquake faulting (addressed above), the limestone being potentially karstic (addressed above) and aging of the HDPE lining.

The HDPE lining reaching the end of its life and starting to leak concerns many people. I've examined the design of the landfill base lining system and concluded that even if the HDPE lining eventually deteriorated and started to leak the leakage rate through the underlying clay soil lining 600 mm thick would be extremely slow. Properly constructed, this lining is required to have a maximum permeability of less than 1×10^{-9} m/s. What this would mean is that if leachate was ponded on top of the clay liner to the maximum design depth of 300 mm it would take 38 years for leachate to flow from the top to the base of the lining and into the wider environment.

The clay soil of the 600 mm thick liner is not subject to the same time related deterioration processes as the HDPE. The critical issue with the clay liner is to ensure that the correct

material type is selected and that the liner is properly constructed so that cracks cannot form in it due to post-construction shrinkage due to loss of moisture. Any such cracks would totally compromise the permeability of the lining system and leave only the HDPE lining to prevent loss of leachate into the environment. If the HDPE lining became degraded for any reason, then leachate is likely to escape from the landfill with the potential to flow down gradient through the limestone toward and into the Karetu River.

Therefore, it is essential to the long-term functioning of the leachate containment system that the 600 mm thick clay lining is built to stringent quality control requirements which includes sign-off by the landfill designer at the end of construction to verify that the clay lining system has achieved the required permeability without cracks forming.

6 Conclusion

I conclude that if the proposed landfill design is properly executed in the detailed design and then construction, then there is no geotechnical impediment to developing the proposed landfill.

However, this conclusion is totally dependent on the proposed containment system being properly constructed. This is because the local geology and topography would not provide effective long-term containment of fugitive leachate.

The critical element of the proposed containment system in my opinion is the 600 mm thick clay lining as that should have an unlimited effective life over which it continues to perform its function. If due to poor construction cracks formed through the clay and if the HDPE layer is damaged during construction and not repaired, then any leachate that escaped the underlying drainage system is likely to reach the adjacent Karetu River. This serves as the ultimate discharge point into the wider environment. The short distance from the quarry void to the river (about 200 m) and the nature of limestone would not prevent this occurring in the long run. This opinion is consistent with Sally Lochead's Section 42A report.

Consequently, in my opinion, constructing a high-quality containment system is the key to the ability to use the quarry void for the proposed hybrid Class1/Class 3 landfill.

Report prepared by:

Clive Anderson

Principal Geotechnical Engineer

Tonkin & Taylor Ltd

March 2025

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Appendix 9: Tonkin + Taylor, Hydrogeology s42A report, prepared by Sally Lochhead

Before the Independent Hearing Panel appointed by the Canterbury Regional Council

IN THE MATTER OF The Resource Management Act 1991

AND

IN THE MATTER OF Application CRC 243699 to 243706

Section 42A Officer's report

Report of: Sally Elizabeth Lochhead (Tonkin & Taylor Ltd)

1 Introduction

1.1 Background

1 Protranz International Limited (Protranz) proposes to operate a limestone quarry and processing plant, and to establish a Class 3 Managed Fill (landfill) that will also accept contaminated soils that will meet the Class 1 landfill leaching criteria, at the existing Whiterock Quarry in Loburn, North Canterbury. Protranz has applied to Canterbury Regional Council (ECan) for a range of resource consents required for the establishment and operation of the proposed landfill.

2 Tonkin & Taylor Ltd (T+T) has been engaged by ECan to undertake a technical review of the groundwater and surface water effects assessment with regard to hydrogeology, lodged by Protranz in support of its resource consent applications.

3 The purpose of this Technical Report is to set out the findings of our Technical Review of Protranz's groundwater and surface water effect assessment with respect to hydrogeology, to support a Section 42a report and inform a decision by ECan on the resource consent applications.

4 The following documents have been considered as part of this technical review:

- **Appendix E – Geotechnical Assessment:** Prepared by WSP, Revision 3, dated 19 March 2024 (referred to as the Geotechnical Assessment).
- **Appendix F – Groundwater and Surface Water Effects Assessment:** Prepared by WSP, Revision 0, dated 15 May 2024 (referred to as the GW & SW Effects Assessment).
- **Appendix H – Design Drawing Set (Rev1):** Prepared by WSP, Revision 0, dated 18 March 2024. Updated to Revision 1, dated 6 August 2024 (referred to as the Drawings).
- **Appendix J – Landfill Design Report:** Prepared by WSP, Revision 0, dated 25 March 2024 (referred to as the Landfill Design Report).

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- **Appendix K – Waste Acceptance Criteria Report:** Prepared by WSP, Revision 1, dated 16 February 2024 (referred to as the WAC Report).
- **Appendix M – Monitoring Programme & TARP (Draft Rev B):** Prepared by WSP, dated March 2024. Updated to Revision B, dated August 2024.
- **Section 9 – Hydrogeology: Response to ECan RFI:** Letter prepared by WSP, dated 16 August 2024.

5 This technical review has been undertaken by Sally Lochhead, Senior Hydrogeologist at T+T. I have reviewed the aspects of the application relating to hydrogeology. This report has been prepared in accordance with T+T's contract with ECan, dated 23 September 2024.

6 References to figures and tables in this technical review relate to those reported in the applicant's Appendix F – Groundwater and Surface Water Effects Assessment, unless specifically stated.

7 I visited the site on 30 May 2024 along with other experts to meet with the applicant; Protranz and their consultants (WSP) and to inspect the site of the proposed landfill.

1.2 Qualifications

8 I am a Senior Hydrogeologist with Tonkin & Taylor Ltd (T+T) and I have 15 years' experience in hydrogeology out of a 30 year career in environmental consultancy in New Zealand and the United Kingdom (UK). My qualifications include BSc. Hons Geology and Physical Geography from University of Gloucestershire, part MSc. Hydrogeology from University of West of England, and I am a Chartered Geologist (Geological Society of London).

9 I have worked on several waste management projects in New Zealand, and I have also worked with a waste management company in the UK. Relevant project examples include:

- Stage 4 Southern Landfill, Wellington – I was responsible for the Hydrogeological Assessment for the Southern Landfill Extension Piggyback Option (SLEPO) for Wellington City Council. I designed the site investigations, developed hydrogeological conceptual model, reviewed groundwater level and quality data, and surface water data to assess the baseline conditions to estimate the potential contaminant loading of SLEPO on the receiving environment. I prepared and gave evidence for Wellington City Council at the council hearing.
- Spicer Landfill, Porirua – I was responsible for assimilating data for a hydrogeological assessment for the proposed extension of the landfill for Porirua City Council (project currently on hold). I designed the site investigations for the installation of the additional groundwater monitoring bores to allow a better understanding of the groundwater regime at the site. I oversaw the initial drafting of the report which outlines the hydrogeological conceptual site model.
- Smooth Hill Landfill, Dunedin – I was an expert witness and I provided a technical review of the hydrogeological aspects of the resource consent application for the proposed landfill for Otago Regional Council (as consent authority). I reviewed the applicant's assessments to consider whether the hydrogeological conceptual model had been fully assessed and provided recommendations for areas of further investigation and hydrogeological model development in the Section 42A report. I gave evidence for Otago Regional Council at the council hearing.

2 Code of Conduct and Conflict of Interest declaration

10 I have read the Environment Court's Code of Conduct for Expert Witnesses contained in the Court's Practice Note of 2023. I have complied with that code in preparing this report and agree to comply with it in providing information or opinion to the Hearing Panel in relation to

this matter. The aspects of the application addressed in my report are within my area of expertise and I have considered and stated all material facts known to me which might alter or qualify the opinions I express.

11 I have no commercial relationship with the applicant.

3 Description of the Proposal

3.1 Landfill Design

12 The proposed Whiterock Landfill will be a Class 3 Landfill (Technical Guidelines for Disposal to Land, WasteMINZ 2023) to receive construction and demolition (C&D) waste, contaminated soils, controlled fill and clean fill. The fill material will include asbestos containing materials (ACM). It is understood that degradable organic materials will be prohibited. The applicant also proposes contaminated soils with TCLP limits for Class 1 Landfills (WasteMINZ 2023) be accepted at the landfill.

13 The design drawings (Appendix H) and report (Appendix J) show the landfill will have a Class 1 landfill engineered liner on the basis of the proposed acceptance of contaminated soils with TCLP limits for Class 1. The purpose of the Class 1 liner is to minimise the risk of leachate leakage through the liner. The design identifies the collection of leachate above the Class 1 liner and stored in a leachate collection pond prior to removal off-site to a waste water treatment plant most of the time. Recirculation of the collected leachate within the waste is proposed if climatic conditions allow.

14 The landfill will be constructed in two stages, each stage with similar phases comprising earthworks, installation of the underdrainage system, landfill bottom liner, and a leachate collection system. The construction of the leachate pond forms part of Stage 1.

15 The landfill design is described in Appendix H and key components specifically relevant to the groundwater and surface water environment are identified as liner, leachate drain system, leachate pond, underdrainage system, and landfill cap. I understand the follow key details are:

- Liner - the liner design has been based on a Class 1 Municipal Landfill. The liner will sit on the insitu limestone, greensand or structural fill. At the base of the landfill, the top part of the liner (i.e. GCL layer) will be 1.5 m above the existing groundwater level. Shotcrete and polyurea wall linings will cover the sub-vertical sides of the landfill.
- Underdrainage system - will be installed beneath the landfill liner to control groundwater levels to at least 1 m below the top part of the liner. The drainage system could also intercept leachate leakage through the liner. Further comment on the underdrainage system is provided in paragraph 47.
- Leachate drain system - installed above the landfill liner and will divert leachate to the leachate pond.
- Leachate pond - has 800 m^3 capacity and will be double lined with a leakage detection system between the primary and secondary liners, underlain by 600 mm compacted cohesive soil of low permeability.

16 In relation to the groundwater environment, the applicant seeks:

- A water permit (CRC243703) for the associated groundwater take to construct the landfill liner and maintain groundwater separation from the liner for the long term basis. This will be via the underdrainage system to intercept groundwater beneath the landfill liner.
- A discharge permit (CRC243705) for the managed fill waste to land and associated leachate discharge to groundwater as a result of potential leakage through the liner.

- A land use consent (CRC243700) for excavation within 1 m of groundwater and within 50 m of a surface water body.
- Other consents (shorter duration of 10 and 15 years) are sought for temporary take and use of groundwater for site dewatering (CRC243702 Water Permit), discharge of site dewatering water (CRC243704 Discharge Permit).

17 Appendix K (WAC report) states the proposed maximum chemical contaminant leachability limits (Toxicity Characteristic leaching procedure (TCLP) concentration[1]) for potentially hazardous contaminants. Total concentration values are proposed as a means to assess potential toxicity as a proxy for TCLP limits. The applicant proposes leachability criteria equivalent to Class 1 WAC criteria for managing contaminant concentrations at the site.

18 Waste Acceptance Criteria (WAC) for the waste will occur using the applicant's Waste Disposal Permit system initiated prior to arrival of any waste which is described in Appendix F and Appendix K reports.

4 Site setting/environment

19 Appendix F provides a description of the environment and identifies the site setting including the following key components:

- Rainfall – measured at Fox Creek weather station located 5.5 km west-northwest of the site. It has been assessed that one third of the annual rainfall amount is received as recharge to groundwater.
- Hydrology – adjacent Karetu River and more distant Grey River to the east of the site. Upstream and downstream of the site, the Karetu River is inferred to have losing reaches of the river. Immediately west of the site the Karetu River is inferred to be a gaining reach. There is limited data to support the gaining and losing reaches. The applicant has used the 1 m x 1 m LiDAR elevation model to derive the river's stage height from topographic lows (where present) and their conceptual understanding to make this informed decision. ***I consider the conclusions reached by the applicant follows a common understanding of the local hydrology based on the publicly available data at the time of the applicant's assessment, although it is not entirely clear how LiDAR data is used to determine this. The assessment is a conservative approach with regards to the potential effects on this surface water in the absence of other published and field data.***
- Details of stream flow measurements completed by the applicant are provided and compared with NIWA's NZ River Map data.
- Two wetlands have been identified; the southern wetland and the eastern wetland, located in their respective directions in relation to the quarry. ***During the site visit, the locations of the wetlands were inspected. The location of the eastern wetland was not easily identifiable***.
- Groundwater flow direction – the shallow groundwater flow direction is shown to be toward the southwest through to west, having been modified by the quarry pond. This is shown on Figure 4-6.

20 The applicant identifies the site to be underlain by a sequence of Tertiary (Miocene and Pliocene) and Quaternary sediments in a south plunging syncline. An overview of the geology is provided as a map and geological cross section in Figures 4-5 and 4-4.

21 Five hydrostratigraphic units are identified at the site from east to west as follows:

[1] Toxicity Characteristic Leaching Procedure: a standard test developed by the US Environment protection Agency to determine the levels of leachable organic and inorganic chemical species in leachates at landfills.

- Kowai conglomerate – generally considered by the applicant to be moderate permeability based on published values or inferred values based on geology.
- Whiterock Limestone – described as moderate permeability with double porosity from fractures and bedrock porosity, assessed by the applicant during field hydraulic conductivity testing.
- Berrydale Greensand – lower permeability assessed by the applicant during field hydraulic conductivity testing. The applicant notes that horizontal hydraulic conductivities could be higher than vertical hydraulic conductivities due to sandier layers within this unit.
- Karetu silica sand – presumed high permeability based on reported 95% silica sand content and published values or inferred values based on geology.
- Alluvium – west of site on flood plain comprising gravel, sand and silt. Hydraulic conductivities are not provided and this unit is not within the landfill footprint.

The base of the groundwater system is identified as low permeability basement rocks of greywacke and/or argillite of the Torlesse Supergroup.

22 Section 4.3 in Appendix F (and Appendix E) refers frequently to Tokama Siltstone underlain by the Kowai Formation. ***It is not clear why Tokama Siltstone is not shown on the geological cross sections and is excluded from many tables where the sequence of geology is provided. However, I consider this is not critical for the hydrogeological assessment and based on an independent literature review, it appears that the siltstone is relatively thin.***

23 ***During the site visit, geology of the Motunau Group, the Tokama Siltstone (the thickness of the beds were not confirmed due to vegetation cover), Whiterock Limestone and Berrydale Greensands were easy to distinguish having been exposed or exposed in part by the quarry operations.***

24 As described in T+T technical review (Appendix J – Landfill Design Report), the Technical Guidelines for Disposal to Land (WasteMINZ 2023) set out key criteria for siting a landfill. Specific relevance when considering the site's hydrogeological conditions for the type of landfill proposed for Whiterock include:

- Avoidance of high permeability underlying soils or fractured rock.
- Avoidance of geothermal, karst areas or active faults.
- Avoidance of effects on drinking water aquifers.

Appendix F describes the Whiterock limestone to have moderate permeability with double porosity and to exhibit karst topography on the top surface "indicating subaerial exposure prior to the deposition of the overlying unit". The limestone is 'massive', as described by the applicant and observed on site with few fractures exposed in the cut face. No karstic features such as sinkholes or caverns are described by the applicant or observed in the exposed limestone. I consider the described surface features to be palaeo-karstic topography, formed when the surface was exposed prior to deposition of the overlying strata (Kowhai Formation). The applicant identifies shallow water supplies to abstract from wells or infiltration galleries near or adjacent to the Karetu River. Based on this information described above, other information available for the underlying geology provided by the applicant and the key criteria set out in the Technical Guidelines for Disposal to Land (WasteMINZ 2023) including the siting criteria set out in Table 4-1, from a hydrogeological perspective, I consider that the proposed site has some technical constraints due to the underlying geology. To ensure the site is suitable for a landfill these constraints need to be engineered by the placement of a liner and leachate management system as proposed by the applicant and the applicant needs to ensure effective environmental risk management

controls as described by our landfill expert; Mr T Kortegast whom I refer to and rely on their response to support this matter.

4.1 Site investigations

25 Site investigations comprising boreholes, testing and monitoring have been completed by the applicant to characterise, and to help better understand the groundwater and surface water at the site. The boreholes were converted to monitoring wells (piezometers) for monitoring and testing of the groundwater conditions. The investigation locations are shown in Figure 3-1 and are spread spatially across the site, targeting the shallow and deeper formations. Water quality data have been obtained from the monitoring wells.

26 Groundwater level monitoring data between October 2022 to June 2023 were recorded in eight monitoring wells with reduced monitoring in BH105 (limestone) due to logger failure, as shown on Figure 4-8. The range in recorded groundwater levels were generally consistent at each monitoring well throughout the monitoring period. Groundwater levels in BH07 showed the greatest amount of variation and this is attributed to the close proximity to the Karetu River with the monitoring well screened in the alluvium. Groundwater levels at the site are influenced by the presence of the quarry pond which holds groundwater. The current groundwater levels (modified by the quarrying activity with gravity drainage of the pond via a syphon) are considered by the applicant to represent the existing groundwater environment. ***I consider that the amount of data gathered on the groundwater levels provides a satisfactory level of understanding on the groundwater environment at the site***.

4.2 Hydrogeological conceptual model

27 The hydrogeological conceptual model identifies groundwater recharge is derived from rainfall and surface water (losing reaches of the Karetu River).

28 As described in paragraph 21, five hydrostratigraphic units are identified at the site. Groundwater levels in the lower Whiterock limestone are shown to be similar to the upper Berrydale Greensand. Groundwater levels at the bottom of the Berrydale Greensand are close to that in the Karetu Silica Sands. This indicates a strong hydraulic gradient (downward flow) across the Berrydale Greensand. Berrydale Greensand has been identified to have a lower permeability than the other units and to be the confining layer between the overlying more permeable Whiterock limestone and the Kowai conglomerates and the underlying Karetu Silica Sands.

29 There is no discussion on how the groundwater moves between the overlying confining layer of the Berrydale Greensand to the Karetu Silica Sands. The conceptual model indicates that the lower permeability Berrydale Greensand allows vertical groundwater flows through this stratum to reach the Karetu Silica Sands, noting that horizontal conductivity could be higher due to sandier layers within this unit.

30 ***I consider movement of groundwater through the bedrock will occur through the primary porosity and secondary porosity through defects such as fractures (where present). Groundwater could flow preferentially through defects and groundwater travel times could be faster than through the primary porosity of the bedrock i.e. through the pore spaces. I note that the Geotechnical report (Appendix E) provides details on discontinuities and it refers to a set of joints widely spaced at 30 m - 40 m spacing in the massive, well indurated Whiterock Limestone. The presence of fractures in the hydrostratigraphic units has not been described in detail in Appendix F. During my site visit, I noticed two vertical fractures in the exposed cut face within the massive, limestone to the north of the Stage 1 landfill footprint. I expect these fractures would extend into the underlying limestone formation and could act as pathways for groundwater movement. My overall impression is the limestone is not***

extensively fractured but there is the potential for fractures to be present in the hydrostratigraphic units underlying the landfill.

31 The synclinal geology has been identified to strongly influence the hydrogeology with groundwater flow directions falling toward the two major rivers; Karetu and Grey Rivers. There is inference that synclinal hinge faults could form preferential pathways for groundwater flow and contribute to vertical anisotropy. ***As I describe in the above paragraph, there is the potential for fractures to be present in the hydrostratigraphic units underlying the landfill.***

32 Both Appendix F and Appendix E reports do not provide detail on the synclinal structure beyond the site. A s92 question; GW-012 (raised by Mr M Silver) seeks confirmation of this conceptual understanding. The applicant has responded to describe a groundwater divide is thought to be present in the middle of the synclinal structure. The applicant has not found evidence that groundwater from the site flows to the east. ***It is reasonable to infer that the groundwater flow direction is more or less parallel to the syncline. However, there remains some uncertainty where the axis of the synclinal structure is located and whether some groundwater flows east in the same direction as the dip until it reaches the hinge of the syncline. To satisfy this interpretation of groundwater flow paths, I have looked at the geological map and I infer the hinge of the syncline could be within 500 m to the east of the Quarry. This general location is within the Karetu River catchment. Therefore, I agree that it is reasonable to conclude that at the axis (also referred to as the hinge) of the syncline, groundwater flow would likely follow the dip of the syncline, which is inferred to be toward the south.***

33 The southern wetland is shown to be connected with the groundwater table. The eastern wetland has been identified not to be hydraulically connected with the groundwater table, but the applicant states that at times, may be locally connected with perched groundwater.

34 Shallow groundwater flow direction is shown to be toward the southwest through to west, having been modified by the quarry pond. The modelled groundwater flow direction is shown to sharply flow toward the south-southwest upon reaching the Karetu silica sands. The range in elevation of the shallow groundwater is modelled between 235 m to 205 m above NZVD.

35 Groundwater in the Karetu silica sand is recharged from the Karetu River upstream and downstream of the site i.e. via the losing reaches. The depth to groundwater in the silica sand ranges between 210 m to 205 m above NZVD across the site in a south-southwest direction as shown in Figure 4-7.

36 Groundwater and surface water have been characterised based on water quality sampling derived from field measurements and laboratory analysis.

37 The results of the water quality monitoring have been used to plot the major ions in selected water samples on a Piper plot to help distinguish the hydrochemical facies (water quality groups). The applicant identifies the three main groups as:

- Upper (i.e. shallow) Whiterock limestone groundwater.
- Deeper Whiterock limestone and upper Berrydale Greensand groundwater.
- Karetu silica sand groundwater and surface water of the Karetu River. This plot supports the assessment that the river is fed by groundwater in the Silica Sands.

4.3 Groundwater model

38 A numerical groundwater model was developed to assess the potential contaminant pathways. The groundwater model that is presented in Appendix F is clear it uses appropriate boundary conditions for the scale of the model and for the proposed use to support the landfill design. The applicant notes the accuracy of the model is limited to the available geological and hydrogeological data from field investigations and literature. ***The model uses***

single effective porosity values also known as specific yield (Sy), (Table 2 of Appendix D in Appendix F), representing primary porosity for each hydrostratigraphic unit. Particle tracking in Modpath has been used to demonstrate the potential contaminant flow direction i.e. leachate leakage in absence of modelling fracture pathways. This means the model could potentially over estimate groundwater travel times if significant interconnected fractures exist through the hydrostratigraphic units between the landfill and the receiving environment. This scenario affects the contaminant travel time and could result in leachate leakage to reach the Karetu River earlier than modelled, however, it does not change the resulting leachate concentrations calculated at the Karetu River. I raised a number of additional minor details that required further clarification as s92 questions; HYDR-006 & HYDR-015. Given the context of the model, these questions have been addressed satisfactorily.

39 Leachate breakout through a liner defect, not captured by the underdrainage system has been assessed to flow downwards and break through the Berrydale Greensand to flow into the Karetu Silica Sands after a period of 10 to 15 years, as shown in Figure 5-1 and 5-2 and ultimately reach the Karetu River.

40 Uncertainty analysis on the potential contaminant flowpaths has been completed by the applicant by adjusting different sets of hydraulic conductivities to adjust the groundwater gradient. The model results show the contaminant pathways remain toward the southwest and the Karetu River.

41 The applicant's response to s92 question; HYDR-003 confirms that modelled groundwater levels in BH01 are 13-14 m higher than the recorded groundwater levels at BH01. ***This response is still not entirely clear. My interpretation of this is a conservative assessment because higher groundwater levels mean a shorter contaminant pathway and a more conservative model. Further clarification would assist in my understanding on the implications of having a model based on elevated groundwater levels.***

42 In response to s92 question; HYDR-006 the applicant has confirmed the location of the discharge points at the Karetu River are close to the landfill site, shown on Figure 5-2. ***I consider these locations are the closest points to the river from the site and will represent a conservative assessment, representing possibly the shortest contaminant pathway between the landfill and the Karetu River.***

5 Receiving Environment

43 Appendix F provides an assessment of the potential impacts to quantity and quality of groundwater and surface water associated with the groundwater take and discharge of leachate during the lifetime of the landfill (construction through to post closure).

44 The applicant identifies the potential effects of the proposed landfill as:

- Water quality effects on groundwater and surface water.
- Effects on water allocation and flows to wetlands and streams.
- Water quality and quantity effects on nearby water users.

With the main effects from the leachate leakage from the landfill liner resulting in contaminant pathways through the groundwater.

45 Karetu River has been identified as the ultimate receiving environment for groundwater that is not intercepted by the landfill underdrainage system at the site.

46 Landfill leachate will be generated by contaminants leaching from the landfill material when they come into contact with rainfall or water runoff or infiltration during the lifetime of the landfill. The landfill design contains key components that are designed to minimise the hydrogeological environmental impacts of the landfill (as described in paragraph 15). ***The***

applicant needs to ensure effective environmental risk management of these key components are implemented as described by our landfill expert; Mr T Kortegast.

47 Collected groundwater from the underdrainage system will drain to a collection sump with water quality monitoring sensors that allow discharge to the Karetu River or the leachate pond depending on the water quality which is matched with trigger levels. Water collected by the underdrainage system identified as clean ambient groundwater will be discharged to the Karetu River via three options; direct discharge, infiltration to ground adjacent to the river or discharge to groundwater.

48 The applicant states contaminant concentrations in leachate are expected to generally decrease following landfill capping and closure due to limiting rainfall infiltration by the sealing of the landfill via a cap. ***I consider that this is not necessarily accurate. Whilst the volume of leachate generation (leachate quantity) is expected to reduce due to the reduction of infiltration due to capping, the leachate quality may increase in contaminant concentration due to the reduced dilution of the leachate.***

5.1 Leachate leakage assessment

49 ***As described in paragraph 30, I consider movement of leachate leakage would follow the groundwater flow paths and will occur through the primary porosity and secondary porosity (where present) in the bedrock. If a fracture or joint was in the vicinity of the point beneath the liner where leachate leakage occurred, leachate could preferentially flow through such defects. This could result in contaminant travel times being faster than through the primary porosity of the bedrock i.e. through the pore spaces in the limestone. How contaminants move through the bedrock via secondary porosity is dependent on the nature of the defects, such as the tightness of a fracture, if a fracture is laterally extensive and whether a fracture is interconnected with other fractures to allow a contaminant pathway to exist. Mobilisation of leachate through these defects cannot be discounted. The groundwater model has not specifically modelled fracture flow. This does not change the results of the leachate leakage assessment (mass mixing approach) i.e. the expected concentration of the leachate leakage in the receiving environment***.

50 The assessment of the potential leachate leakage has been based on scenarios representing a "good" and a "poor" contact liner case. The applicant's leachate liner leakage calculations report leakage rates range between 474 L/day to 776 L/day.

51 An assessment on the potential impact of leachate leakage on the receiving environment under the proposed scenarios has been completed using available leachate quality data. The applicant has selected leachate quality data from Tonlyn Landfill which is a Class 2 C&D type landfill that accepts greenwaste and contaminated soils that meet Class A TCLP criteria which are reported by the applicant to be equivalent to Class 1 WAC. The applicant's response to s92 question HYDR009 provided further details on the relevance of using Tonlyn Landfill leachate quality data in their assessment. ***I consider this to be a reasonable approach in absence of other leachate monitoring quality data being available***.

52 As described in paragraph 17, leachability criteria equivalent to Class 1 WAC criteria are proposed for managing contaminant concentrations at the site. These values are the maximum values which should not be exceeded. Overall, the applicant expects the landfill to be less acidic than a Class 1 landfill due to the absence of putrescible materials and they identify (in response to s92 question HYDR009) that the use of TCLP-based limits is a highly conservative approach for the waste acceptance due to the proposed limited acceptance of organic matter i.e. greenwaste no more than 2% by volume per load will be accepted.

53 A mass mixing approach has been used to assess the effects on the Karetu River by assessing the impacts of a daily leachate rate arriving at one single point at the river without consideration of the natural attenuations process. Contaminant mass mixing calculations have

been assessed at the mean annual low flows (MALF) of the Karetu River based on available NIWA data. ***The contaminant travel times simulated on the groundwater model do not change the results of the mass mixing assessment, i.e. the groundwater quality results are not expected to change if there is a greater amount of flow via secondary porosity (fractures).*** Water quality data obtained from the Karetu River has been used in the assessment of leachate mixing. Three leachate leakage scenarios have been assessed:

- Scenario 1 - likely liner leakage (474 L/day).
- Scenario 2 - worst liner leakage (776 L/day).
- Scenario 3 - 100% failure (15 m^3/day).

The example of 100 % failure is for a liner or leachate pond breakout which represents a significant failure where leachate reaches the Karetu River. **Based on the design of the landfill and the waste type, I *consider these leachate volumes to be fairly high and conservative and I refer to our landfill expert; Mr T Kortegast who provides comments on the HELP model and the likely leachate generation rate whom I rely on for this matter.***

54 Water quality results have been assessed against the Australian and New Zealand Guidelines for fresh and marine water quality (ANZG) 95% species protection which show for likely liner and worst liner failure scenarios, no contaminants exceed these guidelines as shown in Table 5.5. All parameters assessed are shown to be similar to the existing Karetu River water quality with the exception of NH4-N.

55 For 100% failure scenario, chromium and NH4-N are shown to exceed ANZG 95% species protection. Boron and manganese are shown to have noticeable increases when compared with the baseline Karetu River water quality. Elevated NH4-N has been assessed as unlikely to exceed ANZG 95% species protection because no greenwaste will be accepted at Whiterock.

56 The applicant identifies concentrations of aluminium is close to the ANZG 95% species protection levels for 100% failure scenario. ***I note that this contaminant concentration is the same for all assessed scenarios and is the same contaminant concentration in the baseline Karetu River water quality.***

57 Contaminant concentrations in the Karetu River following leachate mixing for all three scenarios do not show exceedances for the Drinking Water Standards for New Zealand (DWSNZ).

5.2 Effects on water allocation

58 The applicant has identified that the drainage of groundwater via the quarry pond represents the existing groundwater environment. Landfill has been designed so that groundwater levels are at least 1 m below the base of the landfill liner (GCL layer) and these groundwater levels are further controlled by the underdrainage system. The applicant reports there is a balance between maintaining sufficient groundwater separation distances between the base of the landfill and minimising the drawdown effects on the wetlands.

59 Numerical groundwater modelling has been completed to assess the groundwater volume discharging from the quarry pond drainage (32 m^3/d). The applicant proposes the underdrainage design will remove the same groundwater volume from the landfill. It is reported that an increase in the rate of groundwater removal may occur for several weeks at a time during construction of Stage 1 and 2 of the landfill with increases of groundwater removal to 74 m^3/d.

60 Modelling of the net groundwater drawdown effect is shown in Figure 5-3 and is identified as a result of the reduced rainfall infiltration rate due to the landfill (operation) and capping of the site (post-operation). Groundwater level drawdown of > 0.1 m is shown (Figure 5-3) extending up to 700 m to the east and up to 150 m to the south. These changes are reported

to take several years to occur and the applicant considers the effects shown by groundwater modelling on streams may not be measurable changes.

61 In response to s92 question; HYDR-012, the applicant identifies that although the modelled net groundwater drawdown effect on Stream 1 (shown in Figure 5-3) is 0.2 – 0.4 m, at this location Stream 1 is not connected with shallow groundwater. It is concluded that the baseflow of Stream 1 may reduce by 2%.

62 The assessed effects on the wetlands are more significant and the groundwater modelling shows there will be a reduction in baseflows to the nearest wetland of 19%. Measures (methods to replace loss of baseflow) are proposed to manage these effects. ***I am not entirely clear on the proposed mitigation solution provided by the applicant as described in paragraph 73 and how it would address the effects on reduced baseflows to the southern wetland.***

63 Water quantity effects have been assessed not to have an effect on the nearby water users. ***Based on the results of the groundwater level drawdown described in paragraph 60, and the elevation of the landfill, I consider it unlikely that water quantity effects will occur to nearby water users.***

5.3 Effects on water users

64 Shallow groundwater users within 2 km of the site have been identified by the applicant based on publicly available information and during community engagement, where other users of shallow groundwater and/or surface water users adjacent to the Karetu River were identified.

65 The contaminant mass mixing assessment shows that DWSNZ guidelines are not exceeded at the Karetu River at the closest spot, a distance not provided but we estimate to be approximately 50 m from the leachate pond. In responding to s92 question; HYDR-010, the applicant has confirmed the mass mixing assessment assumes full mixing of the total potential contaminant load and does not include dispersive mixing processes. ***I consider this mass mixing assessment to be suitably conservative to assess the effects on groundwater on the basis of the high leachate leakage volumes used in this calculation at a single point of discharge. However, the overall effects on groundwater are reliant on the applicant ensuring effective environmental risk management and robust control of the actual waste stream being disposed at the landfill. This is also covered by our Geotechnical expert; Mr C Anderson who I also rely on for this matter, who describes the stringent quality control requirements of the 600 mm thick clay lining.***

6 Monitoring

66 Monitoring and mitigation measures are proposed. This includes a Monitoring and Trigger Action Response Plan (TARP) (Appendix M) which brings together the proposed monitoring and mitigation measures from other reports included in the applicant's resource consent application. Specific groundwater related measures are recommended to avoid, minimise and remedy potential effects on groundwater users and values that depend on groundwater.

67 Monitoring includes monitoring of water levels, flows and water quality, and monitoring of the leachate control system (leachate quality, under drainage and groundwater quality). Baseline monitoring is proposed prior to the landfilling activities and the collected data will be used to establish trigger levels. Provisional trigger levels have been proposed and the applicant proposes to review these trigger levels after additional baseline monitoring data is collected. ***I consider this approach to be a standard method used to verify the existing monitoring data.***

68 Existing and new groundwater monitoring wells, shown on Figure 3-1, will be used to measure upgradient, cross-gradient and down gradient groundwater levels at eight locations (six

locations are paired shallow/deep). The monitoring wells penetrate the Whiterock limestone and the Karetu silica sands. In response to s92 question; HYDR-013, the applicant proposes to add monitoring wells GW8-1 and GW8-2 to the monitoring programme to provide additional information on the groundwater quality to the west of the landfill. ***I consider the number and spatial distribution of the monitoring wells to be reasonable given the size of the site and the groundwater flow paths.***

69 Groundwater quality will be measured to assess changes in the water quality and to "capture"* (as described by the applicant in Section 6.2.1) a potential groundwater contaminant plume from the landfill over the life of the landfill. ****I assume this means to identify early stages of a contaminant plume rather than "capture" meaning to collect.***

70 Water quality parameters selected are typical of landfills shown on Table D of the TARP with indicator water quality parameters and key contaminants which could leach from landfills and affect the receiving water environments. ***I consider the selected list of water quality parameters appropriate and these are reported in Appendix K of the Technical Guidelines for Disposal to Land (WasteMINZ 2023). However, I also refer to ECan Groundwater Quality expert; Mr M Silver who provides further recommendations for additional parameters.***

71 The frequency of monitoring reported is as follows (more comprehensive details are provided in Table E of the TARP Draft Rev B):

- Baseline monitoring - Groundwater - monthly for at least 6 months prior to the landfilling commencing, surface water - bi-monthly for 12 months.
- Operational monitoring – Leachate – monthly, groundwater – quarterly with continuous monitoring at the underdrainage system, surface water – two dry events and two wet events annually.

I note that there is a discrepancy between the groundwater quality monitoring duration stated in Table E (6 months) and that listed on the Document Control (page 1) (to occur for a minimum of 12 months). I consider that a monitoring duration of 12 months would be more appropriate for the baseline monitoring. The proposed operational monitoring frequency for groundwater monitoring is greater than the frequency as shown in Table 8.5 of the Technical Guidelines for Disposal to Land (WasteMINZ 2023).

72 Responses to a trigger level exceedance is described in Table G of the TARP. For groundwater, Trigger level 3 (normal), provisional triggers proposed are baseline mean + or – 2SD (standard deviations) for selected parameters. ***This means 95% of the parameter values are within 2 standard deviations of the mean. I note the WasteMINZ Guidelines refer to the setting of trigger levels for individual parameters at 3SD from the mean or at the median/maximum concentration plus a pre-agreed margin and consider this approach to be standard when selecting trigger levels. Therefore, the applicant is selecting a relatively cautious trigger level.*** For Trigger level 2 (Reduction/Alert) this includes either an increasing trend or decreasing trend observed depending on the selected parameter. For Trigger 1 (Noticeable effect) provisional triggers proposed vary depending on the selected parameter.

7 Mitigation

73 Measures to manage the water quantity effects on wetlands and streams are provided. The applicant proposes to capture groundwater seepages upgradient of the wetlands to manage the predicted loss of baseflows to the wetland in low flow conditions, as shown in Figure 5-3 (amount of groundwater reduction) and Figure 6-1 (remedial solution). In response to s92 question HYDR-014, the applicant's numerical groundwater modelling results show groundwater flow from the engineered wetland or drainage pipe (shown in Figure 6-1) would be greater than the loss in groundwater flow to the southern wetland. This means there will be a net gain in groundwater flows received by the wetland. ***However, it is still not entirely***

clear how the taking of the groundwater upgradient of the wetland will not have a negative effect the wetland itself, i.e. the construction around the wetland may further reduce the residual groundwater flows into the wetland. In addition, I do not understand how these works can be completed without disturbing land within 10 m of the existing wetland boundary as per proposed Consent CRC243703 Condition 5 so that it complies with rules in the National Environmental Standards for Freshwater 2020 (NESF).

74 The applicant identifies that to manage the water quality effects on the underdrainage water, if the monitoring shows exceedances in the adopted trigger levels for the underdrainage water, this will be diverted to the leachate pond until contaminant levels are consistently below the trigger levels. Investigations and contingency measures are proposed as a result of these exceedances.

75 If trigger level exceedances occur in groundwater, liner defect repair, if practicable and line-abstraction and treatment remedial measures are proposed. If a significant groundwater contamination plume forms as a result of the landfill and the water quality of the Karetu River exceeds DWSNZ, abstractions (water supplies) from the river as either a direct take or infiltration galleries are recommended to cease and an alternative water supply will be provided. ***The overall effects on groundwater are reliant on the applicant ensuring effective environmental risk management controls and I refer to our landfill expert; Mr T Kortegast who provides these details, which I rely on their response to support this matter. On this basis, I consider that given the proposed liner design, the modelled leachate leakage quantity and the results of the groundwater model, these remedial measures are appropriate for trigger level exceedances in groundwater at the landfill.***

8 Consent conditions

76 In relation to the relevant consents; CRC243700, CRC243702, CRC243703, CRC243704, CRC243705, I consider that many risks are adequately addressed by the proposed consent conditions covered in these consents which include:

- Requirement of a Site Management Plan which includes information on environmental monitoring and monitoring trigger levels, actions and responses.
- Considerations to spills.
- Unexpected discovery protocol for contaminated material.
- Review condition to deal with any adverse effect on the environment which may arise from the exercise of the consent.

77 I also refer to matters in relation to consent condition CRC243705 covered by our landfill expert: Mr T Kortegast who identifies in their paragraph 125, the recommendation to provide assurance that ongoing engineering and waste stream controls have oversight and remain effective with ongoing peer review. Also, in their paragraph 126 where the aftercare period should be extended to a likely 20-30 years, or until such time as discharges to the environment are deemed by the regulator to be minimal. I rely on their response to address this matter.

78 In relation to Consent CRC243703 Condition 5, I do not understand how the construction works to implement the mitigation measures can be completed without disturbing land within 10 m of the existing wetland boundary in accordance with the relevant rules of the NESF. ***Further clarification by the applicant is required.***

9 Submissions

79 A review of the submissions has been completed where "groundwater", "drinking water" and "water quality" themes have been identified by ECan[2]. A selection of individual submissions have been reviewed based on comprehensiveness of the submission or where different matters to the majority of the submissions have been raised. For other submissions, I have read the summary as provided by ECan. This includes the submissions relating to groundwater where the submitter wants to be heard. I summarise the list of these submissions and key matters raised. Not all of these are listed here (some were reviewed but did not contain any new matters to that already reported). I note that there are multiple other themes and crossovers raised by the submissions. I have relied on responses to these other themes from other technical experts where relevant. The overall general submission topics associated with the above listed themes are identified below with my response to each topic in *italic* text.

80 Appropriateness for construction of a landfill onto limestone.

My comments on this matter are referred to in paragraph 24 and this matter is covered by our geotechnical and landfill expert. I rely on their response to address this matter.

I have been made aware of a cavern feature (photograph of stalagmite) by one of the submitters (O Meijer SUB034717) that was uncovered during the quarry excavation. This indicates that a void/cavern has been encountered within the Whiterock limestone. Other submitters including: A Webb SUB034380, R Connelly SUB034529, N Denton SUB034634, P & K Latz SUB034488, Duncan Mackintosh SUB034805 also refer to voids/caverns. The applicants' design report notes that Karst (limestone dissolution) features, if encountered, can be mitigated by over-excavation and backfill. The applicant needs to include details of the appropriate measures to remedy any voids encountered within the landfill footprint in the Management Plan.

81 Construction of landfill over spring(s) and in groundwater.

The applicant does not specifically refer to springs in Appendix F and it is not clear whether all of the submitters (A Webb SUB034380, R Connelly SUB034529, N Denton SUB034634, Duncan Mackintosh SUB034805) are referring to groundwater seepages feeding the wetlands or other springs at the site or discharging to the river. The landfill design includes an underdrainage system installed beneath the landfill liner to control groundwater levels to at least 1 m below the top part of the liner. The applicant needs to clarify the submitters reference to springs and confirm that the underdrainage system controls spring flows if they are within the landfill footprint. The applicants proposed design for the underdrainage system would need to assess the location and flow rate of the springs to allow flows to be effectively managed.

82 Landfill liner containment with the potential rupture of the liner due to local faulting and instances of earthquakes.

This matter is covered by our geotechnical and landfill expert. There are a range of submissions (including those referenced in this report) on engineering design and performance of the liner system these are addressed by others and I only comment on effects on groundwater. Therefore, I rely on their response to address this matter.

83 Deterioration of the liner over time and leachate leakage.

This matter is covered by our landfill expert; Mr T Kortegast who identifies the service life of a liner would be at least 400 years to over 750 years. This is also covered by our Geotechnical expert; Mr C Anderson who describes the stringent quality control requirements of the 600 mm thick clay lining which is not subject to the same deterioration processes as the HDPE liner. I rely on their responses to address this matter.

[2] Summary spreadsheet, "Working Copy_Submission Summaries_latest.xlsx" provided by ECan on 19.11.2024

84 The mobilisation of leachate through the limestone including the potential to dissolve/erode limestone, create groundwater pathways and development of sinkholes has been raised by many submitters including; M Banks SUB034475 and O Meijer SUB034717.

The applicant has identified that leachate leakage will occur through a defect(s) in the HDPE liner. Leakage has the potential to pass through the liner and reach the limestone if defects occur and a leachate head is present at the location of the defect. The applicant does not describe the potential for leachate to dissolve/erode the limestone. Appendix F reports pH levels of leachate samples from Tonlyn landfill range between 7.4 to 7.9 pH units with a median pH level of 7.6 which is slightly alkaline (basic). As described in Appendix K, green waste or other organic wastes will be prohibited, other than ancillary biodegradable materials up to a maximum of 2 % by volume per load and there will be no organic or putrescible C&D wastes. By comparison, rainfall is typically acidic and will naturally enhance dissolution of limestone. Based on my understanding of the leachate generation from this type of proposed waste, and the expected pH range of the leachate, it is my opinion that development of new pathways in limestone from dissolution of limestone matrix by leachate leakage is unlikely to occur over the lifespan of the landfill. Therefore, I consider that the matter raised by the submitters is unlikely to occur or result in the adverse effect with the dissolution of limestone.

85 Leachate contaminants entering groundwater including asbestos.

The numerical modelling completed by the applicant has assessed groundwater flows (direction and travel time based on primary porosity in the units), simulating leachate contaminants entering groundwater. As per my comments in paragraph 38, I consider the applicants groundwater model to be clear with the use of appropriate boundary conditions for the scale of the model and for the proposed use to support the landfill design. I refer to paragraph 65, where I consider the overall effects on groundwater are reliant on the applicant ensuring effective environmental risk management which includes ensuring a high level of control of the waste stream, a high standard of liner construction, maintaining effective control of leachate generation and minimisation of leachate head long term; and putting in place effective monitoring and environmental management processes, including peer review of design and operation. This matter is covered by our landfill expert; Mr T Kortegast and I rely on their response to support this matter. Asbestos contamination at the landfill would be present as fibres and once buried, asbestos is immobile. Asbestos does not impact groundwater[3] and fibres do not move through the bedrock. Therefore, I consider these matters raised by the submitters are unlikely to occur or result in the adverse effect on groundwater.

86 Presence of waste materials containing PFAS and thus resulting in leachate containing substances such as PFOS-PFAS, hydrocarbons, and other contaminants.

PFAS poses a more significant challenge, and it is likely that PFAS will be present at some level in C&D waste and has the potential to be present in leachate. This matter was raised by Nigel Coughlan SUB034639 and is covered by our landfill expert: Mr T Kortegast and ECan's groundwater expert; Mr M Silver. I rely on their responses to address this matter.

87 Leachate contaminants entering surface water and impacting on stock water, irrigation water and drinking water supplies.

The numerical modelling completed by the applicant has assessed groundwater flows (direction and travel time based on primary porosity in the units), simulating leachate contaminants entering groundwater and subsequently discharging to surface water. As per my comments in Section 4.3 the applicant's groundwater model includes uncertainty analysis which looks at different scenarios and variable input parameters for groundwater flow and leachate leakage. The results of the modelling provides a conservative assessment of the risks of contaminant breakthrough in sensitive environments based on the modelled leachate

[3] Bint, L. *et al* (November 2017) New Zealand Guidelines for Assessing and Managing Asbestos in Soil. BRANZ.

leakage volumes and single point of discharge. The absence of specific fracture flow assessment in the numerical model could result in leachate leakage to reach the Karetu River earlier than modelled, however, it does not change the resulting leachate concentrations calculated at the Karetu River. This matter is also covered in paragraph 85, which I rely on to address this matter. Therefore, I consider this matter which has been widely raised by the submitters are unlikely to occur or result in the adverse effect on groundwater providing the applicant ensures effective environmental risk management controls are put in place.

88 The effects on water quality in local surface water catchments of the Karetu, Okuku and Rakahuri Rivers has been raised by many submitters including; A Webb SUB034380, R Connelly SUB034529, N Denton SUB034634, P & K Latz SUB034488, Duncan Mackintosh SUB034805.

The applicant considers the effects of leachate discharge in the Karetu River at the closest point to the landfill. My comments described in paragraphs 49 to 57 provide the detail of the applicants' assessment and conclude (in paragraph 57) that contaminant concentrations in the Karetu River following leachate mixing for all three scenarios do not show exceedances for the DWSNZ. Based on the results of the applicants' assessment, this means concentrations of leachate in surface water downstream of this point will be less than their corresponding Drinking Water Standard.

The numerical modelling completed by the applicant has assessed groundwater flows (direction and travel time), simulating leachate contaminants entering groundwater and subsequently discharging to surface water. The model has assessed up to 20 years of groundwater breakout at the Karetu River to be up to approximately 1 km[4] from the landfill. Beyond this point, no further assessment has been made by the applicant because no further modelled discharge points have been identified. I consider this matter raised by the submitters is unlikely to occur or result in the adverse effect on water quality in the local surface water catchments.

89 Response to and implementation of the mitigation measures has been specifically raised by submitters; M Banks SUB034475 and Nigel Coughlan SUB034639.

As per my comments in paragraphs 66 to 72, the applicant provides details of monitoring for water quality. I consider these details and methodology to be satisfactory approach provided the monitoring is effectively implemented and managed. However, as per paragraph 71, I consider that a baseline groundwater monitoring duration of 12 months would be more appropriate.

In paragraph 73, the applicant describes mitigation measures to remedy the water quantity effects on wetlands and streams. It is still not entirely clear how the taking of the groundwater upgradient of the wetland will not have a negative effect the wetland itself and how these works can be completed without disturbing land within 10 m of the existing wetland boundary as per proposed Consent CRC243703 Condition 5 in compliance with rules in the NESF. Further clarification from the applicant is required before I can comment on this matter.

The applicant provides details of mitigation if a significant groundwater contamination plume forms from the landfill which I describe in paragraphs 74 and 75. Leachate leakage is covered by our landfill expert and I rely on their response to inform my opinion on this matter. Based on the low leachate generation rate and the considered minimal risk of significant leachate migration to groundwater through direct leakage I consider that the applicants monitoring and proposed actions identified in the underdrainage water should be effective to manage groundwater contamination providing effective monitoring and environmental management processes are put in place.

90 Long term responsibilities of the landfill post-closure and legacy issues.

[4] Our estimate based on a measurement from Figure 5-2 in Appendix F.

This is a matter for ECan to comment on regarding the long term responsibilities of the landfill post-closure. The legacy issues associated with an aging waste mass and landfill liner are covered by our landfill expert who identifies a key factor in managing environmental risk is control of the actual waste stream being disposed of. I rely on their response to address this matter.

91 To summarise, I assess that most the water quality issues raised by the general submissions described above have been sufficiently addressed in the applicant's groundwater modelling. There are some matters that warrant further assessment and/or consideration and these have been described in this report.

92 In addition to the above submission reviews, I have also reviewed the following group submissions where the submission is more comprehensive and related to groundwater/ water quality, submission ID provided in brackets:

- White Rock Community (SUB034741).
- Rangiora High School (SUB034511).
- Tihiaki North Loburn School (SUB034709).
- Te Ngāi Tūāhuriri Rūnanga Inc (SUB034552).

93 Many of the submissions have repeated matters, therefore, I have selected one of the more comprehensive submissions to respond to the matters raised. I consider that this submission and those matters described above address the key matters raised by the submitters. My comments are in italics below each matter. In the White Rock Community submission (SUB034741) the following matters associated with groundwater were raised in addition to most of the matters already described above.

94 Incorrect approach to the requirement for a resource consent under the National Environmental Standards for Freshwater 2020 (NESF) generally relating to; the reduction in groundwater seepage flow to the wetland due to placement of the liner, discharge of groundwater to maintain flows and levels to wetlands, and dewatering of landfill underdrainage system.

I refer to ECan to provide a response to comments on the NESF and policy framework matters.

I can provide comment on the reduction in groundwater seepage flows which is referred to in my paragraphs 44, 58 and 62. The applicant reports there is a balance between maintaining sufficient groundwater separation distances between the base of the landfill and minimising the drawdown effects on the wetlands. The assessed effects on the wetlands shows there will be a reduction in baseflows to the nearest wetland of 19%. I consider that if appropriate measures are implemented, the effects on reduced baseflows to the southern wetland can be managed. However, it is not entirely clear on the proposed mitigation solution provided by the applicant as described in paragraph 73 and how this complies with rules in the NESF. Further clarification from the applicant is required before I can comment on this matter.

95 Effects of temporary onsite dewatering for the leachate pond and dewatering of the underdrainage.

Dewatering is not specifically mentioned in Appendix F, but the applicant refers to "temporary construction drainage will be required followed by permanent drainage". I consider the applicant appropriately describes the effects from the permanent drainage. Overall, I agree with the applicant that the changes to the groundwater levels will be small but as referred to in my paragraphs 44, 58 and 62 the reduction in baseflows to the nearest wetland is notable. it is not entirely clear how the applicant will manage the effects of lowering the groundwater level on the wetland based on the proposed mitigation solution provided as described in paragraph 73 and how this will be achieved. Further clarification from the applicant is required to address this matter.

96 There are 13 families who have drinking water supplies taking from shallow groundwater or Karetu River not considered in the consent application.

I have looked at the locations of these water supplies based on figure provided in the submission and I consider that this is addressed in paragraph 87.

97 Hydrogeology assessment and the conceptualisation is considered unreliable due to actual river flows, points of gains and losses in the Karetu River.

I refer to the ECan experts to address the matters on the Karetu river flows. It is my understanding that at the time of the applicant's report there was limited published information on points of gains and losses in the Karetu River. The applicant has used available data from NIWA for their assessment.

98 Hydrogeology assessment and the conceptualisation is considered unreliable due to quality and quantity of leachate.

As per my comments in paragraph 51, the applicant has selected leachate quality data from Tonlyn Landfill which is a Class 2 C&D type landfill that accepts greenwaste and contaminated soils that meet Class A TCLP criteria. The applicant has provided further details on the relevance of using Tonlyn Landfill leachate quality data in their assessment (response to s92 question HYDR009). I consider this to be a reasonable approach in absence of other leachate monitoring quality data being available. Leachate quantity is covered by our landfill expert and I rely their response to inform my opinion on this matter.

99 Hydrogeology assessment and the conceptualisation is considered unreliable due to groundwater flow paths.

It is not entirely clear from the reference on "Groundwater flow paths" what aspect the submitter is referring to. However, based on my comments in paragraph 29, I agree that there is no discussion on how the groundwater moves between the overlying confining layer to the Karetu Silica Sands. In paragraph 30 I describe my interpretation of primary and secondary porosity in the hydrostratigraphic units. My comments in paragraphs 31 and 32 refer to applicants' assessment that groundwater flows are strongly influenced by the synclinal geology. I conclude that it is reasonable to infer that groundwater flow direction is more or less parallel to the syncline, and groundwater flows at the axis of the syncline are likely to follow the dip toward the south, located in the Karetu catchment. Further clarification should be sought by the submitter if this matter is covered. Additional information from the applicant on groundwater flow paths could be sought this matter. However, overall I consider the hydrogeological conceptual model for the site locality presented by the applicant is acceptable, noting that groundwater travel times could be reduced if significant interconnected fractures exist. I expect that any additional information on the groundwater flows paths will not materially change the conceptual understanding of the site on the basis that the most likely shortest contaminant pathway has been considered by the applicant.

100 Hydrogeology assessment and the conceptualisation is considered unreliable due to potential groundwater contamination locations.

It is not entirely clear from the reference on "potential groundwater contamination locations" what aspect the submitter is referring to. My inference to this matter is that there is concern on the assessed locations of where leachate contamination has been identified. As described in paragraphs 38 to 42 relating to the groundwater model, I consider the applicants model to be clear with the use of appropriate boundary conditions for the scale of the model and for the proposed use to support the landfill design. There remain some minor matters to be address on the groundwater model, as I have described in paragraphs 41. However, I consider it likely that these minor matters will not materially change the results of the assessment.

101 The submitters do not have confidence in the conceptual site model (hydrogeology and geology), therefore, they do not have confidence in the numerical model. In addition, the

numerical model fails to take account of the other groundwater users; 13 families drinking water supplies assessment is focussed on the Karetu river (where groundwater breakout occurs) and not sensitive groundwater receptors.

As described in my response to the general comments raised by the submitters in paragraphs 87, and in paragraph 38, I consider the applicants groundwater model to be clear with the use of appropriate boundary conditions for the scale of the model and for the proposed use to support the landfill design.

102 Summary comment in the submission relates to "the magnitude of effects are downplayed or inadequately assessed".

With respect to groundwater and water quality, I agree that there a few matters requiring further clarification. The applicant should provide responses to these matters raised in this s42a report. However, based on my professional expertise and the opinions of other experts, which I rely on to make my informed conclusion I consider that these matters may not represent significant changes to the proposed landfill development with respect to hydrogeology. I consider the applicants groundwater model to be clear and appropriate for the proposed use to support the landfill design. Our landfill expert identifies the service life of a liner would be at least 400 years to over 750 years and I consider the risk of significant leachate migration to groundwater through direct leakage would be minimal based on the leachate generation rate. I rely on our landfill expert; Mr T Kortegast who identifies a key factor in managing environmental risk is control of the actual waste stream being disposed of and the applicant ensuring effective environmental risk management controls are put in place. Consent conditions are accordingly proposed by our landfill expert.

10 Conclusion

103 Having reviewed the Groundwater and Surface Water Effects Assessment, proposed consent conditions and other relevant documents listed above, I consider that the amount of data gathered and reviewed on the groundwater system to inform the assessment on groundwater effects provides a satisfactory level of understanding on the groundwater environment at the site. This is supported by a numerical groundwater model using a conservative approach to assess the effects of leachate leakage on the groundwater environment. Based on the information available for the underlying geology, from a hydrogeological perspective, I consider that the proposed site has some technical constraints. To ensure the site is suitable for a landfill these constraints need to be engineered by the placement of a liner and leachate management system as proposed by the applicant. The overall effects on groundwater are reliant on the applicant ensuring effective environmental risk management and robust control of liner construction and of the actual waste stream being disposed at the landfill.

104 I consider there are some matters of detail that need to be addressed through further responses and/or in a revised set of consent conditions.

- Further clarification is sought on the hydrogeology conceptual model relating to elevated groundwater levels around BH01 used in the numerical model.
- The discrepancy in the groundwater quality monitoring duration stated in the TARP could be addressed in a revised set of consent conditions.

105 Clarification is sought on the design and implementation of the mitigation measures to remedy the reduction in baseflows to the southern wetland. This also relates to Consent CRC243703 Condition 5, how these construction works can be completed in accordance with the relevant rules of the NESF.

Report prepared by:

Sally Lochhead

Senior Hydrogeologist

Tonkin & Taylor Ltd

7 March 2025

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Appendix 10: CRC, Hazards Assessment Memorandum, prepared by Nick Griffiths

Science Advice

Date	31 January 2025
To	Katie Nagy
CC	
From	Nick Griffiths

Whiterock Limestone Quarry and Landfill – Flood Hazard

Key Messages

- There is potential for flooding from the Karetu River around the existing site buildings
- Some submissions note general concerns with respect to flood hazards, but no evidence is provided to indicate that the flood hazard is more significant than stated by the applicants
- The existing quarry and proposed landfill location is not susceptible to flooding from the Karetu River

Introduction and Purpose

1. Katie Nagy has asked for advice on flood hazards from the Karetu River at the Whiterock Limestone Quarry and proposed landfill site. This advice will be used to assist processing of a resource consent application by Protranz to develop a landfill at the Whiterock Limestone Quarry.

Data and analysis

2. This advice is based on a review of flood modelling information provided by the applicant as part of the resource consent application, LiDAR (ground level) data for the site and surrounding area, and site plans indicating the proposed location of the landfill and associated infrastructure.

Interpretation

3. I have reviewed flood modelling carried out by WSP on behalf of the applicant. I consider the modelling to be suitable for identifying areas of the site that may be susceptible to flooding in a range of design flood events.

4. The modelling shows that some flooding could occur around the existing site buildings from the Karetu River in large (50-year average recurrence interval (ARI) or greater) flood events. The area where the existing buildings are situated has reasonable fall toward the Karetu River, and differences in flood extent between say a 50-year ARI and 200 year ARI event are therefore not substantial. If the chosen model parameters were to be underestimating the severity of flooding, this is unlikely to have a significant impact on the extent of areas shown to be potentially affected.

5. Submissions on the resource consent application note general concerns with respect to flooding at the site, but no evidence is provided to suggest that the information provided by the applicant is inaccurate.

6. The existing quarry and proposed landfill location is situated at least 10 m above the areas of the site that could be affected by Karetu River flooding, and is also located above the height of the river terrace on the opposite bank. The existing quarry and proposed landfill location is therefore not susceptible to flooding from the Karetu River. Considering the underlying geology and the position of the river relative to the proposed landfill, I have no concerns that it could be impacted by riverbank erosion.

Appendix 11: SLR Consulting, Surface Water Quality and Ecology s42A report, prepared by Fleur Tiernan

Before the Independent Hearing Panel appointed by the Canterbury Regional Council

IN THE MATTER OF The Resource Management Act 1991

AND

IN THE MATTER OF Application CRC243699 to Protranz International Limited application for landfilling at Whiterock Quarry, 150 and 174 Quarry Road, Loburn, North Canterbury.

Section 42A Officer's Report

Report of Fleur Tiernan

Introduction

Background

1. This report forms part of the Environment Canterbury's audit of the assessment of environmental effects (AEE) provided by Protranz International Limited (the applicant) in support of resource consent applications CRC243699.
2. This report will provide the decision-maker with information and advice related to:
    a. The actual and potential effects of the proposed activities on surface water quality and aquatic ecology of the Karetu River and the Eastern Boundary Watercourse.

Qualifications

3. My full name is Fleur Tiernan
4. I am an environmental scientist and hold a BSc. (Zoology, 1997), and two MSc (Freshwater Ecology and Environmental Engineering, 1999, 2002) from the National University of Ireland, Galway and Queens University Belfast. I am a member of the New Zealand Freshwater Sciences Society and am a Certified Environmental Practitioner since 2016. I am also a member of the Environment Institute for Australia and New Zealand and headed the local branch in the Top of the South for two years.
5. I have been an employee of SLR Consulting NZ Ltd (SLR) since 17 October 2022. Previous to this I worked as an environmental scientist with Envirolink Limited for two years. I have also worked for six years as an environmental scientist for the Marlborough District Council managing their state of the environment freshwater and coastal water monitoring programmes. In addition, I was a Director of a small New Zealand environmental consultancy, Sustainable Environmental Engineering Limited for ten years. Prior to emigrating to New Zealand I worked for the Scottish Environmental Protection Agency and the Environment Protection Agency in England and Wales for four years, assessing the environmental impacts of water and wastewater discharges to surface waters (rivers and lakes).
6. I have been involved with devising monitoring programmes to define the state of freshwater resources in Marlborough, in catchment studies to investigate the impacts of landuse activities on water quality and aquatic ecology and in numerous assessments

of environmental effects including from industrial discharges, gravel extraction, compost stockpiles and water abstractions.

7. I have complied with the Code of Conduct for Expert Witnesses contained in the Environment Court Consolidated Practice Note 2023. This evidence is within my area of expertise, except where I state that I am relying on the advice of another person. I have not omitted to consider any material facts known to me that might alter or detract from the opinions I express.

Scope of Report

8. This report sets out the findings of my review of the proposed application activities on surface water quality and aquatic ecology. To carry out this audit of the consent applications, I have:
    a. Considered the relevant sections of the assessment of effects on the environment (AEE) submitted by the applicant, including relevant sections of the technical appendices:
        i. Appendix F: Groundwater and Surface Water Effects Assessment.
        ii. Appendix G: Ecological Impact Assessment.
        iii. Appendix M: Monitoring Programme and Trigger Action Response Plan (TARP).
        iv. Appendix C: Stormwater Management Report.
    b. Reviewed further information that was provided by the applicant:
        i. Section 7 – Surface Water Quality, dated 16 August 2024.
        ii. Appendix Y Proposed Conditions Rev1, dated 23 August 2024.
        iii. Appendix M: Monitoring Programme and Trigger Action Response Plan (TARP) Draft Rev B.
    c. I attended a site visit on the 30 May 2024 with ECan consent planners, the applicant and the applicant's ecologist.
    d. Taken into account relevant issues raised by submitters in relation to the effects I have considered in this report.

Description of the Affected Environment

The Proposal

9. Whiterock Quarry has been operating as a limestone quarry since the 1950s. The quarry lies directly east of the Karetu River and is accessed via an unsealed road across a ford in the river. A small unnamed intermittent stream, the 'Eastern Boundary Watercourse', flows along the eastern and southern boundary prior to discharge to the Karetu River. The applicant is proposing to construct and operate a Class 3 Managed Landfill, with the existing quarry pit being used for the landfill.

10. Limestone processing activities will continue during the staged development of the landfill.

11. The existing ford crossing on the Karetu River will be removed and a 23 m span bridge built to provide access to the site.

12. The discharge of stormwater from site activities will be from a new outfall to the Karetu River from a Sediment Retention Pond (SRP). The discharge of sediment from site

activities is more fully described in Appendix C: Stormwater Management Report. The proposal also involves the discharge of landfill leachate to ground, where it may enter groundwater and subsequently surface waters i.e. the Karetu River and the Eastern Boundary Watercourse.

Water Quality – Karetu River

13. The Karetu River is a 4th order river that flows north to south to the west of the site. New Zealand's rivers and streams are classified according to the River Environment Classification (**REC**[1]) system. REC organises information about the physical characteristics of individual river reaches according to physical factors such as climate, source of flow for the river water, topography, geology and catchment land cover (e.g. forest, pasture or urban). This classification system allows for sections of river, that have similar ecological characteristics, to be grouped together. The Karetu River at the Quarry site (NZ Reach ID 13033319), is classed as a cool dry, hill country, soft sedimentary, exotic forest, mid order, low gradient river (CD/H/SS/EF/MO/LG), with a catchment area of approximately 19 km^2.

14. Exotic forestry dominates the upper reaches of the Karetu River catchment.

15. The Applicant has estimated river flows from NIWA's NZ River Maps database.

16. Water quality sampling was carried out by the applicant on two occasions: on 18 October 2022 and 20 April 2023. In my opinion this is insufficient to characterise the water quality of the river.

17. Samples were collected from two sites on the Karetu River, located upstream of the quarry (site SW2) and downstream of the quarry (site SW5). However, the upstream site was not located sufficiently far upstream to represent background water quality. The Ecological Impact Assessment report (Appendix G) states: '*it was discovered that the upstream water quality monitoring location was downstream of an unmanaged stormwater discharge from the existing quarry*'. This oversight has meant that no true 'upstream control' site was available to enable comparison of the affected reach water quality against background water quality.

18. The river water is identified as a source of drinking water in Appendix F: Groundwater and Surface Water Effects Assessment.

Fish Communities – Karetu River

19. Water samples for environmental DNA (eDNA) analysis were collected from the Karetu River upstream and downstream of the Quarry, and the existing ford location, on 17 January 2023. These sample locations differed from the water quality sample locations, with the upstream eDNA sample site located approximately 250 m upstream of the upstream water quality site. Sampling followed recommended best practice, with six replicate samples collected at each site. Six replicates are required to identify 90% of the fish species present (Smith et al., 2023).

20. The following species, along with their threat classification (Dunn et al. 2018), were detected in the eDNA samples at both the upstream and downstream sites:

Longfin eel (*Anguilla dieffenbachii*)	At risk - declining
Shortfin eel (*Anguilla australis*)	Not threatened
Upland bully (*Gobiomorphus breviceps*)	Not threatened

[1] https://niwa.co.nz/freshwater-and-estuaries/management-tools/river-environment-classification-0

Canterbury galaxias (*Galaxias vulgaris*)	At risk - declining
Brown trout (*Salmo trutta*)	Introduced

21. Upland bullies and the Canterbury galaxias are non-diadromous species, spending their entire lives in freshwater. Longfin and shortfin eels are diadromous, migrating to the sea to spawn once as adults before dying. The larvae or 'glass eels' return to freshwaters, where they grow to adult size, before returning to the sea after 15+ years to spawn.

22. Eels are good climbers and it is unlikely that the ford at the site entrance is a barrier to the migration of these fish.

23. The presence of populations of upland bullies and Canterbury galaxias upstream and downstream of the ford suggests that the ford is unlikely to be affecting these fish populations.

Macroinvertebrate Communities – Karetu River

24. Macroinvertebrate taxa were discerned from the eDNA sampling carried out on 17 January 2023 at two locations. The recommended six replicate method was used. Smith et al. (2023) report that 80% of macroinvertebrate species can be detected from six replicate samples.

25. Whilst the eDNA sampling identified macroinvertebrate taxa, and these were reported in the Ecological Impact Assessment (EcIA; Appendix G), biotic indices were not reported in the EcIA. The National Policy Statement for Freshwater Management 2020 (NPS FM) stipulates the macroinvertebrate community index (MCI) and Quantitative MCI (QMCI) as biotic indices with which to categorise ecosystem health. These metrics take account of the macroinvertebrate taxa present, their numbers and their relative tolerance to pollution. Tolerance values range from 1 to 10, with 1 representing taxa that are highly tolerant of pollution and 10 representing taxa that are highly sensitive to pollution.

26. Further information on macroinvertebrate communities was requested from the applicant. The response to the RFI stated that no macroinvertebrate samples were taken as the river is not at baseflow during the winter months. This is not strictly correct as stable base flows can occur year-round and are not limited to the summer months.

27. The National Environmental Monitoring Standards (NEMS) stipulate standardised methods of sampling, including timing of sampling. Timing of samples is best undertaken between November and April as this is when flows are most likely to be stable. Flood flows mobilise streambed material and displace macroinvertebrate populations, therefore sampling under such conditions will not be representative of the macroinvertebrate communities found there. A stand down time of one or two weeks is standard after a flood flow of three times the median flow. Flow data is not always available for a given river and thus nearby flow sites can be used to determine when a river is likely to be at stable flows.

28. Stable flow conditions can occur all year round but are most likely in summer/autumn. As such, sampling during the winter months does not preclude the ability to characterise the macroinvertebrate community structure of a river.

29. Additional information on the macroinvertebrate communities present in the Karetu River above and adjacent to the quarry site would have been useful to allow further assessment of effects of the quarry on aquatic communities.

Stream Ecological Health Indicators – Karetu River

30. The application did not report on biotic indices to describe the ecological health of the river, however the recommended six-replicate eDNA sampling was carried out at both the upstream and downstream sites.

31. The taxon independent community index (TICI) is a newly developed biotic index based on comprehensive eDNA analyses that takes account of a broad taxonomic range, including bacteria, microeukaryotes, fungi, plants, and animals to develop a score to describe the ecological health of a waterway (Wilkinson et al., 2024). The interpretation of the TICI score in relation to stream health is shown in **Table 1**.

32. **Table 1:** Stream health categories based on the TICI scores (from: Wilkinson et al., 2024)

TICI Range	Stream Health Category
>120	Pristine
110-120	Excellent
100-110	Good
90-100	Average
80-90	Poor
<80	Very poor

33. A TICI score was calculated from the eDNA of each of the six replicate samples taken from two sample locations on 17 January 2023. However, these results were not included in the application; but they are publicly available on the Wilderlab NZ Limited website.

34. In the absence of specific macroinvertebrate sampling and associated metrics I reviewed these eDNA generated TICI results to help characterise ecological health of the river upstream and downstream of the site.

35. The average upstream TICI score from the six replicate samples was 104, which is classed as ‘good’ stream health.

36. The average downstream TICI score from the six replicate samples was 100, which is also classed as ‘good’ stream health.

37. These results, combined with the presence of four native fish species, two of which have a threat classification of ‘at risk – declining’, are consistent with the applicant’s assessment of attributing an overall value of ‘very high’ to the river.

Water Quality - Eastern Boundary Watercourse

38. The Eastern Boundary Watercourse is a small, intermittent stream, flowing from east to southwest along the eastern and southern boundary of the Quarry site.

39. Just above the confluence with the Karetu River, and downstream of the quarry, there is a high waterfall. This waterfall acts as a natural barrier to fish migration.

40. From the waterfall to the first track culvert, approximately 180 m upstream, the channel is deeply incised with a substrate comprised of gravel and cobbles. A wetland is present just downstream of this culvert.

41. Upstream of the culvert the channel is less defined and likely ephemeral. There was no water flowing upstream of the culvert on the day of the site visit.

42. A single water sample was taken by the applicant on 30 June 2023, downstream of the lower wetland. The sample was analysed for pH and conductivity. The sampling recorded a pH of 8 and a conductivity level of 33.5 mS/m.

43. The applicant described the pH and conductivity as being lower compared with the Karetu River. However, my assessment is that it is difficult to make a direct comparison due to the difference in the timing of the sampling and the lack of sample numbers. The application states that the watercourse was largely unaffected by the quarry operations due to topography but acknowledges that there are minor quantities of limestone sediment present. I consider the pH of 8 as indicative of the limestone geology of the catchment.

44. Conductivity was also high at 33.5 mS/m and is also a reflection of the limestone geology of the catchment. Groundwater flow direction is towards the stream. Conductivity measured in the stream is similar to conductivity measured from boreholes within the site, thus the water quality of the stream likely reflects the groundwater quality of the site.

Fish Communities - Eastern Boundary Watercourse

45. A single replicate eDNA sample was taken at two locations on 30 June 2023. No fish were detected in the eDNA samples.

46. The RFI, dated 20 June 2024, asked for further sampling be undertaken on the watercourse to include the recommended six replicate eDNA sampling using best practice.

47. The RFI response reported on the outcomes of a follow-up six replicate sample, taken at one location on 29 July 2024. The six-replicate sample comprised of eDNA collected from slow flowing / stagnant water from several suitable locations throughout the length of the watercourse following NIWA's '*eDNA Guidelines and field protocols for lotic systems*'. A comprehensive analysis was undertaken on the samples.

48. No fish were detected in these samples either, however the fish parasite *Ichthyobodo* was. *Ichthyobodo* is an obligate parasite that must have a fish host or it will die within a short time. Its presence is unusual, considering no fish were detected in the samples.

Macroinvertebrate Communities – Eastern Boundary Watercourse

49. The EcIA describes the macroinvertebrate community as indicative of a degraded habitat. This was based on a single replicate eDNA sample taken at two locations.

50. The results from the follow up eDNA sampling, undertaken on 29 July 2024, recorded a more diverse array of freshwater insect species, indicative of good water quality (NEMS, 2022). Included among the sensitive aquatic species detected were the free-living caddis flies *Psilochorema* and *Polyplectropus*, which have tolerance values of 7.8 and 8.1 respectively. A score of 1 represents taxa with the most tolerance to degraded environments, whilst a score of 10 represents taxa that are most sensitive to degraded habitats. Other freshwater aquatic taxa recorded include non-biting midges (Chironomidae) and water bugs (Hemiptera). A TICI score of 106 was calculated from the samples, which classes the watercourse health as 'good'.

51. The ecological values of the Eastern Boundary Watercourse were originally determined as ‘low’ but the additional sampling since shows that ‘moderate’ is a more accurate description of values based on the recent comprehensive eDNA sampling.

Assessment of Effects on the Environment

Actual and Potential Effects on the Environment

52. The key range of actual and potential adverse effects on the receiving environment identified in the application include:
    a. Leachate leakage from under the landfill liner.
    b. Uncontrolled sediment discharge from the site.
    c. Sediment discharge from the SRP.
    d. Stream bank works and ford removal.

Leachate Effects on Water Quality

53. Potential effects on water quality of the Karetu River from landfill leachate was assessed in the application through modelling different scenarios using mass balance mixing.

54. Leachate volumes were estimated based on three scenarios whereby leachate leaks through the landfill liner to groundwater which subsequently discharges to the river. The three scenarios are:
    a. 0.474 m^3/day — Best case leachate leakage
    b. 0.776 m^3/day — Worst case leachate leakage
    c. 15 m^3/day — 100% of the daily average annual leachate

55. The modelled scenarios give a prediction of what might be expected to occur; however, all models have inherent assumptions which can affect the predictive power of the model. Modelling the effects from the leachate discharge to the Karetu River assumes the following:
    a. There is no dilution or attenuation from groundwater prior to discharge to the Karetu River. This is an appropriate assumption due to the proximity of the river to the site. The geology of the area is such that there is a high risk of preferential flow paths, via fractures in the underlying geology, directing leachate, which has leaked through the liner to the river.
    b. Leachate quality and characteristics are unknown but have been assumed based on data from similar landfill types. Metals, metalloids, and ammonia have been identified as the contaminants of concern in the leachate.
    c. Background water quality is essentially unknown as there is a lack of suitable upstream water quality data.
    d. The river will be at MALF (0.0246 m^3/s), which gives a river volume of 2,125 m^3/day. The MALF has been estimated for the site and has not been verified with onsite measurements.
    e. Background concentrations of metals and metalloids are based on dissolved concentrations; however, the ANZ guidelines[2] recommend the use of total concentrations when applying the guidelines ‘*where possible, a hierarchy of*

[2] Australian New Zealand Guidelines for fresh and marine water quality (ANZG, 2018)

chemical measurements (that is, total, dissolved, then bioavailable fractions) should be used for comparison with the DGVs'. The ANZ guidelines are being used in the Trigger Action Response Plan (TARP) (Appendix M) to escalate between trigger levels and therefore the hierarchy prescribed in the guidelines should be followed.

56. The ANZ guidelines are based on a level of species protection, from 80% species protection to 99% species protection. The level of species protection is determined by the current or desired ecosystem condition, which can be broadly categorised as: high conservation or ecological value systems; slightly to moderately disturbed systems; and highly disturbed systems. The Karetu River (NZ Reach ID 13033319) can be categorised as a slightly to moderately disturbed system and as such the 95% or higher level of species protection is most appropriate. The applicant has chosen this level of protection in their assessment.

57. The modelled scenarios indicate that the leachate will not result in an exceedance of the 95%ile species protection guideline for either the best- or worst-case leachate leakage scenarios, however in the event of 100% of the daily average annual leachate volumes (scenario c) being discharged to the river, the ammonia and chromium guidelines would be exceeded.

58. Whilst the modelled scenarios (a and b) show that ammonia concentrations will not exceed the 95%ile species protection guideline, ammonia concentrations will increase downstream nearly four-fold (<0.01 g/m^3 to 0.036 g/m^3) under scenario 'a' and more than six-fold (<0.01 g/m^3 to 0.065 g/m^3) under scenario 'b'. It is probable that this increase in ammonia concentrations downstream, even under best case conditions, will persist for extended periods of time when river flows are at MALF or lower, however this has not been modelled. An increase in ammonia concentrations for extended periods of time and when flows are low (likely to occur in summertime) will increase the risk of prolific algal growth in the river.

59. Arsenic concentrations in leachate have not been modelled downstream despite it being identified as a contaminant of concern. Modelling should be carried out to determine the risk of arsenic concentrations exceeding both the ecological guidelines and the drinking water standards in the Karetu River.

60. In the case of a complete liner failure 15 m^3/day is predicted to discharge to the river. The modelling looks at the effects on water quality at a point in time but does not consider the effects of a continuous discharge of days, months or even years. In the event of a liner failure the discharge of leachate to the river is likely to persist for an extended length of time.

61. In the case of a significant liner failure (scenario c) ammonia and chromium concentrations are predicted to exceed their ANZ guidelines by approximately 30%. It needs to be emphasised that these exceedances could occur for a significant length of time, months or even years, in such an event. An exceedance of a guideline value does not necessarily imply an effect. For this reason, the ANZ guidelines recommend a 'multiple lines of evidence' approach when assessing risk. The DGV for both ammonia and chromium have a reliability of 'very high'. This reliability factor and the fact that the exceedances could persist for extended periods of time imply that adverse effects on aquatic ecology would be likely.

62. Per-or polyfluoroalkyl substances (PFAS) and related compounds (perfluorooctane sulfonate (PFOS) (PFOA) etc.) have not been identified as contaminants of concern but are likely to be present in demolition waste and thus could be present in leachate. PDP (2018) undertook a literature review for the Ministry of the Environment (MfE) where concentrations of 1 – 10 µg/L were documented as having reproductive and

developmental effects on fish species. Their review also reported that these chemicals bioaccumulate in organisms and bio-magnify up the food chain.

63. A draft guideline value (DGV) for PFOS in freshwaters was published in May 2023 (ANZG, 2023) and is currently under review following a draft consultation phase. Fish and invertebrates were found to be more sensitive than plants and algae. The draft DGVs for PFOS in freshwater are:

    a. 99% species protection = 0.0091 µg/L
    b. 95% species protection = 0.48 µg/L
    c. 90% a species protection = 2.7 µg/L
    d. 80% species protection = 17 µg/L

64. The guidelines state that as the DGVs do not account for the bioaccumulation of PFOS in aquatic food chains, the 99% species protection DGV should be used for slightly-to-moderately disturbed ecosystems.

65. The New Zealand's Drinking Water Standards (2022) have a combined maximum allowable value (MAV) for perfluorohexane sulfonate (PFAS) and PFOS of 70 ng/L, and a separate MAV of 560 ng/L for PFOA. The PFOS drinking water standard is nearly eight times higher than the DGV for 99% species protection for aquatic environments.

66. The ANZG set guidelines for individual toxicants but they do not consider cumulative effects from a mix of toxicants on stream health.

67. The potential for cumulative effects from contaminants from the operation of the landfill can be measured using stream health indices such as the MCI, QMCI and TICI.

68. The leachate plume is modelled to extend up to 1.2 km downstream of the quarry site. Potential cumulative effects on river health, in the event of liner leakage or breakthroughs, may also extend up to this distance.

Sediment Effects on Water Quality

69. Sediment entering waterways can be classed as suspended sediment i.e. sediment in suspension within the water column and deposited sediment i.e. sediment deposited on the stream bed. Deposited sediment is defined as inorganic fine sediment (<2mm) deposited on the stream bed. Fine sediment can be further divided into sediments that readily settle out of the water column, defined as sand (0.0625 - 2 mm) and sediments that remain in suspension under normal flow conditions (silts and mud (<0.0625 mm)).

70. In hard bottom streams, the stream substrate is comprised of a mixture of muds, silts, sands, gravel, cobbles and boulders, with the size classes defined on the Wentworth scale (Wentworth, 1922).

71. The spaces between these classes of sediment are called the interstitial spaces. The interstitial space is an important component of the stream habitat, providing refuge spaces for invertebrates and a surface area for microbes and algae to grow, which in turn provide a food source for the invertebrates living on and within these spaces. The greater the volume of interstitial space the greater amount of habitat provided and thus the greater the diversity of life on and within the stream bed.

72. Excessive amounts of fine sediment, particularly muds and silts (<0.0625 mm) clog these spaces, reducing the available habitat for instream fauna and thereby reducing fauna richness and diversity.

73. The NPS FM stipulates attribute bands according to the percentage of fine sediment cover on the stream bed. Attribute bands are specific to the REC group of the river reach. The Karetu River reach (NZ Reach ID 13033319) lies within the deposited sediment

class 2 (Table 24 of the NPS FM). The National Bottom Line for class 2 rivers for percentage fine sediment cover is 29%, based on using the instream visual method, SAM2 as defined by Clapcott et al. 2011 (pages 17-20).

74. The National Bottom Line for instream fine sediment is based on a monthly monitoring regime where sites are visited on a regular basis regardless of weather and flow condition.

75. Instream fine sediment has not been measured or reported on in either the Ecological Impact Assessment (Appendix G) or the Groundwater and Surface Water Effects Assessment (Appendix F), but it is noted as a contaminant of concern.

76. During the site visit on 30 May 2024, a visual observation of fine sediment cover at the ford crossing and up to 50 m downstream of the ford, showed that cover was close to 100%. Excessive sedimentation was also noted upstream of the ford. There was evidence of fine sediment entering the river from breaches in the bund on the left bank of the river (**Photo 1**).

77. **Photo 1**: The bund breached showing where sediment has entered the river from the site (30 May 2024)



78. Instream sedimentation is likely the contaminant of greatest concern with regard to adverse effects on the ecological health of the river. It smothers potential spawning grounds for fish and reduces interstitial spaces that provide refuge and food for macroinvertebrate communities.

79. The downstream extent of deposited fine sediment entering the river as a result of the site works is not known as no assessment has been undertaken nor is it possible to

compare deposited fine sediment downstream of the site with deposited fine sediment upstream of the site.

80. Fine sediment (<0.0625 mm) that remains in suspension will adversely impact water clarity.

81. Water clarity was not measured by the applicant, so it is not possible to quantify how the current quarry operations are impacting water clarity. However, the site visit on 30 May 2024 showed that water clarity was adversely affected by sediment discharge downstream from the site (**Photo 2**). The sediment plume is likely to extend a considerable distance downstream, but the distance has not been quantified.

82. **Photo 2**: Water clarity approximately 50 m downstream of the site entrance (30 May 2024).



83. The NPS FM sets a National Bottom Line for suspended fine sediment, as measured by visual clarity for class 2 rivers (CD/H/SS) of 0.61 m. This is based on calculating the median over a five year period based on monthly monitoring where sites are visited on a regular basis regardless of weather and flow conditions.

84. Suspended sediment is proposed to be discharged in stormwater from the SRP at a maximum concentration of 100 g/m^3. The RFI response dated 16 August 2024, states that modelled concentration of total suspended solids in the Karetu River from the landfill stormwater discharge when mass mixed with the Karetu River mean flow is 7.5 g/m^3. The mass balance equation from Warn and Brew (1980) calculates a total suspended sediment (TSS) concentration of 12.08 g/m^3 i.e. four times the concentration upstream of the discharge.

$$T = (FC + fc)/(F + f)$$

where T is the concentration in the river downstream of the discharge;

F is the river flow upstream of the discharge;

f is the flow of the discharge;

C is the concentration of pollutant in the river upstream of the discharge; and

c is the concentration in the discharge. (Warn and Brew, 1980)

85. Clarification is required to explain the difference in the downstream TSS concentration of 7.5 g/m^3 as given in the response to the RFI and the calculated TSS concentration of 12.08 g/m^3 as obtained from the above equation.

86. The mass balance calculation assumes the river is at mean flow in a 2 mm/hr rainfall event, and that runoff is from a 3.98 ha catchment area. Upstream TSS concentration is assumed to be 3 g/m^3.

87. The above calculation does not take into account any sensitivity analysis or look at worst case scenarios in terms of rainfall events and maximum rates of discharge from the site.

88. It is likely that in heavy rainfall events the upstream TSS concentrations will be elevated, as will river flows, however no information is available for these different scenarios.

89. In terms of river clarity, a four-fold increase in TSS downstream, as predicted for mean flow conditions, will result in a deterioration in visual clarity downstream of the discharge. The proposed condition, relating to water clarity states the visual clarity shall not be decreased by more than 20% 40 m downstream of the discharge point. Clarification is required to show how this will be achieved and why a distance of 40 m downstream is proposed rather than the mixing zone distance, calculated to be 21.3 m (Paragraph 4.3.2 Appendix C – Stormwater Management Report).

90. The Stormwater Management Report (Appendix C) states that treatment via coagulation/flocculation may be required within the SRP to achieve the proposed maximum concentration of 100 g/m^3. Details of the flocculants proposed to be used, the amounts, the potential residual discharge to the river and subsequent effects on river water quality have not been assessed. The report states that the management proposed would be an improvement on the current situation, however the assessment should consider how the proposal would affect instream fine sediment loads against background conditions and not the current situation as the current quarrying activities have heavily impacted fine sediment deposition in the river, as evidenced from the site visit.

91. The Stormwater Management Report (Appendix C) states: '*modelling also indicated a portion of the trafficable area on the western boundary would have flood depths greater than 50 mm in 50yr ARI event both with and without climate change. Reinstatement of the existing bund along the western boundary however could potentially alleviate flooding of those areas or divert flows away from buildings*'. The report further states '*the bund is not continuous and currently enables stormwater flow to exit the site from low points in the bund*'. Such events will also result in the transport of fine sediment into the river. An assessment of fine sediment loads to the river in these events has not been made. Nor has an assessment of how a reinstatement of the bund will prevent such occurrences.

Stream banks works and ford removal

92. The stream bank works proposed, consisting of reinstating the bund on the western boundary, is to prevent flooding of the site and to reduce the current loading of fine sediment discharging to the river. However, it is not clear whether low points will still allow for sediment laden runoff to discharge to the river. The site plan submitted as part of the RFI (Section 7 – Surface Water Quality) shows the bund truncated at two locations. Stream banks works should ensure that no sediment laden water from the site

is discharged directly to the river without treatment. Reinstating the bund and planting it as proposed will provide shading to the river at this location, however this is considered to be remediation of a current situation as opposed to mitigation for future activities.

93. The removal of the ford and the construction of the 23 m span bridge will have a long-term benefit on water quality and aquatic fauna of the river. Short term adverse effects during construction are expected. To minimise adverse effects from the construction of the bridge the applicant proposes to develop an Erosion and Sediment Control Plan (ESCP) consistent with the Erosion and Sediment Control Toolbox for Canterbury and a Freshwater Fauna Management Plan, to be developed by a suitably qualified ecologist. I consider these measures will appropriately mitigate for the short-term construction effects of the bridge.

Discharge of Underdrainage Water to the Karetu River

94. Clean ambient groundwater, collected by the underdrainage system, will be discharged to the Karetu River through either a direct outfall or via a planted area of wetland species with ultimate discharge to the Karetu River. It is expected that groundwater flow is towards the Karetu River and would ultimately discharge to the river in the absence of the proposal. The discharge of clean ambient groundwater is not anticipated to have an adverse effect on river water quality at either of these locations.

Monitoring

95. River monitoring of ecological health, instream sedimentation and water quality, collectively, can help quantify the effects of potential leachate leakage from the liner and sediment discharge from the SRP.

96. Ecological health monitoring can measure the potential cumulative effects from combined contaminants present in the leachate and other discharges from the site entering the river.

Ecological Health

97. Biotic indices are the most appropriate method in which to quantify cumulative effects on stream health from the site.

98. Biotic index scores include the MCI and the QMCI, which are macroinvertebrate community specific, and the more recently developed TICI.

99. The recently developed TICI from eDNA data for New Zealand streams has been found to be highly correlated with the MCI, and by inference to overall stream “health” (Wilkinson et al. 2024). The main advantage of the TICI score is that it is based on all organisms encountered in streams.

100. The applicant has proposed to use the MCI and QMCI, however I would also recommend the use of the TICI as it encompasses a wider range of aquatic taxa and is therefore potentially more sensitive in detecting adverse effects from discharges from the site.

101. For baseline ecological monitoring I recommend that monitoring at SW2 (located 40 m downstream of the proposed SRP discharge outfall) is also undertaken, in addition to the sites currently proposed by the applicant.

102. For operational ecological monitoring I recommend that monitoring is carried out twice a year, as is proposed for the baseline monitoring and that sample site SW2 is included.

103. Trigger level 3 for MCI and QMCI, in the TARP (Appendix M), allows for a 20% decrease downstream (and/or of baseline). This is high. A 20% decrease in MCI and/or QMCI

would indicate a deterioration in stream health and habitat quality. A change of 10 points (for MCI) is considered within a range for normal variation. Based on the TICI results, an MCI score of 110 (placing it in attribute Band B of the NPS FM) could describe stream health upstream. A reduction of 20% at the downstream location would result in an MCI of 88, which puts it below the National Bottom Line, as defined within the NPS FM, of 90.

Instream Sedimentation

104. The proposed Sediment Assessment Method 2 (Clapcott et al, 2011) for the measurement of deposited finer sediment cover for sediment monitoring is a suitable method to measure instream deposited fine sediment. The discharge of fine sediment to the river can be quantified through comparing results from this method at locations upstream and downstream of the site. The spatial extent of impact can be measured by measuring instream sedimentation at multiple locations downstream of the site.

105. In addition to the two monitoring locations proposed by the applicant, I recommend that sample site SW2 is included for both baseline and operational monitoring. SW2 is located 40 m downstream of the SRP discharge. It should be noted that the Stormwater Management Report (Appendix C), specifies a distance of 21.3 m downstream of the SRP discharge as the distance beyond 'reasonable mixing' at which to measure effects.

106. The frequency of twice per year, as proposed by conditions, is an appropriate frequency in which to monitor deposited instream sediment.

Water Quality Monitoring

107. The 'total' fraction of trace metals and metalloids in the river samples should be measured and reported on. The ANZ guidelines recommend a hierarchy approach to monitoring whereby the total fraction is measured in the first instance. The function of the TARP is to assess against trigger levels to assess risk and to determine what actions and responses are made, therefore the most appropriate fraction to monitor is the 'total' fraction.

108. Bi-monthly surface water baseline monitoring is proposed for 12 months prior to landfilling commencing. In view of the importance of baseline data and the short duration of sample collection (12 months), monthly monitoring is deemed more appropriate to characterise water quality for the river, specifically all leachate leakage indicators, nutrients and trace metals and metalloids. Quarterly monitoring of organics is considered appropriate.

109. PFAS and PFOS should be added to the parameters being monitored, both for the baseline monitoring, recommended as monthly monitoring, and the operational monitoring, proposed as quarterly monitoring.

110. Water clarity should be added to the parameters being monitored both for the baseline monitoring, recommended as monthly monitoring, and for the operational monitoring, proposed as quarterly monitoring.

111. For the proposed dry weather event sampling (two events annually) total suspended sediments and turbidity should be included in the suite of parameters being analysed.

Off-setting of, or Compensation for, Actual and Potential Adverse Effects to Ensure Positive Effects on the Environment

112. I agree with the recommendation on mitigation and monitoring proposed in Section 6.5 of the Ecological Impact Assessment (Appendix G).

113. Whilst the presence of the ford may not be adversely affecting fish migrations, its remediation as part of the proposal will be of benefit to stream health as it will enhance connectivity between upstream and downstream and reduce sediment input from vehicle movements at this location over the long term.

114. Schedule 1 of the Proposed Monitoring Report (Appendix Y) outlines further the mitigation measures proposed to reduce adverse effects from the site.

115. Mitigation measures include stabilising and reinstating the bund on the left bank of the Karetu River to prevent the uncontrolled discharge of sediments to the river. Discharge of sediment from the site will be via an outfall pipe from the SRP, further detailed within the Stormwater Management Report (Appendix C).

116. Mitigation also includes planting along the left bank (Area D and E on site plan RC245076B). Area C and D is where the bund is located, therefore it is unclear how effective planting within Areas D and E, will be, particularly in light of the comment '*Where a genuine conflict arises between the location of the site security fence and the requirement to achieve an average of 2-3m, the security of the site shall take precedence*'. This section of river is most at risk from adverse effects from the site, as seen from the site visit on 30 May 2024, due to its proximity to the active quarry site.

117. Offsetting includes the proposal to plant a 10 m width on the left bank of the Karetu River (Area C on the site plan attached to the Appendix). This will have positive benefits in terms of bank stability, instream shading and habitat for terrestrial fauna and the terrestrial life stages of aquatic fauna. However, consideration should be given to planting a wider margin in lieu of the fact that planting on only one bank is proposed, the availability of land and the size of the river.

118. The Eastern Boundary Watercourse was initially categorised as a degraded watercourse, however follow-up monitoring, as requested by the RFI, indicated the watercourse quality is better categorised as 'good'. The Ecological Impact Assessment (Appendix G) recommended a Vegetation Management Plan (VMP) with '*requirements to remediate the eastern boundary watercourse and upper and lower wetlands through indigenous eco-sourced vegetation appropriate for the site, to retain surface water within the lower wetland and to ensure no loss in value of these freshwater ecosystems*'. The proposed mitigation is for the planting of a 10 m (total width) riparian margin with indigenous species along the length of the watercourse on both the left and right banks. A site plan shows the extent of the planted area. This is considered appropriate to buffer the stream from effects of the proposal and to enhance the existing values of the watercourse into the future.

119. Whilst the planting, as proposed, will have positive benefits, input of fine sediment to the river from the site is still considered a high risk to the aquatic environment, and as such any benefits may be negated if sediment input from the site is not adequately managed and sediment loading to the river reduced. Sediment control is assessed in more detail in the Stormwater Management Report (Appendix C).

120. Details regarding how the proposed riparian planting of the Karetu River and Eastern Boundary Watercourse will be protected into perpetuity should be provided.

Consideration of Submissions

Drinking Water

121. A number of submitters have raised concerns regarding impacts on drinking water, particularly long-term impacts from leachate leaking, the presence of persistent contaminants and risks to future generations. A number of domestic water takes from the river via infiltration galleries or shallow wells are identified by submitters directly

downstream of the landfill. There is some uncertainty around the potential contaminants present in the leachate and their persistence in the environment which should be addressed to ensure the long-term security of drinking water supplies downstream of the proposal.

Surface Water Quality and Aquatic Ecology

122. The risk posed by the site to surface water quality from leachate leakage is highly dependent on the efficacy of the landfill liner and the management of the leachate collection system. The efficacy of the landfill liner and leachate management is discussed by other technical experts. Water quality monitoring of the river will be important to help identify any evidence of leachate leakage and the elevated risk to downstream receiving environments, should they occur.

123. The submitters have raised concerns regarding insufficient assessment of the discharge of stormwater to the Karetu River. I agree with their concerns that effects from stormwater discharge to the river have not been adequately assessed. Sediment laden stormwater from the site poses a high risk to aquatic fauna, particularly in regard to deposited fine sediment on the stream bed. The site visit on 30 May 2024 showed the stream bed was heavily impacted by sediment that could be attributed to the site, which was visible up to 50 m downstream of the site and likely impacting the stream for a considerable distance further downstream. There is insufficient information regarding how often the SRP will discharge, the background TSS concentrations in different rainfall events and during discharge events and the expected increase in TSS downstream of the discharge in relation to upstream concentrations. There is also the risk of the site being inundated in flood events and fine sediment being washed from the site into the river.

124. Submitters are concerned with the risks of contaminants entering the river from the quarry during flood events. I believe these concerns are valid as there is insufficient information regarding effects from flooding, furthermore the application states that modelling undertaken for the site shows '*a portion of the trafficable area on the western boundary would have flood depths greater than 50 mm in 50yr ARI event both with and without climate change'.* Flooding of this area would result in fine sediment being transported into the river. Furthermore, the application states '*Reinstatement of the existing bund along the western boundary however could potentially alleviate flooding of those areas or divert flows away from buildings',* however there is no modelling or specific design drawings that show how or if this bund could successfully contain flows within the river channel to prevent flooding, and subsequent entrainment of contaminants, from the site.

Amenity and Recreation:

125. Submitters have concerns regarding the impact on swimming water quality from the site. The presence of pathogens in waterways is generally the number one concern when assessing impacts on swimming water quality. The risk of pathogens being present in the leachate or in the stormwater discharge is low. High concentrations of suspended sediment can impact water clarity and in turn the amenity quality of swimming waters and I believe a deterioration in water clarity is a risk posed by the discharge of sediment laden stormwater from the site.

Conclusions and Recommendations

126. Potential adverse effects on the Karetu River and Eastern Boundary Watercourse from leachate from the landfill is contingent on the landfill liner and leachate collection system

operating as designed. Effects are also contingent on the presence of potential preferential flow paths and whether, in the event of a breach of the liner, preferential flow paths will direct leachate towards the river.

127. The three modelled leachate discharge scenarios rely on the accuracy of estimating river flows and volumes of leachate discharged from the site. River flows should be verified through on-site measurements.

128. River monitoring as proposed and with the additional recommendations made, should be adequate to detect and quantify any potential adverse effects from the leakage of leachate from the site on water quality and ecology. The feasibility and success of the proposed possible action and responses for Trigger 1 level for surface water quality in dry weather needs to be reviewed by a groundwater expert.

129. Potential adverse effects on the Karetu River from sediment discharged from the site is contingent on stormwater being adequately managed on site. The proximity of the site to the river means that the river is at high risk of fine sediment entering the river from the site. Flood flows will potentially inundate the site, transporting fine sediment into the river. A bund has been built on the left bank of the river to mitigate such events, however there are no details as to the effectiveness of this bund in dealing with storm events.

130. Monitoring of deposited fine sediment, as proposed in the Monitoring Programme and TARP (Appendix M) and with the additional recommendations made in this report, will be adequate to measure potential effects on deposited instream sediment from sediment discharges on the river.

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Appendix 12: CRC, Water Quantity and Hydrology s42A report, prepared by Lucy Just

Before the Independent Hearing Panel appointed by the Canterbury Regional Council

IN THE MATTER OF The Resource Management Act 1991

AND

IN THE MATTER OF Application CRC243699 to CRC243706, 150 to 176 Quarry Road, Loburn

Section 42A Officer's Report

Report of Lucy Just

Introduction

Background

1. This report forms part of the Environment Canterbury's audit of the assessment of environmental effects (AEE) provided by Protranz International Limited (the applicant) in support of resource consent applications CRC243699 to CRC243706 to establish and operate a landfill at the Whiterock Quarry site, 150 to 176 Quarry Road, Loburn (the site).
2. This report will provide the decision-maker with information and advice related to:
    a. characteristics of surface water quantity in the sub-catchment and catchment
    b. the actual and potential effects of the proposed activities on quantity

Qualifications

3. My name is Lucy Just. I hold a Bachelor's Degree in Environmental Science from Massey University and a Master of Science Degree in Geography from the University of Otago. I am currently a Water Resources Scientist in the Surface Water Resources team at Environment Canterbury Regional Council. Prior to this I worked in a Science Analyst role where the focus of my work was data collection and processing. My role as a Water Resources Scientist at Environment Canterbury has involved working with hydrological data (rainfall, water level, and flow) and deriving hydrological statistics and metrics. As part of my work, I also provide technical advice in relation to surface water allocation, hydrological monitoring, and environmental minimum flows.

Scope of Report

4. This report is prepared under the provisions of Section 42A of the Resource Management Act 1991 (RMA). This section allows a council officer or consultant to provide a report to the decision-maker(s) on a resource consent application made to the council and allows the decision-maker(s) to consider the report at the hearing. Section 41(4) of the RMA allows the decision-maker(s) to request and receive from any person

who makes a report under Section 42A "*any information or advice that is relevant and reasonably necessary to determine the application*".

5. This report is supplementary to the Section 42A Report prepared by the Environment Canterbury for the above resource consent applications. Full details of the consent applications are provided in that report.

6. To carry out this audit of the consent applications, I have:

   a. Considered the relevant sections of the assessment of effects on the environment (AEE) submitted by the applicant, including its technical appendices. These include:

      i. Appendix F – Groundwater and Surface Water Effects Assessment
      ii. Appendix L – Site Management Plan draft RevB
      iii. Appendix Y – Proposed Conditions (Rev1)

   b. Reviewed further information that was provided by the applicant on 16 August 2024, specifically the S92 response to Environment Canterbury's request for further information:

      i. Section 5 Surface Water Quantity
      ii. Section 9 Hydrogeology.

   c. Considered relevant issues raised by submitters in relation to the effects I have documented in this report.

7. Finally, this report provides conclusions on the scale and significance of adverse and positive effects

Description of the Affected Environment

Catchment Description

8. The applicant has provided a brief description of the area and waterbody of relevance to this application, "*The site is located along the eastern (true left) bank of the Karetu River in the foothills southwest of Mt Grey and the Ashley Forest, approximately 19 km northwest of Rangiora. The site is currently a limestone quarry surrounded by dryland farming and forestry*".

9. The applicant has used Environment Canterbury's Maps GIS layer, presumably the 'Ecan River Network' layer, which classifies the river as a 'Hill-fed-Lower' River and correctly identified that the river is within the Ashley/Rakahuri River catchment and surface water allocation zone.

10. The applicant has provided an accurate description of the spatial location and run of the Karetu River within the Ashley/Rakahuri catchment. *"The main surface water body near the site is the Karetu River, which flows from north to south directly west of the site. Wetlands have formed on the downstream stretches of these tributaries, and along the east bank of the Karetu River, south of the site. The Grey River West Branch flows roughly from north to south at 3 km east of the site. The Karetu and Grey Rivers join and flow out into the Okūkū River at about 6 km south of the site, which eventually flows into the Ashley River"*

Flow and flow statistics estimates

11. The applicant has provided an estimate of the mean annual low flow (0.0246m^3/s), median flow (0.0895 m^3/s), mean flow (0.2143m^3/s) and 1 in 5-year low flow (0.0155 m^3/s) for the Karetu River, generated from NIWA's River Maps database. WSP, the

consultant for the applicant, has commented on the accuracy these estimates which is important to highlight in my evidence*: "It should be noted that the NIWA estimations are not based on recorded stream flows, but on catchment flow estimation methods by Booker and Woods (2012), which has limited accuracy."*

12. In Appendix F of the application, WSP presented some rainfall analysis for the nearby Fox Creek rainfall site (5 km away) and a single flow measurement for 16 May 2023 (0.039m^3/s). WSP commented that the rainfall in the month prior (57 mm) was two thirds of the monthly median rainfall (90mm) and concluded that it "...*appears to be consistent with what would be expected from antecedent rainfall in the catchment. As such NIWA's estimated MALF(7d) would be reasonably representative of the real MALF(7d)".*

13. I do not agree with the above statement that a single flow gauging demonstrates that the modelled NIWA MALF(7d) is reasonably representative.

14. Typically, when considering monthly rainfall totals, we use the total for a given month and compare it to the long-term average for the same month. The Fox Creek rainfall site has been operating since 1989 (35 years). For the month of February 2023, the Fox Creek site experienced 121 mm of rain compared to the February long-term average of 66 mm. In March 2023, the site received 114 mm of rain compared to the long-term March average of 66 mm. In April 2023, the site received 82 mm compared to the long-term average of 81 mm. Rainfall in the catchment in the 3 months prior to the single measurement suggests the antecedent conditions in the catchment were average to wetter than average. The Okuku River at Fox creek flow on the 16 May 2023 was 1.3 m3/s, well above MALF(7d).

15. For the 2023 water year, (the same water year WSP conducted the flow measurement) the annual low flow (7-day minimum flow) for Okuku River at Fox Creek occurred in November 2022For comparison, I have taken two NIWA modelled MALF(7d) estimates which correspond to locations where Environment Canterbury has established flow sites within the Ashley/Rakahuri Catchment. Environment Canterbury has had a flow site at Okuku at Fox Creek for the past 16 years, and another at Ashley Gorge for the past 53 years. The 7-day Mean Annual Low Flow (MALF(7d)), calculated using the daily mean flow record, is presented in Table 1 below. The comparison shows an over-estimation of MALF(7d) for the two recorder sites which suggests the Karetu River MALF(7d) estimates are likely to be lower than NIWA modelled values.

16. Environment Canterbury is working to map dry reaches in the Karetu catchment and collect flow data. At this stage we have insufficient data to estimate a mean, median, or mean annual low flow (MALF(7d) from these gaugings.

Table 1: Comparison of Calculated 7-Day Mean Annual Low Flow Statistics with NIWA modelled 7-Day Mean Annual Low Flow

Metric/Statistic	**Okuku River at Fox Creek 66213**	**Ashley Rakahuri River at Ashley Gorge 66204**	**Karetu River at White Rock**	**Karetu River at Loburn White Rock Road**
NIWA modelled MALF(7d) (m3/s)	0.7155	2.54	0.0246	0.0278
Measured MALF(7d) (m3/s)	0.4601	2.0437	-	-
NIWA modelled mean flow (m3/s)	4.91	13.1	0.2143	0.0249
Measured mean flow	4.45	11.74	-	-

(m3/s)				
NIWA modelled median flow (m3/s)	2.76	8.59	0.0895	0.104
Measured median flow (m3/s)	2.10	7.35	-	-
Length of record	16	52	-	-

17. An important feature of the Karetu catchment is the vegetation cover on the upper slopes, a mix of grassland, native forest, and exotic plantation forestry. The exotic forestry contains some recently harvested areas and maturing forest cover. It should be noted that afforestation can influence the water balance of a catchment, by modifying evapotranspiration and runoff processes which can result in reductions groundwater recharge and streamflow (Fahey and Payne 2016, Mourout *et al.,* 2021). Future plantations may reduce the flow and the Mean Annual Low Flow in the catchment.

Trends in flow records

18. Environment Canterbury has maintained a flow site at Ashley/Rakahuri River at Ashley Gorge site for over 50 years. Mann Kendall trend analysis was conducted for the past 50 years on the Ashley River record (1975-2024 water years). The Okuku River has a shorter flow record at Fox Creek and trends were calculated for a 15-year record (1990-2024).

19. Trend results indicate that for the Ashley/Rakahuri River, annual mean and median stream flow is very likely decreasing for the 50-year record. Annual low flow (ALF(7d) is likely decreasing for the same period. At a monthly resolution, each month from September through to December show the strongest trends, for which flow is very likely decreasing. The Okuku record shows no significant flow trend at the annual or monthly resolution. Ashley River at Lees Valley flow site has a 6-year flow record and is too short to determine any trends.

Gains and losses

20. The presence of flow losses and gains to groundwater in the Lower Ashley Catchment are important characteristics of the Karetu catchment.

21. The applicant has stated that the Karetu River is losing to groundwater in the upper reaches and gaining in the lower reaches. WSP have provided a hydrogeological conceptual model diagram (Figure 4-11 of Appendix F, Assessment of Environmental Effects AEE) which shows groundwater flow directions from the hills to the Karetu river. When asked to clarify the gaining and losing reaches of the Karetu River, the S92 Section 9 Hydrogeology report reiterated that they understand the river is losing upstream of the site and gaining along the quarry and further downstream.

22. An Environment Canterbury report from 2004 described that the Karetu River in fact dries in the lower reaches during lower flow periods when surface flow is lost to groundwater (Chater, 2004). The report estimated a loss of 15.1 L/s (MALF(7d) during low flow conditions from below the Karetu at Whiterock Loburn Road to the Grey River confluence.

23. The full extent of the drying reach is not well documented, however, the 2004 Chater report and a recently mapped dry reach (Figure 1) both documented the dry reach beginning around 800 m below Whiterock Loburn Road.

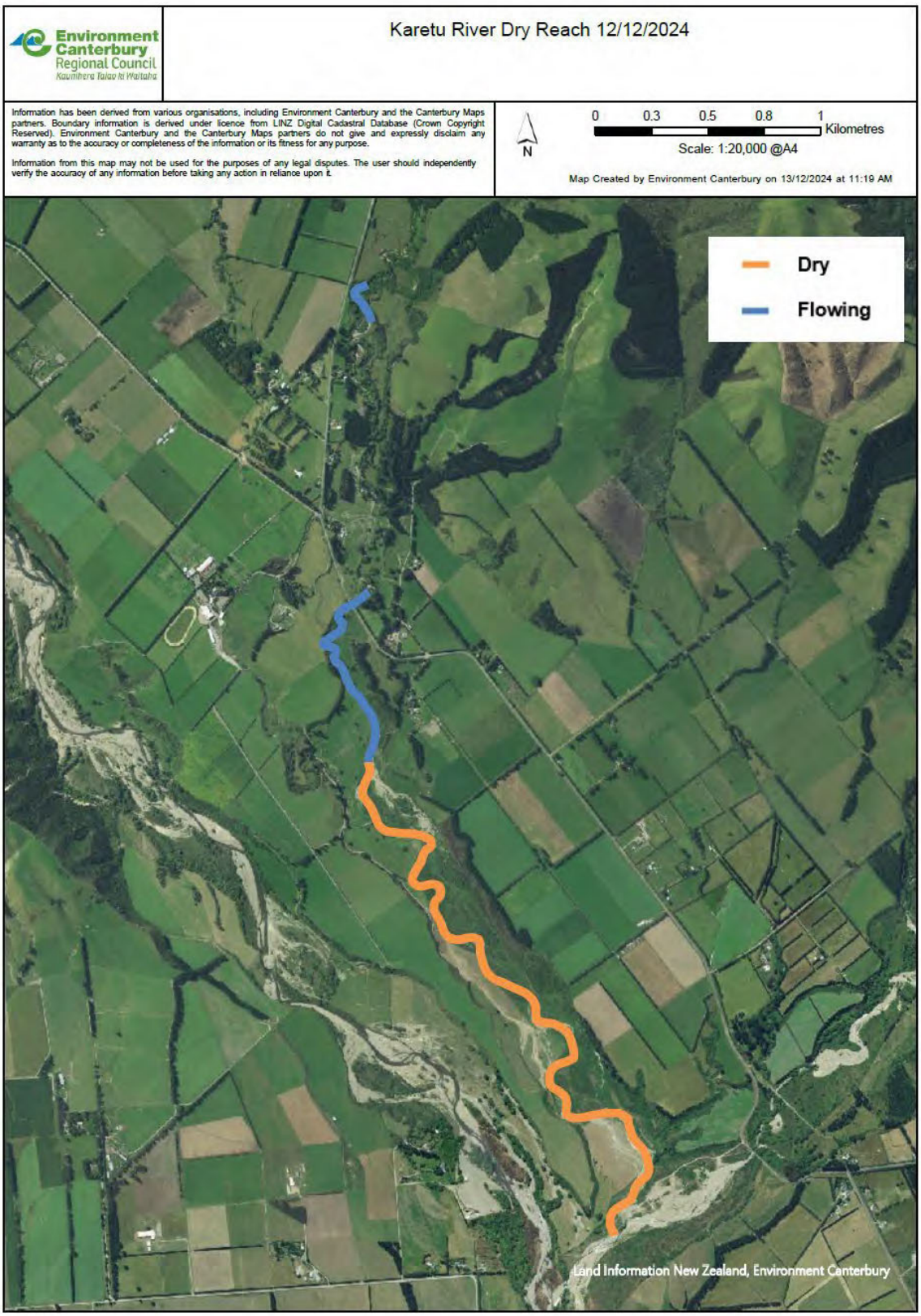


Figure 1: Map of Karetu River dry reach (Provided by Laura Somerville of Environment Canterbury, 2024)

24. There is no flow or dry reach data for the section of river between the quarry and Karetu River at Whiterock Loburn Road ~2km, therefore it is unknown if this section of river is gaining or losing to groundwater.

Other water users in the catchment

25. The applicant has confirmed from Environment Canterbury's wells database that there is a water supply well BW23/0559 located 500 m downstream of the site which is used for domestic and stock water supply. During consultation with landowners downstream of the quarry site to the Grey River confluence, the applicant was informed of multiple other water users with either shallow water supply wells or infiltration galleries in groundwater, which are likely to be hydraulically connected to the Karetu. There is no reticulated supply as the Hurunui/Ashley council scheme does not supply the White Rock area.

26. Another important consideration for the proposed activity is the availability of water for allocation within the Ashley/Rakahuri catchment. As per the Land and Water Regional Plan, the take and use of water from a river is a Permitted Activity, provided the conditions stipulated in the plan are met (Environment Canterbury, 2023). For the Karetu River, the Mean Annual Low Flow, MALF(7d), is <100l/s therefore the rate and volume respectively must be less than 0.5 l/s and $2m^3$ per day. For a groundwater take, the user is permitted <0.5L/s and less than $100m^3$ par day.

27. The allocation status of the Ashley/Rakahuri catchment, as of September 2024, is shown in Table 2 below.

Table 2: Allocation status of Ashley/Rakahuri, September 2024

28. Ashley River/Rakahuri	Current allocation status	Allocation limit L/s
A Block	No A block allocation water available	700
B Block	117 L/s available in May to August only	135
C Block	403 L/s available September to April. 478 l/s available May to August only	494

29. There is no A block allocation water available and limited B block water from May to April. There is C block allocation available (403 L/s), which would be connected to the minimum flow at the Ashley River at Gorge. Water in the C block will only be available when flows are greater than $6m/^3s$ and therefore is less reliable than A or B block water.

Assessment of Effects on the Environment

Actual and Potential Effects on the Environment

30. A key concern from a water quantity perspective is the effect on downstream users. The Karetu River is a small river and MALF(7d) is estimated to be less than 0.025 m^3s. Per the AEE Site Management Plan (Appendix L, RevB), the applicant proposes to use permitted activity water, 0.5L/s surface water ($2m^3$ per day) and 0.5L/s groundwater ($100m^3$ per day), for staff facilities and dust suppression. During full operation and low flow periods any consumptive takes by the applicant would likely reduce the availability of supply for downstream users of the White Rock community.

31. If the flow in the Karetu is less than the modelled NIWA MALF(7d), the effects on water quality, instream values, and river health may be greater than estimated by the applicant. Effects on ecology and water quality are discussed in my colleagues' evidence (Dr Matt Silver and Fleur Tiernan).

32. In section 3.8 of the AEE Site Management Plan (Appendix, L RevB) minimum water usage and storage requirements are specified: 100 m^3 of minimum daily supply and 400m^3 of storage water for dust suppression. For a 400 m^3 storage, some of this will be required for daily use given the maximum groundwater abstraction rate will be 0.5L/s or 1.8m^3 per hour, which leaves less than 400m^3 for storage

33. Dust control management is outlined in Section 8.3 of the Site Management Plan. As a guide, for wet suppression of unpaved areas in most parts of New Zealand an application rate of 1 L/m^2/hour is recommended (Ministry for the Environment, 2016). The applicant has stated that this should be sufficient for an area of 1.4 ha, yet it is unclear for how many hours and what proportion of the landfill site or unpaved road area this would cover. A water cart for dust suppression at the site has been estimated to have an application rate of 20m^3 per hour, enough to treat 2 ha. However, the applicant is assuming this for a 5-hour workday. For a 10-hour workday, 200m^3 would be needed. During hot and dry periods of prolonged Northwest wind conditions, the permitted availability of water in the Karetu catchment area would not be enough to support this type of operation.

Off-setting of, or Compensation for, Actual and Potential Adverse Effects to Ensure Positive Effects on the Environment

34. Appendix F of the applicants AEE states that river flows will be unchanged upstream and will slightly increase downstream of the site and concluded that no adverse water quantity effects are anticipated. I assume this 'increase' is based on discharge from the underdrainage, however, I am not confident that this will result in an increase in flow below White Rock.

35. In Section 5 of their S92a response the applicant has provided a rough approximation for groundwater discharge from underdrainage (approximately an average rate of 0.39 L/s). It is important to note it is not additional water, this groundwater would migrate and feed the Karetu River anyway and is therefore not offsetting any takes from the Karetu.

36. Section 9 of the S92a outlines a plan to utilise stormwater runoff in sediment retention ponds (SRPs) for dust suppression and fire-fighting purposes, of which discharge may be used to supplement flows in the Karetu. However, this isn't reliable storage or method of compensation to increase flow in the Karetu River as Canterbury weather can be hot and dry for prolonged periods. As acknowledge by the applicant, there may be a period of several weeks to several months when no stormwater is discharged due to lack of rainfall.

37. It is of my opinion that additional storage would be needed if the site were to operate as a landfill. The applicant could use available C block water and build an additional storage pond for more reliable water and to aid in supplementing low flow periods.

Consideration of Submissions

Submissions relevant to Surface Water Quantity

38. A major concern expressed by various submissions is the effect of the proposal on the availability of water. Residents of White Rock use the Karetu as a source of drinking water and stock water, with submissions mentioning 13 families are currently doing so. A reduction in flow or degradation in quality will have an impact on the amount of clean drinking water available for these downstream users.

39. Community submissions commented on the Karetu River drying during low flow or drought periods and concern of this being exacerbated by any upstream use (e.g., Tim Hawke, Alice Mackenzie, Nicola and James Watherson, Nicki White). An observation

from Duncan Mackintosh noted the Karetu River has been dry at the White Rock quarry site in the past. With a lack of data on the Karetu River, anecdotal evidence from these submissions is important to consider.

40. Karetu, Ōkūkū and Rakahuri are of cultural significance to the rohe of Ngāi Tūāhuriri, a primary hapū of Ngāi Tahu. Highlighted in their submission is the historic importance of these rivers for seasonal collection and of mahinga kai. The Rakahuri catchment and all tributaries remains culturally important to Ngāi Tūāhuriri's tikanga and exercise of rangatiratanga

41. The submission from White Rock Community raised concerns with the hydrogeological model and uncertainties around actual river flows and location of gains and losses. As discussed in items 20-23 of this report, the gains and losses presented by the applicant contradict the data held by Environment Canterbury. The presence of a drying reach in the lower Karetu may extend up further, particularly in low flow years.

42. The submission from Duncan Mackintosh speaks on the uncertainty of the minimum flow or Mean Annual Low, MALF(7d), flow of the Karetu River. The submission addressed concerns that any take by the applicant could reduce the flow below the MALF(7d). Considering we have very little flow data on the Karetu River, this is a valid concern.

Conclusions and Recommendations

43. The Karetu is already a small river and may flow at a lower rate than the estimations provided. Any consumptive take would put pressure on the river and the aforementioned 13 users downstream of the White Rock community, reducing their availability of clean drinking and stock water.

44. It is of my opinion that the size and flow of the Karetu catchment is not enough to support the water use needs for the proposed activity based on an available combined surface and groundwater daily volume of 102m^3. While is would be less common for dust suppression to be required for 10 hours a day, the applicant would need to ensure that storage could support 200m^3 is stored and available for dry windy days.

45. To understand the potential and actual effects on the Karetu River requires an understanding of the flow characteristics of the river. It its difficult to estimate the mean, median and MALF(7d) of the Karetu River with few flow gaugings.

46. Further, there needs to be a better understanding of the losses and or gains to groundwater to understand quantity and therefore effects on water quality. The current information provided by the applicant is entirely conceptual and contradicts the observations of surface water losses to groundwater by Environment Canterbury staff.

References

Environment Canterbury. 2023. Canterbury Land and Water Regional Plan. Volume 1. August 2023. Section 5.111

Ministry for the Environment. 2016. Good Practice Guide for Assessing and Managing Dust. Wellington: Ministry for the Environment.

Mourot F, Westerhoff RS, Taves MW, Macdonald N, Moreau M. 2021. Investigation of the effects of afforestation on catchment water balance: case studies in Northland and Waikato. Wairakei (NZ): GNS Science. 62 p. Consultancy Report 2021/57.

Fahey B, Payne J. The Glendhu experimental catchment study, upland east Otago, New Zealand: 34 years of hydrological observations on the afforestation of tussock grasslands.Hydrological Processes. 2017;31:2921–2934. https://doi.org/10.1002/hyp.11234

Chater, M 2004: '7-day Mean Annual Low Flow Mapping for the Ashley Catchment Area. Environment Canterbury Report No. U04/16', April 2004

Appendix 13: LizardExpertNZ, Herpetology s42A report, prepared by Dr Mandy Tochter

Before the Independent Hearing Panel appointed by the Canterbury Regional Council
IN THE MATTER OF The Resource Management Act 1991

AND

IN THE MATTER OF Application CRC243699 by Protranz International Limited for earthworks, quarrying and landfilling at Whiterock Quarry, 150 and 174 Quarry Road, Loburn, North Canterbury.

Supplemental Section 42A Officer's Report

Report of Dr Mandy D Tocher

Scope of Report

1. This report is prepared under the provisions of Section 42A of the Resource Management Act 1991 (RMA). This section allows a council officer or consultant to provide a report to the decision-maker(s) on a resource consent application made to the council and allows the decision-maker(s) to consider the report at the hearing.
2. Section 41(4) of the RMA allows the decision-maker(s) to request and receive from any person who makes a report under Section 42A "any information or advice that is relevant and reasonably necessary to determine the application".
3. This report is supplementary to the Section 42A Report prepared by the Environment Canterbury/WDC for the above resource consent applications. Full details of the consent applications are provided in the respective Section 42A reports.
4. To carry out this audit of the consent applications, I have:
    a. Considered the relevant sections of the Applications and Assessment of effects on the environment (AEE) submitted by the applicant, dated 28th March 2024.
    b. Considered the technical Appendix G 'Ecological Impact Assessment' (EcIA) attached to the AEE/Application.
    c. Considered the proffered conditions dated 27/03/2024 attached to the AEE as Appendix Y. These conditions cover Region and District conditions in separate sections.
    d. Considered the revised set of conditions (Appendix Y Rev1) that formed part of the s92 response to ECAN, dated 27/08/2024. These conditions address lizard management in 'District Proposed Conditions' 'Biodiversity & Landscape Enhancement' and its accompanying Schedule 1.
    e. Considered the Site Management Plan (draft Rev B; Appendix L).
    f. Reviewed further information that was provided to WDC by the applicant on draft Management Plans, stock fencing & Terrestrial Ecology (Lizards) (dated 23/8/2024).
    g. Reviewed further information that was provided to ECAN by the applicant on crown land (GEN-003) and draft MPs (GEN-002) (dated 16/8/24).

h. Considered Section 6(c) significance criteria in the Canterbury Regional Policy Statement and its supporting guidance document.[1]

i. Looked at Appendix H rev1 to determine footprint and locations of proposed activities.

j. Undertaken a site visit on 24th January 2025 to determine lizard habitats onsite.

k. Considered lizard specific issues raised by 22 submitters: namely concerns related to effects of the proposal on lizards and the management of actual and potential effects.

l. Reviewed the following report: Hutchison, M. August 2024. Botanical Survey of White Rock Limestone Site, Loburn, Waimakariri District. 57 pages.

m. Reviewed the 'Whiterock lime quarry and landfill lizard management plan' (LMP), dated December 5th, 2024.

5. Of note, I was not provided with a copy of a Lizard Management Plan (LMP) until 5th February 2025, 6 months after it was drafted (first draft produced 30th August 2024) and 2 months after it was submitted to DOC for permitting (December 2024).[2]

6. Of most concern to me, however, is that the first LMP draft was produced 5 months after lodgement of the AEE/Application (28th March 2024) despite the AEE indicating that an application had been made to DOC for a salvage permit.[3] Salvage permits cannot be processed by DOC without a supporting LMP. This means the Applicant lodged consent documents with misleading references to the availability of the salvage application and its supporting LMP.

7. Furthermore, the salvage permit application and LMP was withheld when requested as part of the RFI in August 2024. The reasons given by the Applicant for why the LMP was withheld at lodgement and then again when requested in the RFI are discussed over paragraphs 73-78 below, along with my opinion on this that has recently been informed by new case law regarding the 'Mt Messenger project'.[4]

8. This report also provides my assessment of the scale and significance of adverse and positive effects.

9. Finally, if the decision makers are of a mind to grant the application, this report provides recommendations on the scope of conditions of consent that are required to ensure adverse effects on lizards can be adequately avoided, remedied or mitigated, and/or compensated for.

Introduction

Background

10. This report forms part of the Environment Canterbury's (ECAN) audit of the assessment of environmental effects (AEE) provided by Protranz International Ltd (the applicant) in support of ECAN resource consent applications CRC243699-CRC243706, and RC245076 (Waimakariri District Council).

11. This report will provide the decision-maker with information and advice related to:

[1] UpdatedGuidelinesfortheApplicationofEcologicalSignificanceCriteriaforIndigenousVegetationandHabitatsofIndigenousFaunainCanterburyRegion%20(10).PDF
[2] DOC reference 107310-FAU.
[3] AEE, page 6. Section 2.4 'Wildlife Act 1953'.
[4] Environmental Law Initiative v Director-General of the Department of Conservation & Ors [2025] NZHC 391.

a. The actual and potential effects of the proposed activities on indigenous lizards.

b. The scale and significance of the anticipated environmental effects as they relate to lizard populations and habitats.

c. The proposed management of lizard-related actual and potential adverse effects.

Qualifications

12. I have worked in the field of New Zealand herpetology (lizards and frogs) for over 30 years with almost all my career based in Canterbury and Otago.

13. I currently hold the position of Principle Herpetologist at LizardExpertNZ, my own business that I initiated April 2021.

14. I obtained a M.Sc. with first class honours in 1992 and a Ph. D in Zoology in 1997. These were both awarded by the University of Canterbury. I also hold a master's degree in planning (Distinction), awarded from the University of Otago in 2017.[5]

15. I am a member of the New Zealand Amphibian Specialist Group for the IUCN, the New Zealand Reintroduction Specialist Group. I am a past member of the Department of Conservation (DOC*)* lizard Technical Advisory Group (TAG*),* the Native Frog Recovery group, grand and Otago skink Recovery group and the Resource Management Law Association. I am an Associate Editor for the New Zealand Journal of Zoology and an accredited RMA hearings commissioner.

16. From 2011-2016 I was employed as Senior Ecologist by Wildland Consultants Ltd, and then as Principal Ecologist/Herpetologist by Ryder Environmental until April 2021 when I initiated LizardExpertNZ. Before I took up my position with Wildland Consultants I was employed by the DOC as the South Island Herpetologist for 16 years, specialising in research and management of South Island lizards and frogs.

17. Under contract to DOC, I helped to develop the DOC lizard management plan template[6] and the key principles for lizard salvage in New Zealand.[7]

Description of the Activity

18. I have relied on the description of the activity provided in Section 4 of the Applications & AEE. The proposed activities are located at 150, 154, 174 Quarry Road,[8] Loburn as well as WDC road reserve and crown land (Karetu riverbed & margins). Many actions designed to balance anticipated lizard-related effects are proposed for part of 174/176 Quarry Road (a WDC Significant Natural Area (SNA)[9]).

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[5] Tocher, M. (2016). Biodiversity Maintenance and Protection under RMA Section 6(c) (Thesis, Master of Planning). University of Otago.
Tocher Mandy D., Theo Stephens, Claire Freeman, and Chris Garden (2017). Biodiversity Maintenance and Protection Under Both Clauses of s 6(c) of the RMA. Resource Management Theory & Practice 2017, pages 136-260.

[6] https://www.doc.govt.nz/globalassets/documents/about-doc/concessions-and-permits/wildlife-research-permits/lizard-management-plan-template.pdf

[7] DOC TAG, 2019. Key principles for lizard salvage and transfer in New Zealand. Department of Conservation. 19 pages.

[8] Properties 150 and 154 Quarry Road are held together under a single title and 174 and 176 Quarry Road are held under another single title. The existing quarry and proposed landfill site are generally referred to as 150 and 174 Quarry Road, Loburn according to the AEE page 2.

[9] WDC SNA039 'Whiterock Limestone Vegetation'.

19. The proposed activities relevant to lizards are any activities that disturb or remove their 'existing environment' habitats (refer to paragraphs 23-40 below for my views on existing/receiving environment).

20. Proposed activities over lizard habitats are earthworks and associated vegetation clearance of a mix of indigenous (riparian margins of the Karetu River, the Karetu Riverbed, and wetlands) and exotic vegetation (exotic grasslands over 150/154 and 174/176 Quarry Road and the WDC Road Reserve).

21. Activities most likely to affect lizard values, i.e., earthworks and concurrent vegetation removal (including exotic pasture) and spoil disposal (if required) over most of actual and potential lizard habitats are well described in terms of consents required by both ECAN and WDC, and Appendix H (rev1) shows site plans where such activities will generally take place.

22. Exceptions, where descriptions of activities over potential lizard habitats are not well set out by the applicant in the AEE or the LMP include:

    a. The width and method of installation of the proposed security fence. The installation of this fence may affect a variety of lizard habitats over exotic grasslands, wetlands and recently cleared pine plantations.

    b. The width and method of installation of the proposed herbivore exclusion fencing around SNA (called stock exclusion fence in the LMP). The installation of this fence may affect a variety of lizard habitats over exotic grasslands and recently cleared pine plantations. The proposed location of this fence is helpfully described and mapped in the LMP.[10]

    c. The width and method of installation of the proposed stock exclusion fencing around watercourses. The installation of these fences may affect a variety of lizard habitats over exotic grasslands/shrublands of riparian areas.

    d. Proposed activities (if any) over the existing access road (WDC road reserve) from Quarry road and before the proposed new bridge.[11] Activities such as widening to accommodate entry onto the new bridge and/or introducing culverts/water tables could affect potential Canterbury grass skink (*Oligosoma* aff. *polychroma* clade 4) habitat along the roadsides, e.g., along the existing fence line that is not regularly mown or grazed.

    e. The location and description of offsite overburden storage[12]. I was unable to be assured by the information provided by the applicant that overburden will not be placed on top of offsite lizard habitats thus extending potential effects off site to a second location.

    f. The location and description of activities over wetlands, riparian areas and riverbed of the Karetu River.

    g. The location and description of any wastewater disposal areas/trenching from weighbridge buildings.[13] I was unable to be assured by the information provided by the applicant that wastewater disposal onsite will avoid lizard habitats including wetlands.

[10] Section 5.3.3. Fencing of the LMP, page 27, and Figure 28.
[11] The applicant's response to WDC issue 5 a) i. does not unequivocally rule out works over the road reserve (page 23).
[12] Application Section 4.5.3 page 31.
[13] Application Section 2.2.22 page 5.

Description of the Receiving Environment

23. I consider the existing environment is represented by baseline lizard populations and their habitats, and any factors that are currently influencing them e.g., predator loading of the site, woody weed encroachment, current & lawfully established activities.

24. The application provides a general and mostly high-level description of the existing environment in Section 3. Section 3.10 addresses 'Ecology' and defers to Appendix G the Ecological Impact Assessment (EcIA) for existing lizard-environment.

25. Despite reviewing the EcIA and more latterly the LMP, I remain unsure of the extent (and quality) of lizard habitats that make up the existing environment. For example, I question whether lizard habitats over the recently cleared pine plantations of 150/154 and 174/176 Quarry Road (*ca.* 6.5 ha)[14] constitute the existing environment, or alternatively, are habitats created by the proposed activity.

26. I note that the Applicant has indicated that the removal of pine plantations is not part of the Application,[15] yet removal was/is necessary to install the security fence and presumably to install landfill related infrastructure. For this reason, I believe the removal of forestry should be considered part of the application.

27. Given potential lizard habitat is present in and around the pine plantations and indeed, lizards may ultimately benefit from their removal; a commentary on the applicant's position on this activity as it pertains to lizards/lizard habitat was warranted and was provided in the EcIA.[16] This acknowledgement is, however, inconsistent with the RFI response declaring that the harvesting was not part of the application.[17] I remain confused and suggest this topic could be addressed at expert conferencing.

28. The WDC SNA forms an important part of the application as it is a proposed release site for lizards salvaged from the development footprint. I expected, therefore, a description of lizard values of the site and details of any management being carried out there now that may affect existing lizard values. This information was overall not provided; the exception to this is information based on the lizard survey showing skinks of unknown species reside very close to the boundary of the SNA (e.g., Figure 12 of the LMP).

29. Bunding work has begun onsite and as I understand it forms part of the applicant's proposal. A description of onsite bunding work already carried out over potential lizard habitats was appropriately provided in the EcIA.[18]

30. Finally, in terms of the receiving environment and factors influencing lizard populations and habitats, the application along with Appendix G of the AEE addresses relevant issues except for existing pest control. I was unable to ascertain based on information provided by the applicant and an ecological report of the SNA[19] if any predator control was underway over the site or the SNA; I have assumed not. The LMP does confirm, however, that no pest control has been undertaken historically over the site, which may mean the SNA too.[20]

[14] Page 53 Section 4.5.2 of the EcIA (Appendix G of the AEE).
[15] RFI response to WDC page 9 Section i) Forestry Activity.
[16] Page 53 Section 4.5.2 of the EcIA (Appendix G of the AEE).
[17] RFI response to WDC page 9 Section i) Forestry Activity.
[18] Based on observation's made during January 2025 site visit, and reference to this is made in the EcIA page 53 (Appendix G of AEE). This information was not, however, carried through to the LMP, i.e., no mention of bunding was made in the LMP.
[19] Hutchison, M. August 2024. Botanical Survey of White Rock Limestone Site, Loburn, Waimakariri District. 57 pages.
[20] LMP page 29.

Lizard Values – Assessment and Characteristics

Potential Lizard Species Affected

31. To determine potential lizard values of the site, the results of a desktop appraisal of the DOC Herpetofauna database was provided.[21]

32. I agree with the applicant that the potential lizard values present based on desktop alone are Canterbury grass skink and McCann's skink (*O. maccanni*) along with either Waitaha gecko (*Woodworthia brunnea*) or greywacke gecko (*Woodworthia "*Southern Alps northern*"*) and possibly jewelled gecko (*Naultinus gemmeus*), and their respective habitats.[22] All are nationally At Risk – Declining except McCann's skink (Not Threatened).[23] Jewelled geckos are very unlikely to be present.[24]

33. It would have been helpful to have more commentary on the herpetological context of Waitaha/greywacke gecko, and Canterbury grass skink complex and McCanns skink. For example, greywacke gecko is a recent split from Southern Alps gecko meaning its distribution is not well documented. Likewise, Canterbury grass skink cannot be easily physically differentiated from sister grass skinks, or from McCann's skink, which creates difficulties identifying the boundaries of their respective distributions and necessitates handling lizards to identify them from each other.

Actual Lizard Species Affected

34. To determine actual lizard values (populations and habitats), a 'passive' lizard survey was conducted, and lizards were not handled. The survey was carried out without a Department of Conservation (DOC) handling permit which although appropriately acknowledged,[25] lessened the accuracy and usefulness of the lizard survey. A case in point, the two skinks photographed in the EcIA are grass skinks (probably Canterbury grass skinks)[26]; neither are McCann's skink as suggested by the applicant.[27]

35. It is standard & best practice to carry out a lizard survey under a DOC handling permit. This allows the surveyor to handle lizards and be sure of identification either by using their own experience or by taking high-quality photographs to enable others more experienced to assist with identification. As a result of the inability to handle lizards, the lizard species affected by the proposal are not entirely known.

36. I am surprised, therefore, that DOC issued a cover-all Wildlife Act (1953) permit for this project that captures potential rather than actual lizard species affected. For this reason, I have requested from DOC under the Official Information Act (1982) the internal decision-making support document relating to the issued salvage permit (107310-FAU). A review of this document will allow me to determine if the DOC technical advisor that advised on the application also raised concerns on this matter, concerns that may or may not have been considered critical by the final decision maker. The OIA response[28]

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[21] Table 33 of the EcIA (Appendix G of AEE).

[22] Page 30 of the EcIA (Appendix G of the AEE).

[23] Hitchmough *et al.* 2021.Conservation status of New Zealand reptiles, 2021. New Zealand Threat Classification Series 35. Department of Conservation, Wellington. 15 p.

[24] Based on observations of habitats present during January 2025 site visit.

[25] This situation is acknowledged in the EcIA page 30 (Appendix G of AEE).

[26] The only way to be sure is to collect a genetic sample – tail tip – from a handful of skinks. Grass skinks cannot be identified by physical appearance alone, but location does point to the grass skinks onsite being Canterbury grass skinks.

[27] EcIA Figures 15 & 6 (Appendix G of AEE).

[28] I have been advised that the OIAD-5018 relating to 107310-FAU will be issued by DOC no later than 10th April 2025.

was, however, not available for me to review at the time of writing but is expected to be available before expert conferencing and/or the hearing.

37. What is known is that At Risk-Declining grass skinks (probably Canterbury grass skinks) are present in good numbers across the site including in areas recently cleared of pine plantation. [29] Also, potential habitat for *Woodworthia* spp. geckos is present in the WDC SNA of 176 Quarry Road.[30] The presence and habitat use of McCann's skink and *Woodworthia* sp. geckos is not so certain given surveyed locations[31].

38. To remedy this situation regarding lizard survey, the applicant has suggested the survey although not ideal, is sufficient and by erring on the side of caution and assuming At Risk declining lizards are present, the information collected from the survey is sufficient to assess effects and design appropriate mitigation for all lizard species affected.

39. Although I commend the applicant for being cautious and as it turns out At Risk Declining grass skinks are indeed present, I don't believe it is sufficient to simply guess at which of the likely species are present. Waitaha gecko, for example, may also be present over the landfill footprint.

40. My view originates from the need to have a solid and robust foundational assessment of lizard values to then accurately determine effects and in turn, accurately determine appropriate 'mitigation' to balance any adverse effects. This must be done species by species, not genus by genus. A shaky foundation based on inadequate survey can, in my view, only lead to inaccuracies along the line, ultimately to the detriment of affected lizard values, some of which occupy 'significant fauna habitats' (refer to paragraphs 50-51 below).

Lizard Habitats Affected

What lizard habitats are affected?

41. The proposed activities will affect a mix of highly disturbed land e.g., the quarry pit and associated disturbed surfaces and what I call 'lesser' disturbed land. Highly disturbed land is unlikely to provide lizard habitat, and this is broadly consistent with the lizard habitats described and mapped in the LMP.[32]

42. I define 'lesser' disturbed land as land that has been disturbed in the past, e.g., from farming, weed invasion, afforestation/logging and/or historic fires and no longer retains a predominately indigenous vegetation cover but nonetheless can and does provide lizard habitat.[33]

43. Lesser disturbed land can be found over:

    a. recently felled pine plantations
    b. wetlands
    c. exotic grasslands
    d. the riparian margins of the Karetu River

[29] Observations made during the site visit, January 2025.
[30] Observations made during the site visit, January 2025.
[31] WDC requested in their RFI information on survey methods for this Waitaha gecko. This was helpfully provided on page 23 of the response, section ii. and confirms this species was only searched for over the Quarry footprint rather than the project footprint. Section 3.3 of the LMP 'Waitaha gecko' is consistent with this, i.e., Waitaha gecko maybe affected but its not certain.
[32] E.g., Figure 12 of the LMP that is also provided as Figure 17, page 35 of the EcIa (Appendix G of application).
[33] Figure 17, Page 35 of EcIA (Appendix G of application) and observations during the January 2025 site visit.

e. the Karetu Riverbed and

f. the WDC road reserve area[34].

Where and how much lizard habitats are affected?

44. The extent and location of 'lesser' disturbed land (listed in paragraph 43) affected by the proposed activities was not provided in the AEE nor the LMP. Instead, the Applicant has provided imprecise information on where activities will impact on lizard habitats and suggests all development will be restricted to the quarry footprint within 150 Quarry Road which isn't the case based on project plans.[35]

45. For example, the Applicant has estimated 1.9 ha of 'high-quality'[36] lizard habitat *maybe* affected by the proposed activities but might not be.[37] This habitat is then mapped Figure 13 of the LMP, but not as 'high-quality' lizard habitat affected, but as lizard habitat to be salvaged. Somewhat confusingly, some areas of high-quality habitat detected through survey are not mapped nor included in the 1.9 ha despite these areas being affected by proposed activities such as the installation of the security fence and the development of other landfill infrastructure.[38]

46. Also, potential lizard habitat or lizard habitat other than 'high quality' is not included in the mapping or the 1.9 ha calculation (e.g., recently cleared forestry plantations).

47. As a result of these omissions, the lizard habitats and lizard populations affected by the proposed activities have been underestimated and as a result, so too has the effects assessment and 'mitigation package' offered to address effects (refer to paragraphs 79-104 below).

48. Using Google earth imagery, observations during the site visit and a visual appraisal of Appendix H rev1[39] and Figure 43 of the EcIA[40], I have estimated lizard habitats affected by the proposed activities to cover a combined area of at least 4 ha. Also, a further *ca*. 0.5 ha of habitat loss has already occurred relating to bunding work.[41]

49. The applicant's assessment of lizard habitat loss of 0.5 ha in the EcIA appropriately acknowledges that this estimate does not include all "other possible impacts"[42] such as improvement of the existing flood protection bund, but overall and in my opinion, information provided on extent and location of affected lizard habitats is inadequate for consenting purposes. Moreover, the increase in lizard habitat to be lost from a predicted 0.5 ha in the EcIA, the key document available to submitters, to a predicted 1.9 ha in the LMP is clearly not consistent yet the discrepancy was not explained in the LMP.

RMA Section 6(c) Significant Fauna Habitat

50. Despite the problems I have raised regarding the lizard survey and the information provided on the location and extent of affected lizard habitats, the applicant states that lizard values are 'high' when considered at the Ecological District (ED) level.[43]

[34] The applicant's response to WDC issue 5 a) i. at page 23 does not unequivocally rule out works over the road reserve.
[35] AEE, Appendix H (rev1).
[36] "High quality" lizard habitat is defined in the LMP Glossary as "Areas demarcated with confirmed lizards or areas of habitat highly likely to support lizard species on-site."
[37] Page 8 of the LMP.
[38] E.g., Compare Figure 12 and Figure 13 of the LMP.
[39] Provided in the s92 response to ECAN.
[40] Page 51 of EcIA (Appendix G of AEE).
[41] Page 36 and 53 of the EcIA (Appendix G of AEE).
[42] Page 33 of the EcIA (Appendix G of AEE).
[43] Section 3.10 of application page 26 & Section 4.3.1. page 36 of the EcIA (Appendix G of AEE).

51. I generally agree with this as areas of the site that provide habitat for Canterbury grass skinks and/or Waitaha gecko represent Section 6c RMA 'significant fauna habitat' under the Canterbury Regional Policy Statement i.e., having an At-Risk Declining threat status is enough to trigger significance in Canterbury.

Supplementary Lizard Survey

52. The areas that were subjected to lizard survey were confirmed in the s92 response[44] and as I understand it, survey was not carried out over all areas affected by the proposed activities.

53. Non-surveyed areas that may provide lizard habitat that could be affected by the proposed activities include:

    a. Areas recently cleared of pine plantation.

    b. Wetlands.

    c. The riparian margins/riverbed of the Karetu River and footprint of proposed stock exclusion fencing here.

    d. The WDC road reserve.

    e. An area of grassland over the eastern area of 154 Quarry Road.

    f. The WDC SNA and footprint of proposed stock exclusion fence.

    g. The footprint of the security fence that will encompass the site[45].

54. To illustrate by an example the potential consequence of this survey deficit I note that grass skinks (probably Canterbury grass skinks) were easily found over an area recently cleared of pine plantation during the January 2025 site visit. The area in question was directly adjacent to the WDC SNA on 176 Quarry Road. As far as I can tell, this area was not surveyed by the applicant which means effects on this area and other similar non-surveyed cleared pine plantation habitats may have been underestimated (assuming they form part of the existing/receiving environment; paragraphs 23-30).

55. Moreover, some or all these habitats maybe 'significant fauna habitat' under the Canterbury Regional Policy Statement (CRPS) necessitating 'protection' through application of the effects management hierarchy. For this reason, the location and extent of these habitats should have been documented in the EcIA and the LMP to enable an assessment by Councils, submitters and experts of proposed 'protection' of these areas.

56. In my opinion, an additional supplementary lizard survey is justified ahead of consenting (or otherwise) this application for the following reasons:

    a. It is best practice to carry out a lizard survey robust enough to determine which lizard species are present and the extent and quality of their habitats, and depending on methods employed, relative numbers of each species affected.[46] This is the purpose of a lizard survey and allows first and foremost an opportunity for significant and important lizard habitats to be avoided.

    b. Unfortunately, for reasons relating to DOC permitting, the current survey was unable to ascertain which species are present, i.e., there may be 1 species of

[44] s92 response to WDC issues 5 a) i. or 5 a) ii. and shown in Figures 13 & 17 of the EcIA (Appendix G).
[45] Appendix H rev1 'Location Plan'.
[46] The LMP Section 1.3 page 5 states that the passive survey was able to determine relative abundances, and this is shown for sites surveyed in Figure 12 of the LMP.

lizard affected or more and up to three. The numbers affected for each species has not been provided.[47]

c. The effects assessment described over the next section must logically be inherently flawed if the number of lizard species affected and the extent of each of their habitats is unknown or underestimated. Moreover, the scale and significance of effects, a key consenting metric, cannot be ascertained unless the survey informing the assessment is adequate.

d. A flawed effects assessment cannot be used to design an appropriate mitigation package; for example, and as mentioned above, avoidance actions cannot be considered unless there is an understanding of where lizard values lie, and which places are priority for avoidance. I note that no legitimate lizard habitat avoidance actions have been suggested in the EcIA or the LMP for any lizard habitats (refer to paragraphs 80-84). This information deficit needs addressing given grass skinks (and possibly Waitaha gecko) occupy significant fauna habitat across the site (significant under Section 6c, RMA 1991) and this habitat must be considered for avoidance under the Canterbury RPS and the mitigation hierarchy.

e. The sufficiency (adequacy) of the proffered 'mitigation package[48] described below, itself lacking in substantive detail, cannot be determined based on a flawed effects assessment.

f. In the absence of an adequate lizard survey, the number of each lizard species expected to be relocated to the WDC SNA is not known, nor is the quantum of effects then bestowed on lizards already resident within the SNA. In short, I remain unconvinced that the SNA lizard populations are not already near carrying capacity, given the finite nature of the lizard habitats present, and that proposed fencing will change this (refer to paragraphs 99-101).

57. I note that the LMP does not provide enough additional information to make up for the information that is lacking from the application as lodged meaning that in my opinion additional survey will still be required to properly inform the effects assessment required under the RMA (1991).

58. Proper and appropriate 'protection' of significant fauna habitat can only be achieved if we know where such habitat lies.

Actual and Potential Effects on Lizard Values

Description of Effects

59. A high-level list of actual and potential project impacts (effects) of the proposed activities on lizard values was supplied in the EcIA.[49] Some listed effects were nonspecific in terms of affected values, mechanism and location so I have assumed these related to all biodiversity, including lizards, over all habitats of the proposal and in adjacent areas. e.g., temporary to short term increase in dust, noise and vibration.

[47] This is partially addressed in the LMP where it is estimated that "the 1.9 ha of high-quality habitat on-site and proposed for removal, could support a few hundred Canterbury grass skinks, or a mix of Canterbury grass skink and McCann's skink". Section 3.2 of the LMP, page 12.
[48] 'Mitigation package' as used here is as informal term for actions proposed to balance effects.
[49] Section 2.2.3 of EcIA (Appendix G of AEE).

60. A further commentary on effects specific to lizards is provided in Section 4.3.2 of the EcIA.[50] This commentary appropriately acknowledges that effects maybe more severe during the colder months, and the applicant acknowledges that there may be other potential impacts too that are not specified.[51]

61. I note that although the Zone of Inference (ZOI) is defined in the EcIA as follows: "*lizard habitats immediately adjacent (within 5 m) to activities onsite*", as noted above all lizard habitats have not been mapped and extent quantified over all areas of the site, so it is not possible to deduce where the ZOI is to then determine scale and magnitude of effects. Also, the 5 m buffer into adjacent habitats is inconsistent with the 1 m described in the 'pre-mitigated level of effects assessment' for lizard habitats.[52]

62. Overall, however, most relevant actual and potential unmitigated effects were documented in Section 4.3.2. of the EcIA.[53] The exceptions including unspecified effects to areas listed in paragraph 22, are:

    a. injury to lizards

    b. potential permanent fragmentation of lizard habitats & populations both onsite and over surrounding areas including the WDC SNA, and

    c. the potential positive effects to lizards of removing pine plantations that were shading their habitats (if these habitats form part of the existing/receiving environment; see paragraphs 23-40).

    d. A list of any effects to lizards related to the quarry operation versus the landfill.

Magnitude & Significance of Effects

63. I have raised concerns over paragraphs 34-40 relating to inadequate survey that has likely resulted in an underestimate of effects on lizard habitats and lizard populations. Also, as noted in paragraph 22, the location and size of some proposed activities have not been provided, some of which will impact lizards and their habitats.

64. I note that the RMA (1991) gives no guidance on how practitioners are to assess the magnitude or significance of effects.

65. *In lieu* of guidance under the RMA, the applicant has used EIANZ guidelines to assess level, magnitude and significance of lizard-related effects.[54] I do not generally support the application of the EIANZ guidelines as resulting effects assessments can be formulaic and rigid rather than bespoke for the site/project. As a result, there is a risk that effects can be downplayed. Moreover, the RMA (1991) and as far as I am aware ECAN too, do not formally support the EIANZ approach.

66. However, using the EIANZ tables, the applicant has assessed:

    a. The pre-mitigated level of effect of the proposal on lizards as "very low".[55]

    b. The pre-mitigated magnitude of effect of the proposal on lizards as "negligible".[56]

67. For level and magnitude of effect 'lizards' have been clumped into a single entity, i.e., the applicant has assumed there is only 1 lizard species affected by the proposal despite

[50] Page 36 (Appendix G of AEE).
[51] EcIA page 33 (Appendix G of AEE).
[52] Section 4.3.2. page 36 of EcIA (Appendix G of AEE).
[53] Dust, noise and vibration, permanent habitat loss, disturbance & death of protected wildlife.
[54] https://www.eianz.org/document/item/4447
[55] Table 6, page 38 of the EcIA.
[56] EcIA page 36.

inferring otherwise.[57] As a result, the level and magnitude of effect is only provided for 'lizards' rather than for each lizard species affected, the latter being more appropriate in my view with the former likely to underestimate effects.

68. For example, it logically follows that if each lizard species was assessed separately, as per best practice, effects would be relatively higher for each species than for the clumped entity assessed by the applicant.

69. I note that the LMP provides no further information on effects and refers instead to assessments in the EcIA.

70. For reasons detailed in paragraph 49 I have formed the view that effects have likely been underestimated, and underestimates will have affected the applicants' assessments of both level and magnitude of effect, i.e., it follows that both level and magnitude of effect are also underestimated. For these reasons, I advocate for a fulsome reassessment of level and magnitude of effect following additional survey (refer to paragraphs x-x).

71. The pre-mitigated significance of effect is not provided by the applicant. In my opinion, inadequate survey has meant that an assessment of 'significance of effects' is also not possible now, ahead of supplementary survey.

72. However, Table 6 of the EcIA[58] assesses the 'post-mitigation magnitude of effect' as 'positive'. In my opinion, the level of detail provided by the applicant is insufficient to enable this assessment to be made and I recommend this assessment is completely disregarded.

RMA 1991 v Wildlife Act 1953

73. As noted elsewhere in this statement, the LMP was withheld at lodgement and when requested as part of the RFI process. Instead, the applicant suggested in the application and again in the WDC RFI response that managing lizard-related effects under the Wildlife Act (1953) process was preferable to managing them under the RMA (1991), The reason proffered was to reduce "*a potential duplicated and or inconsistent approach with the Waimakariri District Council*."[59]

74. In keeping with the applicant's view, very little information on lizard management was provided in the application thus depriving submitters of an opportunity to engage in the detail of proposed management. Unfortunately, however, the LMP once provided also fell short of the mark (e.g., paragraphs 79-109 below).

75. Managing effects over indigenous lizard habitats are very clearly within the mandate of the RMA (1991) and its planning tools overseen by WDC and ECAN. This is especially so for significant fauna habitats occupied by grass skinks (and perhaps Waitaha gecko) that are addressed in the RMA as a Part II matter (Section 6c), and feature prominently in the NPS-IB.[60] I strongly disagree, therefore, that the RMA (1991) devolves responsibility for 'effects management' to the Wildlife Act (1953) permitting process as the applicant proposes.[61]

76. In my opinion, providing the LMP as part of the applicant's resource consent application would have better served due process and to reduce any administrative duplication by allowing complete transparency to all stakeholders on how effects were proposed to be managed under both the Wildlife Act (1953) and the RMA (1991). This view is supported

[57] Page 30 of the EcIA (Appendix G of the AEE).
[58] Page 38 of the EcIA (Appendix G of AEE).
[59] s92 response to WDC, page 6.
[60] National Policy Statement for Indigenous Biodiversity 2023 (October 2024 version).
[61] Page 6 Section 2.4 'Wildlife Act 1953' of the application, and Section 5.6.2 of the application (page 47).

by one submitter who agreed with the need to have the LMP upfront as part of the consenting process.[62]

77. Irrespective of the applicants view of the RMA versus Wildlife Act (1953), recent caselaw has rendered the issued salvage component of Wildlife Act (WLA) permit 107310-FAU unlawful[63] as it requires 'incidental kill'. Incidental kill is a necessary part of lizard salvage as no salvage operation can or does capture all affected lizards; those left behind over the works footprint will be either killed, injured and/or displaced.

78. Moreover, the permit has a clause that relies on the issue of RMA (1991) consents before the permit can be used which supports my view on equivalency of both statutes in relation to lizard effects management.[64]

Effects Management: Application of Mitigation Hierarchy

79. I note that one submitter referred to the need to protect significant biodiversity including lizards now and for future generations.[65] Section 6c of the RMA (1991) highlights the duty of practitioners to "…*recognise and provide for the …. protection of significant habitats of indigenous fauna*". As I understand it, implicit in this provision is the need to exhaustively avoid, remedy and mitigate adverse effects on 'significant fauna habitat', regardless of magnitude or significance of effects on such habitats. This is generally acknowledged by the applicant on one hand,[66] but the notion is lost in the LMP where significant fauna habitats are neither mapped or fully surveyed.

Lizard Habitat Avoidance

80. I could find no legitimate actions described in the EcIA, the application or the LMP that relate to avoiding lizard habitats.[67] Indeed, the opposite appears true whereby habitat of Canterbury grass skink that may not be affected by proposed activities will be salvaged on a just-in-case basis, and this approach is incorrectly referred to as "precautionary".[68]

81. I strongly disagree that this approach is precautionary. The more appropriate approach is to determine which habitats will be affected and to avoid completely those that will not be affected and where possible, significant fauna habitats. Salvaging lizards unnecessarily increases effects on both salvaged lizards, that would otherwise be avoided, and those currently residing at the release site. This is not best practice, and I consider salvage of otherwise undisturbed lizards an **adverse effect** of the LMP/lizard management pertaining to the project and a very unusual situation to contemplate.

82. In any case, I would have found it very helpful to see on a map, at the very least, where lizard habitats will be avoided or alternatively a clear statement that no lizard habitats can be avoided due to the nature of the development/business.

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[62] SUB034870.
[63] Environmental Law Initiative v Director-General of the Department of Conservation & Ors [2025] NZHC 391.
[64] Schedule 3 clause 1.1 requires WDC consents prior to enacting the WLAA.
[65] SUB034380.
[66] Supported by the applicant in Section 3.3.3.3. 'Management of Effects' at page 20 of the EcIA (Appendix G of AEE).
[67] As noted elsewhere, I suspect this is because lizard habitat areas have not been mapped, but I note that wetland areas are mapped and included in project maps in Appendix H rev1; I expected a similar level of detail for lizard habitats, but this was absent.
[68] Page 8 of the LMP.

83. I note that reference to avoiding the SNA[69] is not a legitimate lizard-management action as the SNA is required by law/rules in the WDC Plan and the NPS-IB to be avoided, except for a few exempted activities.[70]

84. As it stands, therefore, I cannot determine if all avoidance options have been exhausted but I suspect not. This aspect also requires clarification given compensation by way of a covenant is one of the main components offered to balance effects, and compensation can only be considered under the NPS-IB when all lizard-related avoidance actions have been exhausted.[71]

Lizard Habitat Remediation

85. The LMP covers remediation in Section 7 (page 35). Remediation actions listed in the LMP include:

    a. Riparian plantings of the eastern watercourse and wetlands.

    b. 0.7 ha of ground maybe hydroseeded with exotic grassland species "beyond the riparian zone". This area is reportedly shown in Figure 31 of the LMP, which was not provided.

    c. At landfill closure *ca*. 8 ha of exotic grassland and tussock will be created. This area is shown in Figure 32 of the LMP.

86. The first two actions in paragraph 85 seem to be primarily aimed to offset effects of the proposed activities on other project components and will provide an uncertain or only incidental benefit for lizards affected by the project. For this reason, they cannot be considered as legitimate lizard management (remedial) actions, but I agree that it is appropriate to mention them in the LMP given the potential incidental benefits they may have. In support of my view on these remediation actions, I note the riparian areas and wetlands were not surveyed for lizards, so any benefits cannot be known by the applicant without further survey

87. The applicant also proposes over the longer term and at landfill closure, to reinstate 8 ha of pastureland for lizard habitat.[72] I note that a single lizard-related submission referred to a desire to see remediation of the quarry for biodiversity purposes.[73]

88. I fully support this landfill closure idea but require confirmation that the site will be left ungrazed, free from afforestation and have some form of protective covenant applied to it to ensure no further development will occur. Without these assurances, I don't believe any weight should be placed on this remediation action.

89. As it stands, therefore, I cannot determine if all remediation options have been exhausted, but I suspect not. This aspect along with avoidance actions requires clarification given compensation can only be considered under the NPS-IB when all lizard-related remediation actions have been exhausted.[74]

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[69] EcIA Section 4.3.3. Effects management hierarchy, page 37 (Appendix G of AEE).
[70] WDC Rule ECO-R1 for mapped SNAs prohibits large scale earthworks and indigenous vegetation clearance but does allow the erecting a protective fence by right inside the SNA. The proposed stock exclusion fence falls outside the SNA and is subject to Rule ECO-R2 that must consider at risk lizard habitats under ECO-MD1.
[71] Appendix 4 of the NPS-IB.
[72] LMP page 35, Section 7.
[73] SUB034380.
[74] Appendix 4 of the NPS-IB.

Mitigation for Lizard Habitat & Lizard Population Loss

90. For mitigation, the applicant proposes to:

    a. Avoiding the winter months when developing areas of the site that have an exotic grass cover that could harbour grass skinks (May-August inclusive).[75]

    b. Lizard Salvage from 1.9 ha of the project area for release into the WDC SNA with various actions proposed to create a suitable release area.[76]

Avoiding the Winter Months

91. Avoiding the winter months is proffered in the EcIa but not in the LMP. I suspect this is an error and seek clarification on why this mitigation-like action is proposed when skinks are proposed to be salvaged from the footprint, or at least 1.9 ha of it. Also, I have doubts that the applicant would be able to, in a business sense, cease work over the winter months to avoid rank exotic grassland habitat of grass skinks.[77]

Lizard Salvage

92. Sections 5 & 6 of the LMP describe the proposed lizard salvage. Methods for capture of lizards during salvage are appropriate, but as I noted over paragraphs 44-49, I have concerns around:

    a. Why only 1.9 ha is flagged for salvage despite other lizard habitat being detected and other habitats remaining un-surveyed, and

    b. The applicant has indicated that of this 1.9 ha, some areas may not even need salvaged as they may not be affected.

93. I think the answer to a. relates to a statement made in the LMP, which is also discussed in paragraph 44. The statement I refer to is as follows: "The area proposed for quarry-related earthworks and landfill operations will be restricted within the current quarry site at 150 Quarry Road".[78] If this was the case, that all development was completely confined to be carried out within the current quarry site at 150 Quarry Road, it makes sense why only 1.9 ha of lizard habitat is considered affected in the LMP. As noted elsewhere, however, proposed activities take in a much larger actual and potential lizard habitat area than this (see paragraphs 44-49).

94. A second statement made in the LMP also relates to the 1.9 ha area where Principle 5 of the DOC salvage principles,[79] provided here as Appendix 1, was given as a reason why only 1.9 ha would be salvaged. This principle is as follows:

    "*Principle 5: Lizard salvage, transfer and release must use the best available methodology*".

95. After reacquainting myself with Principle 5, I can see no relevance of this principle to the issue of salvage only targeting 1.9 ha of lizard habitat. Indeed, by drawing my attention to Principle 5 I am reminded of how the Principles are not being followed by the applicant, as I have discussed elsewhere. For example, in the text for Principle 5 the following is stated:

[75] EcIA Section 4.3.3. page 37 (Appendix G of AEE).
[76] Page 44 of the EcIA (Appendix G of the AEE); LMP Sections 5 & 6.
[77] See Figure 43 of the EcIA, page 51 (Appendix G of AEE).
[78] LMP page 1, Section 1.2.
[79] Page 12 of DOC TAG, 2019. Key principles for lizard salvage and transfer in New Zealand. Department of Conservation. 19 pages.

"*A mandatory component of any salvage and transfer application is a detailed description of why the salvage is needed, the salvage techniques proposed for each of the lizard species to be salvaged (which, importantly, must include a detailed assessment of the release site), and post release management (covered in Principles 7–9).*"

96. I note that the applicant proposes a one-off salvage effort.[80] I suspect that if further survey is carried out as suggested (refer to paragraphs 52-58) a lot more lizard habitats will be found and thus the ability to do a one-off salvage, as suggested, will not be possible. Instead, a staged salvage maybe required, and this is supported by Principle 5 that states:

"*To maximise the number of salvaged animals, salvage should be undertaken over multiple 'salvage events' and these should only stop after at least three unsuccessful salvage attempts under appropriate field conditions*."

97. The use of lizard exclusion fences is introduced into the LMP. Lizard exclusion fences are particularly important in managing movement of lizards from a salvaged/non salvaged area into the works areas. Considering my concerns raised above in paragraph 92, it would be helpful to understand exactly where and why the fences will be used. This is not clear in the LMP, [81] and could address a concern raised by a submitter. [82]

98. Multiple actions are proposed to enhance lizard habitats and populations in the part of the WDC SNA that is within 170 Quarry Road. These actions are as follows:

    a. A stock exclusion fence outside the SNA boundary[83] including 4 ha within 170 Quarry Road that will be used as a 'lizard' release site; and including a 3.75 ha area of recently felled pine plantation. [84]

    b. Removal of *ca*. 0.2 ha of woody weeds, including some pines, from the 4-ha lizard release area.[85]

    c. Enhancement of the 3.75 ha recently cleared of pine plantation by hydroseeding and planting with tussocks.

    d. Pest Control at the 4-ha lizard release area targeting hedgehogs, mice, ship and Norway rats. Pest control will commence at least 1 month before salvage and remain in place for at least 1 month after salvage is completed.

99. The erection of a stock exclusion fence, as proposed, around part of the SNA, is a good suggestion to enhance exotic grasslands already present and hopefully increase grassland habitats for skinks. This action is supported by botanists with an interest in maintaining rare plants of the SNA.[86] Grass would need to grow an entire season to be ready for skink release meaning fencing is a priority action ahead of salvage. It would have been helpful, therefore, to have a timeline of actions included in the LMP.

100. I also wonder if removing stock from the SNA although touted as a positive effect of the proposal[87] may instead cause seasonal rodent eruptions in response to exotic grasses

[80] LMP page 8.
[81] LMP Section 5.2.
[82] SUB034767.
[83] As I understand it, the proposed stock exclusion fence falls outside the SNA and is subject to Rule ECO-R2 that must consider at risk lizard habitats under ECO-MD1. The At- Risk Declining Canterbury grass skinks maybe affected by the fence construction as they were found within the cleared pine plantation during the January 24th 2025 site visit.
[84] Section 5.3.3. Fencing of the LMP, page 27, and Figure 28.
[85] LMP Section 5.3.2.1.
[86] Hutchison, M. August 2024. Botanical Survey of White Rock Limestone Site, Loburn, Waimakariri District. 57 pages.
[87] EcIA page 17 (Appendix G of the AEE).

seeding that could in turn result in perverse outcomes (in terms of elevated predation) for both the existing lizards of the SNA, and the newcomers released via salvage. Rodent monitoring will be key at managing this effect and the LMP will need to provide a rodent control/suppression response action if rodent tracking goes above *ca*. 5 % tracking.[88] Rodent monitoring over the fenced/non grazed area is an essential action that is currently missing from the salvage package.

101. Also, science has shown that releasing lizards into existing lizard populations does not result in good outcomes for released/salvaged lizards especially where mice are present.[89] Beginning predator control at least 3 months before salvage may help mitigate this risk and keeping control going for at least the same length of time after salvage is recommended.

102. The proposal to enhance the 3.75 ha recently cleared of pine plantation by hydroseeding and planting with tussocks needs a rethink. The LMP declares this area unsuitable, as is, for lizards but lizards were easily found there during the site visit. Also, large amounts of herbicide will be required to control woody weeds over this area, weeds that have not been documented in the LMP. Also, there is no real assurance given that this area won't be used as for forestry in the future, and I note it is outside the proposed Reserves Act covenant area.[90]

103. The LMP states that woody weeds will also be managed in the 4-ha lizard release area within part of the SNA, but I believe this is already occurring[91] and this action is therefore not truly additional. Also, woody weeds are more prevalent over the northern area of the SNA that will not be managed under this project.[92]

104. The proposed pest control, if packaged into a pest plan drafted by a recognised predator expert, could produce positive effects for the lizards of the lizard release area.[93] The description of this key lizard management action is vague in the LMP and requires further work to reassure me that is could be effective at increasing the carrying capacity of the site for what could be a few hundred skinks. As noted above, predator management is recommended to be extended both before and after salvage to manage a potential threat of rodent eruptions once grazing is removed

105. So, in summary, I have raised multiple problems with the salvage proposal which I note is in keeping with concerns raised by multiple submitters.[94] For reasons detailed above, I am unable to assess whether salvage is the best option for lizards of the site but accept that it maybe. In my opinion if salvage is progressed, the proposal requires a substantive overhaul.

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[88] A recommended tracking rate to generate a positive effect on lizards. See Norbury, G., Wilson, D.J., Clarke, D. et al. Density-impact functions for invasive house mouse (*Mus musculus*) effects on indigenous lizards and invertebrates. Biol Invasions 25, 801–815 (2023). https://doi.org/10.1007/s10530-022-02946-9

[89] Norbury, G., van den Munckhof, M., Neitzel, S., Hutcheon, A., Reardon, J., & Ludwig, K. (2014). Impacts of invasive house mice on post-release survival of translocated lizards. *New Zealand Journal of Ecology*, 322-327.

[90] Issued permit 107310-FAU, Schedule 3 clause 1.2.

[91] Hutchison, M. August 2024. Botanical Survey of White Rock Limestone Site, Loburn, Waimakariri District. 57 pages.

[92] Figure 44 of Hutchison, M. August 2024. Botanical Survey of White Rock Limestone Site, Loburn, Waimakariri District. 57 pages.

[93] Appendix 4 of the NPS-IB.

[94] SUB034396, SUB034571, SUB034415, SUB034518.

Compensation for Residual Adverse Effects

106. I hold the view that compensation is the most suitable path to address any residual effects on lizard values, and that compensation actions are required to adhere as far as technically feasible to principles in Appendix 4 of the NPS-IB.[95]

107. A residual effects assessment for each lizard species and their habitats was not provided in either the EcIA or the LMP. As noted elsewhere, inadequate survey was the cause. A species-by-species residual effects assessment is required to determine the level of compensation required to address residual effects. I note that under the NPS-IB only significant residual effects require addressing through compensation (or biodiversity offsetting that is not appropriate for lizards).

108. Based on information supplied I have formed the opinion that significant residual effects will likely ensue following the implementation of the avoidance, remediation and mitigation actions proposed by the applicant, irrespective of species affected. This view was reached because no lizard-related avoidance and remediation actions have been proposed, and the mitigation proposed is flawed.

109. I note that the applicant forms a different and more optimistic view on level of residual effect and assesses the residual level of effect for 'lizards' as 'net gain'[96] whilst providing no supporting evidence or expert commentary for how this assessment was made. A net conservation gain is also declared in the LMP.[97] I don't agree with this assessment and believe net loss will result for all affected lizard species if the LMP is implemented 'as is'.

Compensation Offerings

110. The LMP offers a few actions that are neither avoidance, remediation of mitigation actions, so by default, must be compensation. Compensation can only be considered, however, if the effects management hierarchy has been exhaustively applied.[98] Over paragraphs 79-105 I reach the conclusion that this has not occurred.

111. Notwithstanding the validity of compensation, compensation actions are described in Section 5.4.2. of the LMP and I have reproduced them here word for word. Actions relate to pest control and include:

> "Pest control outlined in the Site Management Plan (Draft B as at 16/08/2024) that includes 'Pest Controls' in Section 8.6. These include:
>
> i. Rodents (Rats and Mice). Pest control monitoring and maintenance will occur throughout the life of the proposed development as outlined within the Site Management Plan. The site will be maintained as 'rodent free' as far as practicable through standard anti-coagulant bait station use, and/or the repurposed use of the 'DOC200', or similar, kill traps from the lizard salvage. Monthly monitoring and maintenance will occur, at a minimum, for rodent control, for the life of the Project.

[95] [2023] NZEnvC 103 Friends of Conical Hill Incorporated v Hurunui District Council and Hanmer Springs Thermal Pools and Spa [PDF, 223 KB]
[96] Table 6, page 38 of the EcIA.
[97] LMP page 39 states" When this LMP is implemented in full it is expected to result in a positive conservation outcome and an overall Net Gain for indigenous lizards on-site."
[98] Appendix 4 of the NPS-IB Principle 1.

ii. Rabbits, hares and feral cats. Regular, nocturnal, feral cat shooting will be conducted as necessary.

iii. Possum, mustelid and hedgehog trapping will be performed with automatic self-resetting, or single strike kill traps. Kill traps will be 'Terminator' or similar, for possums and repurposed use of the 'DOC200', or similar, kill traps from the lizard salvage for mustelids and hedgehogs. Monthly monitoring and maintenance will occur, at a minimum, for the Possum, Mustelids and Hedgehog controls for the life of the Project."[99]

112. Compensation actions need not be lizard-centric but cannot be considered compensation unless they are additional.[100] Actions proposed to balance other effects on biodiversity are not additional, i.e., represent 'double-dipping' whereby a single action is proposed to offset multiple effects across a range of ecological values. The predator work proposed in the LMP Section 5.4.2. is not additional as it is firstly required/offered under the Site Management Plan.

113. A second action that could be considered compensation (or part of the proposed mitigation?) is the proposal to apply a Reserves Act (1977) Covenant to the 4-ha lizard release site. The covenant requires full collaboration with a third party, the Department of Conservation, and some detail on the covenant is provided in the issued WLA permit[101], much of which is now unlawful (paragraphs 73-78). The LMP did not mention the covenant at all.

114. Given the uncertain legal status of the issued WLA permit, I have concerns about the enduring commitment to the covenant by the applicant. It would have been helpful to me, for example, to have a formal link established between the applicant and DOC outside of the WLA permit. At the very least, the LMP needs to be revised to refer to the covenant to make it fit for purpose as an RMA LMP.

115. Also, it would be helpful to understand who is responsible for ongoing management of the covenant and if a management plan will be produced for the site describing what management will take place. On-going management of the covenant, e.g., woody weed control, is referred to in the LMP but no detail is provided on scheduling or responsibilities.[102]

116. Should the panel accept the covenant as compensation rather than part of a mitigation programme, I wish to question if the covenant is truly additional given the protection already offered for the site under the WDC plan and NPS-IB.

117. I accept, however, that a covenant can add an additional administrative layer of protection over part of the SNA, than the WDC plan and NPS-IB alone, but the weight the covenant should be given in balancing effects can only be determined when its management is determined. In the absence of information on the covenants planned management, I don't give it much weight and as a result hold the view that significant residual effects remain unaddressed.

[99] LMP Section 5.4.2.
[100] Principle 4 of Appendix 4 of the NPS-IB.
[101] WLA permit 107310-FAU.
[102] LMP Section 5.3.2.2., page 24.

Consideration of Submissions

118. Twenty-two submissions referred directly to indigenous lizards, skinks or geckos. [103]

119. I have divided these submissions into two topic areas:

    a. Effects of the proposal on lizard values, and

    b. Proposed effects management: Lizard translocation.

120. Each will now be addressed in turn.

121. I note that should the LMP have been provided at lodgement, I cannot say if submitters concerns would have been put to rest, but I think not as my own concerns were not.

Effects of the proposal on Lizard values

122. Of the twenty-two lizard-related submissions, twenty specifically raised concerns regarding potential effects and all of these 'oppose' the application. No lizard-related submissions supported the applicant's approach to assessing effects nor the proposed effects management.

123. Effects identified by submitters were general and referred to 'disruption', 'impact', 'contamination', 'potential threat', 'health', 'short and long-term effects' of and to indigenous lizards. One submitter[104] shared my concern that effects may have been underestimated by the applicant and others seem to infer this. A single submitter[105] questioned the quality of technical reports which I take to include the lizard effects assessment.

124. As noted above, I too have concerns about lizard effects and the inability of the applicant to robustly ascertain the scale and magnitude of effects from the lizard survey carried out.

125. Four submitters[106] while not expressly referring to lizards, had concerns regarding the impact of the proposal on wetland habitats and their biodiversity (fauna and flora). As noted above, wetland habitats were not surveyed for lizards, despite their potential as significant fauna habitat. For this reason, I share submitters concerns and note again my recommendation that a further supplementary survey is required to ascertain the degree with which onsite wetlands support indigenous lizards (see paragraphs 52-58).

126. Seven submitters[107] had concerns relating to the potential impact of the proposal on the WDC SNA (176 Quarry Road). These submissions are highly relevant to lizards because the SNA forms part of the applicant's proposal, and the SNA was not surveyed for lizards. I too have concerns regarding the impact on the SNA, but my concerns are very specific to the applicant's proposal to relocate lizards there (see paragraphs 92-105 above) with scant regard to understanding, via survey, how many lizards maybe relocated and therefore the quantum of impacts on existing lizards within the SNA.

Proposed Effects Management: Lizard Translocation

[103] SUB034326,SUB034361,SUB034380,SUB034383,SUB034384,SUB034396,SUB034413, SUB034415,SUB034497,SUB034518,SUB034529,SUB034566,SUB034571,SUB034623, SUB034627,SUB034631,SUB034668,SUB034767,SUB034806,SUB034807,SUB034848, SUB034837.
[104] SUB034741.
[105] SUB034741.
[106] SUB034741, SUB034405, SUB034529, SUB034380.
[107] SUB034383, SUB034384, SUB034413, SUB034627, SUB034668, SUB034806, SUB034807.

127. Four submitters[108] questioned the likely success and/or the appropriateness of the proposed lizard relocation from the works footprint to the nearby SNA. A related issue was raised by a single submitter regarding the fate, in terms of adverse effects of a landfill, to lizards that evade capture and are not relocated, i.e., those that are left behind.

128. Having now had the opportunity to view the LMP submitted to DOC, I agree that key information is missing from the application that DOC consider necessary for a successful salvage.[109] I refer to information such as (but not limited to):

    a. The lizard species to be relocated and some idea of numbers likely to be involved.

    b. Lizard species and numbers at the proposed release site (the WDC SNA).

    c. The likely carrying capacity of lizards at the proposed release site.[110]

129. Based solely on information provided by the applicant I have formed the view that the planned relocation of skinks from the footprint to the nearby WDC SNA has only casually been considered by the applicant and submitters concerns have merit. In support of the submitters, I note that scientific research has shown that lizard relocation is often unsuccessful.[111]

130. Also, I agree with a submitter[112] that raised concerns about lizards left behind to an unknown fate. As I understand it, the applicant only intends to salvage 1.9 ha of the project area rather than all habitats affected.[113] This decision requires further justification along with the decision to salvage habitats that may not be affected at all, including significant fauna habitats occupied by Canterbury grass skinks and/or Waitaha geckos.[114]

131. Lastly, I am far from convinced that relevant DOC salvage principles have been adhered to in the design of the salvage/translocation proposal, which could also compromise the success of any planned relocation. To remedy this, I suggest the applicant provide an audit of proposed salvage actions against the DOC nine salvage principles[115] as part of expert conferencing; in this way, submitters concerns can be addressed directly against current best practice.

Conclusions and Recommendations

132. Lizard survey did not cover the entire project area and has failed to generate key information necessary to understand the scale and magnitude of effects of the applicant's proposal on lizard values. For example, the number of lizard species onsite, the extent of their habitat uses, and the population levels affected remains largely unknown. A flawed effects assessment is a concern also raised by multiple submitters.

[108] SUB034396, SUB034571, SUB034415, SUB034518.

[109] DOC TAG, 2019. Key principles for lizard salvage and transfer in New Zealand. Department of Conservation. 19 pages.

[110] Some commentary is provided in the LMP, Section 5.3.1. but the issue of current carrying capacity is not convincingly addressed.

[111] Griffith B, Scott JM, Carpenter JW, Reed C 1989.Translocation as a species conservation tool: status and strategy. Science 245: 477-480

[112] SUB034767.

[113] Mapped Figure 13 of the LMP.

[114] Page 8 of the LMP.

[115] DOC TAG, 2019. Key principles for lizard salvage and transfer in New Zealand. Department of Conservation. 19 pages.

133. Without an effects assessment based on appropriate survey, the quantum of mitigation required to balance effects is unable to be determined. This is particularly concerning given much of the lizard habitat onsite is 'significant fauna habitat'.

134. Moreover, I believe withholding the LMP that had been submitted to DOC is inappropriate as stakeholders have been unable to effectively engage in the consent process as it pertains to lizards. In short, I hold the opinion that key and essential information was unreasonably withheld.

135. For the reasons stated above, I recommend processing of the WDC consents are stalled until a supplementary lizard survey is completed that addresses information gaps. The issuing of the DOC WLA (1953) permit (107310-FAU) does not change my views on this, and in any case, the permit is unlawful.[116]

136. If, however, the decision makers are of a mind to grant the application ahead of new survey, I recommend that conditions of consent are imposed that cover the following matters.

    a. A requirement to carry out an additional lizard survey. This survey must include all areas affected by proposed activities (including areas listed in paragraph 43) and must:

        i. Identify lizard species affected.

        ii. Provide an estimate of population/individuals affected for each lizard species and

        iii. Quantify the extent of lizard habitats affected for each lizard species.

    b. A requirement to provide an amended Lizard Management Plan upfront and ahead of consenting that:

        i. Disregards the EIANZ guidelines and opts instead for clear & precise expert commentary of values, magnitude, level and significance of effects.

        ii. Conforms to the DOC LMP template[117] and that caters solely for the RMA (1991); e.g., makes reference to the covenant.

        iii. Applies the mitigation hierarchy to actual and potential adverse effects and compensates for any residual effects that are deemed significant.

        iv. Provides a residual effects assessment to determine if compensation is required.

        v. Adheres as far as technically feasible to principles in Appendix 4 of the NPS-IB, if compensation is required.[118]

        vi. Describes a best practice lizard salvage regime that conforms to relevant principles in the DOC salvage principles guidance document.[119]

[116] Environmental Law Initiative v Director-General of the Department of Conservation & Ors [2025] NZHC 391.
[117] https://www.doc.govt.nz/globalassets/documents/about-doc/concessions-and-permits/wildlife-research-permits/lizard-management-plan-template.pdf
[118] [2023] NZEnvC 103 Friends of Conical Hill Incorporated v Hurunui District Council and Hanmer Springs Thermal Pools and Spa [PDF, 223 KB]
[119] DOC TAG, 2019. Key principles for lizard salvage and transfer in New Zealand. Department of Conservation. 19 pages.

137. Should conditions be imposed that cover these matters, I will be confident any adverse effects of the proposal on lizard values will be appropriately avoided, remedied or mitigated, and/or compensated for.

Appendix 1: Excerpt from DOC 2019. Key principles for lizard salvage and transfer,

Principle 5: Lizard salvage, transfer and release must use the best available methodology

While salvage and transfer can be used to save some individuals from a development site, DOC is primarily interested in protecting existing populations by ensuring they are able to re-establish elsewhere. Any transfer must meet the minimum requirements of translocations as outlined in the International Union for the Conservation of Nature (IUCN) translocation guidelines (IUCN/SSC 2013). Salvage must also follow the requirements of DOC's translocation permitting process. A mandatory component of any salvage and transfer application is a detailed description of why the salvage is needed, the salvage techniques proposed for each of the lizard species to be salvaged (which, importantly, must include a detailed assessment of the release site), and post-release management (covered in Principles 7–9).

Salvage methods include capture and collection techniques, temporary captive care (if required) and holding, transportation, health screening, data collection and release protocols. Principles 7–9 cover post-release activities; these are just as important as the transfer activities, as they ensure that viable populations become established. The DOC Herpetofauna toolbox (DOC Herpetofauna Inventory and Monitoring Herpetofauna link) can assist with determining which sampling methods should be employed for each species and habitat combination.

The IUCN translocation guidelines provide the best guidance on how to approach salvage; however, they do not distinguish between salvage- or conservation-related translocations. There is little New Zealand-based research data to guide best-practice lizard translocations. The approach adopted depends on the objectives of the salvage proposal and, in particular, how much it contributes to the attainment of no-net-loss in lizard values.

To maximise the number of salvaged animals, salvage should be undertaken over multiple 'salvage events' and these should only stop after at least three unsuccessful salvage attempts under appropriate field conditions. Using people with herpetological skills and experience is critical to the success of this process. Even using the best methodology, a high proportion of lizards will remain undetected, so compensation for any loss of lizards and/or their habitat will be required. The only published study that has attempted to quantify the portion of lizards caught during monitoring showed it was highly variable and usually low (<50%; ranged from 0.002 ± 0.001 (SE) to 0.470 ± 0.069), even with reasonable monitoring efforts (Lettink et al. 2011). We can therefore assume that only a portion of the population will be caught during salvage.

As a last resort, some of the remaining undetectable lizards may be recovered by having a herpetologist present to capture lizards fleeing from earthworks or revealed when large objects are moved while work is being undertaken (destructive searches). In addition, a post-vegetation-clearance search for remaining lizards or for those that attempt to return to their home site can be carried out.

The guideline for conservation-led translocations (DOC Lizard Technical Advisory Group 2017) provides more detail on methods for the capture, temporary holding and release of lizards following translocation, as do the IUCN Translocation Guidelines.



Canterbury geckos (*Woodworthia brunnea*) in box awaiting release. Photo: Marieke Lettink.

Appendix 14: SLR Consulting, Wetland s42A report, prepared by Dr Stephen Rate

Before the Independent Hearing Panel appointed by the Canterbury Regional Council

IN THE MATTER OF The Resource Management Act 1991

AND

IN THE MATTER OF Application CRC243699 by Protranz International Ltd for operation of a quarry and landfill at 150 and 174 Quarry Road, Whiterock (Loburn)

Section 42A Officer's Report

Report of Stephen Ronald Rate

Introduction

Background

1. This report forms part of the Environment Canterbury's audit of the assessment of environmental effects (AEE) provided by ProTranz (the applicant) in support of resource consent application CRC243699.
2. This report will provide the decision-maker with information and advice related to:
    a. the actual and potential effects of the proposed activities on terrestrial vegetation and wetlands.

Qualifications

3. My full name is Stephen Ronald Rate. I hold a PhD in Ecology, obtained from the University of Otago in 2005. I have worked as an ecological consultant for the last 19 years, focusing on terrestrial and wetland systems throughout New Zealand. I have been based in Dunedin since 2007, joining SLR Consulting in 2022, where I am currently a Senior Ecologist.
4. My relevant experience includes undertaking assessments of ecological effects and significance assessments for a range of activities including airports, residential subdivisions, irrigation schemes, wind and hydroelectric energy schemes, afforestation, ski field expansions, and industrial and quarry developments.
5. I regularly undertake natural wetland assessments as required under the National Policy Statement for Freshwater Management (NPS-FM) (Ministry for the Environment 2024).
6. I have read and am familiar with the Environment Court's Code of Conduct for Expert Witnesses, contained in the Environment Court Practice Note 2023, and agree to comply with it. My qualifications as an expert are set out above. Other than where I state that I am relying on the advice of another person, I confirm that the issues addressed in this report are within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

Scope of Report

7. This report is prepared under the provisions of Section 42A of the Resource Management Act 1991 (RMA). This section allows a council officer or consultant to provide a report to the decision-maker(s) on a resource consent application made to the council and allows the decision-maker(s) to consider the report at the hearing. Section 41(4) of the RMA allows the decision-maker(s) to request and receive from any person who makes a report under Section 42A "*any information or advice that is relevant and reasonably necessary to determine the application*".

8. This report is supplementary to the Section 42A Report prepared by the Environment Canterbury for the above resource consent applications. Full details of the consent applications are provided in that report.

9. To carry out this audit of the consent applications, I have:

    a. Considered the relevant sections of the assessment of effects on the environment (AEE) submitted by the applicant, including its technical appendices.

    b. Reviewed further information that was provided by the applicant: 1-E0087.00 Whiterock Landfill Post Lodgement Response to ECan RFI Section 4 – WET dated August 2024, wetland aspects of the Groundwater and Surface Water Effects Assessment dated15 May 2024, Revision 1 of the proposed consent conditions dated 23 August 2024 supplied by the applicant, revision B of the Monitoring Programme and Triggers and Action Response Plan (TARP), and the responses to s92 information requests (Wetland Ecology).

    c. Taken into account relevant issues raised by submitters in relation to the effects I have considered in this report.

10. This report provides conclusions on the scale and significance of adverse and positive effects.

11. In addition, a site visit was undertaken on 27 May 2024 which entailed a site walkover and discussion with the applicant's ecologist.

Description of the Affected Environment

12. The application and accompanying Ecological Impact Assessment (EcIA) provides a very broad overview of the site, describing the site's location within the Oxford Ecological District, adjacent to the Karetu River, the Waimakariri District Significant Natural Area (SNA 039), the limestone escarpment, and the site's setting within largely agricultural land[1].

13. The application outlines the proposed works, zones of influence, and duration, and provides a summary list of actual and potential impacts on ecological values. In relation to terrestrial vegetation and wetlands the proposed works will include vegetation removal within the proposed quarry footprint and modification to groundwater and surface water hydrology near wetlands within the site.

Vegetation Assessments

14. The EcIA included a desktop assessment to review former vegetation cover of the site and surrounding area, and GIS layers of current vegetation mapping before onsite surveys of vegetation types were undertaken.

1.

[1] Appendix G Ecological Impact Assessment, Section 1.2 Site location, Description, and Ecological Context

15. The walk-through assessments that were undertaken to describe and map the vegetation and habitats present are an appropriate survey technique[2]. The assessment methodology was generally adequate although somewhat lacking in detail. For example, during the site visit, several plant species not listed in the species lists were observed. Due to the omission of many plant species, it is unclear whether any important species may have been overlooked. Nevertheless, due to high levels of modification at the site, the probability of important plant species being present outside the SNA is likely to be low.

Wetland Delineation and Description

16. The wetland delineation assessment[3] was undertaken in line with the requirements under the National Policy Statement for Freshwater Management (Ministry for the Environment 2024) and the wetland delineation protocols (Ministry for the Environment 2022). The findings generally concur with observations undertaken in the wetlands during the site visit.

17. Wetland extent is accurately demarcated at these sites. Mapping of wetland boundaries based on the vegetation community, hydrological features, topography and professional judgement[4] is considered appropriate.

18. The descriptions of the wetlands are generally sufficient, and include hydrology, plant species composition, and levels of modification.

19. I concur with the Ecological Impact Assessment (Appendix G) that both the upper and lower wetlands meet the definition of a natural inland wetland under the National Policy Statement for Freshwater Management.

Significance assessments

20. The significance assessments undertaken for wetlands are problematic.

21. In Tables 21 and 23 of the EcIA, the outcome of the significance assessments for wetlands is greatly influenced by the determination that no indigenous vegetation is present and therefore criteria 1-8 and 10 from the CRPS (Environment Canterbury Regional Council 2021) do not apply[5].

22. The determination of whether indigenous vegetation is present is mostly based on the cover of indigenous species in two wetland delineation plots in each wetland which are then averaged for each wetland, with a mean of <50% indicating the presence of exotic vegetation[6].

23. However, what constitutes indigenous vegetation is not defined in the CRPS. Second, two of the plots (one in each wetland) have greater than 50% cover of indigenous species indicating the presence of indigenous vegetation. Third, mosaics of indigenous and exotic vegetation are typically observed in wetlands and the entire wetland does not need to contain indigenous vegetation for indigenous vegetation to be present.

24. Based on the wetland delineation plot data and my own observations on site, it is my opinion that indigenous vegetation is present in both of the wetlands identified at the site, along with areas of exotic vegetation.

25. If indigenous vegetation is present in both wetlands, then the criteria in the CRPS have not been assessed correctly. The EIANZ guidelines (Roper-Lindsay *et al*. 2018) used in the assessment state that attributes to be considered for the Rarity/Distinctiveness

1.

[2] Appendix G Ecological Impact Assessment, Section 4.5 Flora and Vegetation
[3] Appendix G Ecological Impact Assessment: Appendix C – Wetland Delineation data
[4] s92 response, WET-001 (WSP 2024e)
[5] s92 response Section 004 Wetland Ecology, responses WET-002 and WET-005 (WSP 2024e)
[6] s92 response, Section 004 Wetland Ecology, response WET-002 (WSP 2024e)

criterion include whether the habitat type is naturally uncommon or has induced scarcity. Freshwater wetlands are much reduced at a national scale with <10% of their original extent remaining (Cromarty and Scott 1995). Freshwater wetlands are also rare in Oxford Ecological District (where the quarry is located) where it is estimated that they originally covered and still cover <1% of the district (Harding 2009).

26. It is my opinion that the wetlands at the site meet Rarity/Distinctiveness criterion 3 of the CRPS as they contain indigenous vegetation in a habitat type which has been reduced to less than 20% of its former extent in the region, or relevant land environment, ecological district, or freshwater environment. This assessment concurs with the examples of habitat types (including lowland wetlands) which meet criterion 3 in the guidelines for application of the CRPS ecological significance criteria (Wildland Consultants 2013).

27. In addition, Table 10 of the EcIA appears to show that SNA 039 also does not meet the significance criteria. This is clearly incorrect, as the Rarity criterion alone would be easily met due to the presence of a range of Threatened and At Risk plant species (Hutcheson & Reinders 2024). At least two of these species are located near the southern boundary of the SNA where it abuts the quarry area (personal observation).

28. It may have been more appropriate to assess the significance of areas within the quarry and the SNA separately, for clarity.

29. Nevertheless, the conclusions reached in the EcIA are considered accurate – that the highest values lie in the SNA (not adversely affected by the proposal) and the wetlands and watercourses.

Assessment of Effects on the Environment

Actual and Potential Effects on the Environment

30. The assessment of effects on terrestrial vegetation and wetlands provided in the EcIA is considered to be generally accurate.

31. The EcIA identifies that the highest value vegetation and habitats are present in the SNA and these will be avoided by the proposed activity. Effects of the landfill on terrestrial vegetation are largely limited to exotic vegetation.

32. The extent of works will avoid directly encroaching into the site wetlands and the associated eastern boundary watercourse, with the intent that surface flows to the wetlands remain unaffected. A minimum 10m setback from the upper wetland is proposed.

33. Works are expected to result in changes to groundwater discharge that will have some effect on the lower wetland through a reduction in groundwater recharge. Such changes could ultimately impact vegetation composition and the extent of the wetland[7]. The hydrology report indicates that mitigation in the form of redirecting intercepted groundwater to the wetland is proposed.

34. The pre-mitigation potential reduction in the area of a wetland may be relevant to rules regarding wetlands in the Canterbury Land and Water Regional Plan 2023.

35. The proposed Water Permit conditions (Condition 5) specifies that the ground water take must not cause a permanent reduction of extent of the lower wetland. There appears to be a disconnect between the anticipated effects outlined in both the ecology and hydrology reports and this requirement. The hydrology report indicates that mitigation in

1.

1. [7] Potential effects on wetland extent are mentioned, for example, in Appendix G Ecological Impact Assessment, Section 4.9.7.

the form of redirecting intercepted groundwater to the wetland is proposed. That report also notes the removal of the plantation pine trees is likely to have increased baseflows that would previously have been intercepted by these trees. The ecology report notes that selective plant choice for the lower wetland could be undertaken to help retain surface water.

36. There is no disagreement that without mitigation there will be an adverse effect on the wetland hydrology, and it is appropriate to manage this effect through consent conditions to provide surety that impacts on the wetland are avoided or minimised.

37. The level of adverse effects on the lower wetland are considered by the applicant to be low[8], based on low wetland values and a moderate magnitude of effect of long-term groundwater drawdown of up to 0.2 m at the wetland and up to 0.4 m up gradient of the wetland[9]).

38. However, if the lower wetland is considered to be ecologically significant due to the Rarity criterion being met, and assigned a Moderate ecological value on that basis (see paragraphs 20-25 above), while the magnitude of effect remains Moderate, then the level of adverse effects would be Moderate (based on Tables 6, 8, and 10 of the EIANZ guidelines for Ecological impact assessments (Roper-Lindsay *et al*. 2018)), which has implications for the level of mitigation required.

39. However, the EIANZ process does not fully account for the requirements of the NES-F, including working through the effects management hierarchy.

Off-setting of, or Compensation for, Actual and Potential Adverse Effects to Ensure Positive Effects on the Environment

40. The proposed mitigation for potential effects on terrestrial vegetation is considered appropriate. The mitigation measures proposed by the applicant include remediation of the landfill site following closure, hydroseeding, stock exclusion fencing on both sides of the eastern watercourse, and planting of eco-sourced indigenous species alongside the watercourse[10]. Monitoring of planting success and weed control is also proposed (e.g. CRC243700 proposed condition 46).

41. However, there is uncertainty with what is considered required as mitigation and what is being offered up by the applicant. For example, in Table 11 the Ecological Impact Assessment includes a proposed mitigation approach to “remediate the loss of any indigenous vegetation by replacing with indigenous eco-sourced vegetation”. It is unclear what area of vegetation loss this refers to or at what ratio vegetation loss should be replaced at. It would be useful to specify which areas of indigenous vegetation will be affected and mitigated.

42. Adverse effects on the lower wetland are proposed to be mitigated by enhancing seepage flows, providing additional surface water flows, and planting of indigenous species to retain surface water. These actions would better be considered remediation, not minimisation (as stated in the EcIA[11]), as they will be implemented after the effect on wetland hydrology has occurred.

43. The National Environmental Standards for Freshwater (NES-F) require that any effect on natural inland wetlands must be managed using the effects management hierarchy. I disagree with the s92 response that effects on wetlands are avoided, and therefore that the NES-F is not relevant, given that the justification provided includes examples of

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[8] Appendix G Ecological Impact Assessment, Section 4.9.6
[9] Groundwater and surface water effects assessment. Rev 0, Figure 5-3
[10] Appendix G Ecological Impact Assessment, Section 4.9
[11] Appendix G Sections 4.9.7 and 6.6

remediation (enhancing seepage flows, planting indigenous species to retain surface water) to address adverse effects.

44. From my understanding of the application, I have assessed adverse effects on wetlands using the effects management hierarchy in Table 1.

Table 1. Effects management hierarchy for effects on wetlands (National Environmental Standards for Freshwater)

Effects management hierarchy	Assessment
effects management hierarchy means an approach to managing the adverse effects of an activity on indigenous biodiversity that requires that:	
(a) adverse effects are avoided where practicable; then	Some effects on wetlands are avoided, such as direct damage to wetlands through earthworks, by the use of a protective buffer Groundwater modelling predicts adverse effects on the lower wetland (lowered groundwater discharge) which may result in changes to wetland extent and vegetation composition
(b) where adverse effects cannot be avoided, they are minimised where practicable; then	Minimisation is not proposed [presumably because it would require significant changes to the application]
(c) where adverse effects cannot be minimised, they are remedied where practicable; then	Proposed remediation includes enhancing seepage flows and planting of indigenous species to retain surface water
(d) where more than minor residual adverse effects cannot be avoided, minimised, or remedied, biodiversity offsetting is provided where possible; then	Biodiversity offsetting is not proposed as it is considered that adverse effects will be remedied
(e) where biodiversity offsetting of more than minor residual adverse effects is not possible, biodiversity compensation is provided; then	Biodiversity compensation is not proposed [although fencing and planting of riparian areas is planned to enhance wetlands above the baseline level]
(f) if biodiversity compensation is not appropriate, the activity itself is avoided	Not applicable

45. The updated monitoring programme for wetlands (Appendix M Monitoring Programme and TARP RevB), is proposed to include additional baseline monitoring before work commences, twice yearly monitoring, monitoring of groundwater levels at proposed shallow monitoring wells GW4-1, GW5-1 and GW6-1, monitoring of wetland extent, and inclusion of a Triggers and Action Response Plan (TARP). These measures are supported and will help ensure that any adverse effects are identified and addressed through review and adjustment of mitigation actions.

46. However, there is much uncertainty in the likelihood of the proposed mitigation method for the lower wetland being successful and that as a result, effects cannot be properly assessed. For example, mitigation options will be governed by space constraints and land stability[12] and therefore the most effective solution may not be available when required. In addition, it is not known whether taking water upgradient of the wetland to supplement flows to the wetland will itself have a negative effect on the wetland by reducing residual groundwater flows, or indeed whether baseflow supplementation will be successful at all. Planting of wetland margins with indigenous species could also reduce water flow to the wetland[14] increasing the level of required mitigation. While planting to retain surface water/formation of an artificial wetland is proposed as mitigation for adverse effects on the lower wetland in the Ecological Impact Assessment[13], it is not mentioned in the Monitoring Programme and TARP[14], and it is therefore uncertain when this action may be undertaken or modified as a result of monitoring. No options are provided should the proposed mitigation actions prove unsuccessful.

Management Plans

47. It is proposed that a Vegetation Management Plan (VMP) is prepared within 6 months of commencement of the consent[15].

48. There are brief descriptions of the requirements of a VMP[16]. It will be important that he VMP includes all works required to meet the proposed mitigation goals, including details on planting, fencing, and weed control.

49. A Wetland Management Plan (WMP) is also proposed, which intends to ensure no loss of value is caused to the lower wetland, although no detail on the content of the WMP is presented.

Appendix Y Proposed Conditions Rev1

50. CRC243699 Proposed condition 2. A 10 m setback from wetlands meets the requirements for earthworks under the Resource Management (National Environmental Standards for Freshwater) Regulations 2020. This condition could be improved by requiring the 10 m buffer to be clearly delineated and/or temporarily fenced prior to works commencing to avoid accidental encroachment of machinery or spoil into the wetland.

51. CRC243700 Proposed condition 47, Pg 18. In my opinion, the timescale specified is inappropriate and requirements for infill planting following original planting should be based on monitoring. This condition would be improved by deleting ‘years two to three’ and adding that infill planting should be undertaken yearly to satisfy the requirements of condition 48.

52. The requirement for development and implementation of a WMP has not been included in the proposed conditions of consent. The s92 response for further information stated that this was not required as it is not part of mitigation and wetland monitoring (and actions and responses) are covered by the Monitoring Programme and TARP. It is unclear whether the proposed supplementation of water flows to the lower wetland is also covered by the WMP. Planting of indigenous species to retain surface water within the lower wetland is covered by VMP. Nevertheless, I believe any proposed plan should be included in the conditions of consent.

1. ---
2. [12] Whiterock Limestone Quarry and Managed Fill Landfill Resource Consent Applications and Assessment of Effects on the Environment 28 March 2024 (page 47)
3. [13] e.g. in Section 4.9.7 and Section 6.6.
4. [14] Appendix M Monitoring Programme and TARP (Draft Rev B) Table G. Lower Wetland Extent.
   [15] Appendix Y Proposed Conditions Rev1, RC245076 Land Use consent, condition 31
   [16] Appendix G Ecological Impact Assessment, Section 6.4

53. CRC243700 Proposed condition 48, Pg 18. The 75% survival rate is low, with best practice typically being 80-90%. Justification for this low figure is warranted.

54. Proposed Conditions (Rev1), Schedule 1, Wetland Margin Enhancement. It is recommended that the objectives for each proposed activity regarding wetlands be included in this schedule, e.g. planting for hydrological retention, to help retain surface water in the lower wetland.

55. Proposed Conditions (Rev1), Schedule 1. It is recommended that the proposed conditions or goals included in Schedule 1 should include requirements for woody weed control over the entire part of the SNA within the property. This control would align with the priorities outlined in Hutcheson & Reinders (2024) for enhancement of the SNA. This is important because the proposed fencing of the SNA will reduce grazing pressure, and therefore weeds may increase in abundance.

Consideration of Submissions

56. A key word search (supplied by CRC) was used to determine relevant submissions, which were read along with a search of a further selection of submissions (299 submissions).

57. It was noted that the predominant concerns relating to ecological matters were regarding contamination of water, particularly in the Karetu River. Relatively few submissions mentioned terrestrial vegetation or wetlands.

58. Many submitters used general terms to express concern for potential effects on terrestrial values, including “flora”, “local ecosystem”, “biodiversity”, and “environmental” (e.g. submission of R. van der Bos). These submissions could not be assessed in detail.

59. The key word search identified three submissions relating to “vegetation”. C. Onellion is “concerned about the proposed vegetation clearance and earthworks near waterways”. D. Gibbs is concerned about “Excavations & vegetation clearance outside of river bed”. B. De Goldi is concerned about spread of contaminated soil to vegetation and waterways. These concerns are addressed by the applicant (e.g. dampening down dust, earthworks set-backs from wetlands, undertaking indigenous plantings on riparian margins).

60. The key word search identified nine submissions referencing ‘wetland’. One additional submission mentioning wetlands was also identified. Several of these submissions were generalist in nature. For example, the submission of S. Fitzjohn is in opposition to the consent “because is carries environmental risks in the forms of…the alteration of wetlands…” and J. McCaleb states in his submission that he is “concerned that the applicant has little consideration for … the wetlands within its own property”. While noted, these submissions could not be assessed in detail.

61. Some submissions are more detailed in their concerns regarding wetlands. For example the submission from White Rock Community Incorporated raises several points including:

    - vegetation types in each wetland are not adequately described.
    - loss of wetland vegetation and extent due to earthworks and reduction in groundwater recharge/dewatering.
    - the ecological value of the wetland is not “low”.
    - the WMP should be submitted as part of the application.
    - works will require consent under the NES-F.

    These issues have been addressed by the applicant and in this evidence.

62. The submission of R. Conelly raised further issues regarding wetlands including contamination of wetlands, rarity of wetlands, and water take within 100m of wetlands. These issues have been addressed by the applicant or in this evidence.

63. The submission of Rangiora Ashley Community Board asked “How can they guarantee the effects on water quality would be less than minor when it is not known whether the groundwater monitor sites are useable in the lower wetlands?”. This question was answered by the applicant following the s92 request for information regarding the use of monitoring stations GW4-1, GW5-1 and GW6-1 to monitor water levels affecting wetlands.

64. The submission summary identifies nine submissions with concerns relating to the nearby Significant Natural Area (e.g. submissions of Z. Brock, L. Munroe, and M. Stanton). The application proposes to avoid the SNA, and concerns relating to proposed enhancement of the SNA have been outlined in this evidence.

Conclusions and Recommendations

65. The description of the environment is generally accurate, and the wetland delineation assessment appears to have been undertaken correctly.

66. In my opinion the ecological significance assessment for wetlands does not consider the rarity of wetlands, both at a natural scale and within Oxford Ecological District. On that basis, it is considered that the site wetlands are likely to meet the rarity criterion and would be significant under the Canterbury Regional Policy Statement criteria. Nevertheless, the conclusions reached in the EcIA are considered accurate – that the highest values lie in the SNA (not adversely affected by the proposal) and the wetlands and watercourses.

67. The assessment of effects for terrestrial vegetation is generally accurate, and the proposed mitigation is considered appropriate.

68. The assessment of effects for wetlands is affected by the outcome of the significance assessment. It is considered that effects on the lower wetland are Moderate, not Low as assessed in the EcIA. However, both wetlands should be protected, as the proposed consent conditions[17] specify that no reduction in the extent of the lower wetland is permitted, and no earthworks are permitted within 10 m of wetlands. In addition, the proposed monitoring and Triggers and Action Response Plan (TARP) will help ensure that any adverse effects are identified and addressed through review and adjustment of mitigation actions.

69. There is much uncertainty in the likelihood of the proposed mitigation method for the lower wetland being successful. As a result, effects cannot be properly assessed.

70. An independent assessment (Hutcheson & Reinders 2024) identified weed control as the priority action to be undertaken in and adjacent to SNA 039 to protect the habitats of threatened plant species. The proposed fencing of the SNA, while supported, is likely to reduce browsing pressure, which may lead to an increase in weed abundance. Targeted weed control within the SNA for the duration of the consent would therefore be a good way to compensate for any adverse effects on ecological values that could result from the proposed landfill, and should be part of the consent conditions.

71. Several other relatively minor adjustments to the proposed consent conditions (paragraphs 48-53) would also provide more certainty that the proposed mitigation actions are successful.

1.

[17] Appendix Y Proposed Conditions Rev1, CRC243703 Condition 5, page 35

72. The concerns of submitters regarding potential adverse effects on terrestrial vegetation and wetlands have been addressed by the applicant or in this evidence.

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Appendix 15: Tonkin + Taylor, Air Quality s42A report, prepared by Richard Chilton

Before the Independent Hearing Panel appointed by the Canterbury Regional Council

IN THE MATTER OF The Resource Management Act 1991

AND

IN THE MATTER OF Application CRC 243699 to 243706

Section 42A Officer's report

Report of: Richard Chilton (Tonkin & Taylor Ltd).

1 Introduction

1.1 Background

1 This report forms part of the Canterbury Regional Council's (ECan) audit of the assessment of environmental effects (AEE) provided by Protranz International Limited (Protranz) (the applicant) in support of resource consent applications for the discharge of contaminants into air from an industrial or trade premise or process as follows:

- CRC243706: Discharge of contaminants to air from the development and operation of a quarry and managed fill landfill, including the handling and storage of bulk solid materials. 35-year term sought.
- CRC243707: Discharge of contaminants to air from an external combustion heat device (furnace) and associated particulate from the rotary kiln drying lime (processing of bulk solid materials). 10-year term sought. Subsequent to public notification of the application, the applicant has amended the application to incorporate heating of the rotary kiln using a diesel fired appliance in place of the existing coal fired appliance. The applicant has withdrawn application CRC243707, with discharges associated with the lime processing plant to be merged with CRC243706.

2 This report provides the decision-maker with information and advice related to the actual and potential effects of contaminant discharges to air from the proposed activities. This report is intended to inform the Section 42A Report prepared by ECan for the above resource consent applications.

1.2 Code of Conduct and Conflict of Interest declaration

3 While not required for a Council hearing for a resource consent application, I have read the Environment Court's Code of Conduct for Expert Witnesses contained in the Court's Practice Note of 2023. I agree to comply with that code when giving evidence to the Hearing Panel in

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this matter. All my evidence is within my expertise and I have considered and stated all material facts known to me which might alter or qualify the opinions I express.

4 I confirm that the issues addressed in this brief of evidence are within my area of expertise, except where I state I am relying on what I have been told by another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

5 I have no commercial relationship with the applicant, save in my role as an expert in relation to this application or other concurrent work for the applicant as an independent expert.

1.3 Qualifications

6 I am an Air Quality Scientist with Tonkin & Taylor Ltd (T+T), where I hold the position of Technical Director - Air Quality. I have 25 years' experience in air quality assessment and management. I have undertaken air quality assessments for a wide variety of industrial processes, waste management activities, transport infrastructure, intensive livestock farms, quarries and mining operations in New Zealand, Australia, the United Kingdom, and Fiji.

7 I hold the following qualifications, membership and certification:

- Bachelor of Science (Geography).
- Master of Science (Honours) in Environmental Science.
- Member of the Clean Air Society of Australia and New Zealand (CASANZ).
- Certified Air Quality Professional (CAQP).
- Accredited RMA decision maker (Making Good Decisions certificate holder).

8 I have been extensively involved in assessing and reviewing discharges to air from (and presenting expert evidence in relation to) a variety of activities, including landfills, quarries and lime processing plants. Some examples include the following:

- I prepared the air quality assessment, dust management plan and presented expert evidence for the application by Lyttelton Port Company in relation to the reconsenting of its Coal Stock Yard (LPC 2019-2023).
- I was the air quality technical reviewer and expert witness for ECan in relation to the consent applications by:
  - Woodstock Quarries for its proposed landfill operation (2023).
  - SOL Quarries for an expansion of its Conservators Road Quarry (2020/2021).
  - Taggart Earthmoving Limited for quarrying at the Rangiora Racecourse (2020/2021).
- I was the air quality technical reviewer and expert witness for Otago Regional Council in relation to a proposal by Dunedin City Council for the Smooth Hill municipal landfill (2019-2022).
- I prepared the air quality technical assessment in relation to air discharges from Marsden Point Oil Refinery air quality assessment as part of its reconsenting project (New Zealand Refining Company, 2019-2020).
- I prepared the air quality technical assessments, dust management plans and presented evidence in relation to Road Metals five separate resource consent applications for the expansion of its Yaldhurst quarry operation (Road Metals Limited 2006 – 2024).

1.4 Involvement with this project

9 Protranz International Limited (Protranz) proposes to operate a limestone quarry and processing plant, and to establish a Class 3 Managed Fill (landfill) that will also accept contaminated soils that will meet the Class 1 landfill leaching criteria, at the existing

Whiterock Quarry in Loburn, North Canterbury. Protranz has applied to Canterbury Regional Council (ECan) for a range of resource consents required for the establishment and operation of the proposed landfill.

10 Tonkin & Taylor Ltd (T+T) has been engaged[1] by ECan to undertake a technical review of the emission reduction plan and air quality assessment lodged by Protranz in support of its resource consent applications.

11 My technical review of the air quality assessment and emission reduction plan has considered the following documents:

- **Appendix K – Waste Acceptance Criteria Report:** Prepared by WSP, Revision 1, dated 16 February 2024 (referred to as the Waste Acceptance Report).
- **Appendix L – Site Management Plan:** Prepared by Protranz, DRAFT Revision A, dated 27 March 2024. Updated to DRAFT Revision B, dated 23 August 2024 (referred to as the Site Management Plan).
- **Appendix N – Emission Reduction Plan:** Prepared by WSP, Revision 0, dated 24 December 2023 (referred to as the Emission Reduction Plan).
- **Appendix S – Air Quality Assessment:** Prepared by WSP, Revision 2, dated 2 September 2024 (referred to as the Air Quality Assessment (AQA)).
- **Appendix Y – Proposed Conditions (Rev1):** Prepared by WSP, Revision 0, dated 27 March 2024. Updated to Revision 1, dated 23 August 2024 (referred to as the Proposed Conditions).
- **Section 10 – Air Quality: Response to ECan RFI:** Letter prepared by WSP, dated 16 August 2024.

12 In undertaking my review, I have also considered relevant air quality related guidance, including the following:

- Schedule 2 of the Canterbury Air Regional Plan (CARP).
- The Ministry for the Environment (MfE, 2016) 'Good Practice Guide for Assessing Discharges to Air from Industry' (GPG Industry).
- The MfE (2016) 'Good Practice Guide for Assessing and Managing Dust' (GPG Dust).
- The MfE (2016) 'Good Practice Guide for Assessing and Managing Odour' (GPG Odour).
- The MfE (2004) 'Good Practice Guide for Atmospheric Dispersion Modelling' (GPG Modelling).
- The MfE (2002) 'Ambient air quality guidelines' (AAQG).
- The UK Institute of Air Quality Management (IAQM, 2016) 'Guidance on the assessment of mineral dust impacts for planning'.
- The World Health Organization (WHO 2021) 'HWO global air quality guidelines: particulate matter (PM2.5 and PM10), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide'.

13 I visited the site and surrounding receiving environment with ECan and Waimakariri District Council staff on 30 May 2024. The purpose of the site visit was to become familiar with the site operations, its location, the receiving environment, emission control measures and the application in a general sense.

[1] In accordance with T+T's contract with ECan, dated 23 September 2024

1.5 Scope of Report

14 This report is supplementary to the Section 42A Report prepared by Environment Canterbury for the above resource consent applications. Full details of the consent applications are provided in that report.

15 The scope of this technical review specifically considers the environmental effects of discharges to air:

- The continued operation of the existing limestone quarry and its lime processing plant.
- The operation of a proposed class 3 managed fill (landfill) that will also accept contaminated soils that will meet the class 1 landfill leaching criteria.
- Greenhouse gas emissions associated with the operation of the lime processing plant in relation to the national environmental standards for greenhouse gases from industrial process heat (nes-ghg).

2 Description of the Proposal

16 Details of the proposal are described more fully in the s42A report. However, the following summarises the proposal with respect to activities that give rise to discharges of contaminants into air. In general, there are three key activities associated with the site that give rise to discharges to air:

- CRC243706: Quarry and landfill
  - Continued operation of the existing limestone quarry, with an annual extraction rate of approximately 100,000 tonnes per year (approximately 40,000 m^3/year). The main discharge into air from the continued operation of the quarry is particulate matter (dust). Limestone is extracted using an excavator or milled from the floor of the quarry and is crushed/screened prior to being transported by truck to the processing plant. Blasting is not proposed to be used to fracture the rock to facilitate its extraction.
  - A proposed managed fill operation that will occupy quarried out parts of the limestone quarry. The managed fill operation will receive construction and demolition waste (C&D waste), including asbestos. Clarification has been provided by the applicant that the C&D waste will not include gypsum wallboard material, which can give rise to hydrogen sulphide (which has a rotten egg odour) as the material breaks down.
- CRC243707: Lime processing plant
  - Continued operation of the existing limestone processing plant, which includes a coal-fired limestone dryer that is used to produce 'ag-lime' (limestone used for agricultural purposes such as top-dressing of pasture). The main discharge to air from the operation of the processing plant is particulate matter (especially the fine fraction that is ten microns or smaller (PM_{10}) and 2.5 microns or smaller ($PM_{2.5}$) from limestone and combustion particles not captured by the particulate control equipment. Emissions also include combustion gases including carbon dioxide (CO_2) and sulphur dioxide (SO_2) from the burning of coal.

17 I understand that the applicant now proposes to fire the lime processing plant using diesel rather than coal, and that it has subsequently withdrawn CRC243707. The main reason provided by the applicant for having a separate application for the lime processing plant when fired using the existing coal-fired appliance is due to the maximum of consent term (10 years) that can be granted under the NES-GHG, and not wanting to limit the consent term for the quarry and landfill operation to ten years (noting that under the RMA consent can be granted for a period of up to 35 years). With the change from coal to diesel, the discharges of

greenhouse gases would not be subject to Regulation 10 of the NES-GHG and therefore a 10 year limit on consent term is no longer applicable. Consequently, the applicant now proposes that discharges from the lime processing plant be captured under CRC243706.

3 Description of the Receiving Environment

18 The receiving environment, including the location of sensitive receptors, is described in Section 4 of the AQA. It describes there being two sensitive receptors (rural dwellings) located within 250 m of the site (both are located on the same property to the west of the site). This is consistent with my observations of the receiving environment during my site visit of 30 May 2024. Beyond this, there are no sensitive locations within 500 m of the site. I agree with the AQA where it describes that other dwellings located more than 500 m from the site boundary are not expected by the AQA author to be adversely affected by the site operation. One notable exception is in relation to the Wirtitsch family's property, which abuts the Site to the west. The air quality assessment does not identify the residence at this property as a sensitive receptor. I discuss this later in response to the submission from the Wirtitsch family submission.

19 The remaining surrounding land is dominated by pastoral farming and forestry, which I consider have a low sensitivity to air quality effects of the proposed operation.

20 The AQA describes the topography and meteorology of the site location, using modelled meteorological data due to an absence of nearby representative meteorological stations. Of note is that prevailing winds are predicted to be from the north-northeast and are generally light. This likely indicates the direction from which cold air down-slope drainage flows from the wider valley occur. Strong winds, which are of most interest in terms of dust propagation, are typically from the northwest and to a lesser extent from the southwest, which is consistent with wind conditions for inland Canterbury.

21 The AQA describes local rainfall, which is an important consideration in relation to potential dust emissions from the managed fill and quarry operations and their management. It states that the median annual average rainfall measured at Fox Creek weather station was 1,059 mm per year, which is higher than many areas of the Canterbury Plains and Christchurch. Rainfall is generally higher in the winter months.

4 Assessment of Effects on the Environment

4.1 Quarry and landfill operation

4.1.1 Nature of discharges

22 The AQA describes the key discharge to air from the continued operation of the limestone quarry and the proposed operation of the managed fill as being dust (particulate matter), including fine fractions that are comprised of particles of less than ten micron (PM_{10}) and 2.5 microns ($PM_{2.5}$) in diameter. I agree with this description, noting that $PM_{2.5}$ particles typically comprise a very small fraction of discharges from quarrying and managed fill operations.

23 The assessment describes the source and mechanisms under which dust emissions can occur. In particular, it notes the following key sources:

- Limestone extraction.
- Haulage of excavated limestone.
- Open areas (due to wind erosion).
- Filling where the material being deposited is dusty and due to the movement of vehicles over material.

24 I agree with the description of emission sources and mechanisms that can give rise to dust emissions.

25 The assessment also discusses how asbestos materials will be disposed at the site, following the requirements of an asbestos removal control plan (ARCP) and subject to specific controls and monitoring provisions. I refer to those controls later in this report.

26 I note that the type of material described in the waste acceptance criteria (WAC - discussed further below) that could be received at the landfill indicates that it should not give rise to any appreciable odour.

4.1.2 Managed fill waste acceptance criteria

27 I have reviewed the waste acceptance criteria (WAC) proposed for the managed fill operation in Appendix K of the original application documents. I noted that the WAC describes the following:

- *"As the proposed site will only accept inert C&D materials (no organic or putrescible C&D wastes), the proposed Class 3 site is unlikely to generate landfill gas and/or hydrogen sulphide. The site will therefore not require the addition of LFG collection system."*
- The WAC Is silent on whether inert 'C&D' wastes include gypsum wall board materials.
- Section 5.4 of the WAC lists prohibited materials. This list appropriately prohibits high odour risk materials such as greenwaste, municipal waste, but is silent on whether biosolids or gypsum wallboard materials will be excluded.

28 My concern (raised in the s92 request) regarding gypsum wallboard materials relates to the potential of gypsum to decompose in managed fills and release hydrogen sulphide and other highly odorous reduced sulphur compounds.

29 The applicant's s92 response has subsequently addressed my concern, confirming that gypsum wallboard materials and biosolids will be prohibited materials in the WAC. Consequently, I am satisfied that there is a negligible risk of potential offsite odour effects associated with the proposed managed fill operation.

4.1.3 Assessment approach

30 The effects of the discharge of dust from the continued operation of the limestone quarry and operation of the proposed managed fill operation on air quality have been assessed using a qualitative approach that considered the FIDOL factors (frequency, intensity, duration, offensiveness and location). This approach is appropriate in my opinion given the scale and nature of the proposed quarry and managed fill operations and is consistent with the recommendations for such assessments as set out in Schedule 2 of the CARP and the MfE GPG for dust.

31 The assessment approach used published separation distance criteria as the basis for an initial screening assessment. Sensitive locations identified within the separation distance criteria are then the focus for the more detailed FIDOL assessment. The FIDOL assessment is informed by an analysis of wind conditions that could potentially transport dust emissions from the quarry and landfill operation towards the identified sensitive locations.

4.1.4 Assessment results

32 The initial screening assessment relied upon separation distance guidelines published by the Environmental Protection Agency of Victoria (EPA Victoria). I agree with the air quality assessment that these guidelines have been widely referred to and used for such purposes in New Zealand. I note that the air quality assessment has referred to a version of the EPA Victoria separation distance guidelines from 2013 and had not considered the consultation

draft update to those guidelines that was published in 2021. The separation distance guidelines have subsequently been replaced with new guidelines finalised this year[2]. Of note is that the separation distance recommended for quarries that operate without using blasting has been revised from 250 m to 500 m in the 2024 guidance document.

33 In practice, I note that the use of the larger 500 m separation distance recommendation would not affect the findings of the air quality assessment as there remains only two sensitive receptor locations within 500 m. Accordingly, I agree that the focus of the assessment is appropriate in relation to the two nearest residential dwellings to the west of the site, the nearest being approximately 115 m from the quarry/landfill footprint.

34 The FIDOL assessment has focused on the potential exposure of the two nearest sensitive receptors to strong dry (typically above 5-7 m/s as an hourly average) wind conditions coming from the direction of the site, which are generally a worst case for the propagation of dust emissions in the absence of good dust mitigation measures. The analysis presented in the air quality assessment identified that the two receptors (R1 and R2) would be downwind of the quarry/fill site during strong dry wind conditions for approximately 0.14% of a year (approximately 12 hours). I agree with the air quality assessment that this is a very low frequency of exposure to these wind conditions at the receptors. In this regard I refer to the UK Institute of Air Quality Management (IAQM)[3] which provides guidance on the frequency of exposure to strong dry winds when assessment dust impacts from mineral extraction activities, which clarifies the 'infrequent' exposure as being when a receptor is exposed to strong winds (>5 m/s) for 5% or less of the year.

35 With regard to the potential intensity of dust impacts at sensitive receptor locations, the separation distance between a sensitive receptor and discharge source is a key consideration, as dust will settle, disperse and dilute with distance. The air quality assessment notes that R1 has a high potential intensity of impacts compared with R2 by virtue of it being 75 m closer to the site. Notwithstanding this, I note the IAQM classifies receptors based on how close they are to a dust source, noting that locations between 100 m and 200 m (which includes both receptors) are deemed to be an 'intermediate' distance. By comparison, IAQM considers locations within 100 m to be a 'close' distance.

36 With regard to the duration of potential impacts at sensitive receptor locations, I agree with the air quality assessment the duration of dust events are largely short in duration, reflecting the low frequency of winds blowing from the site towards the two receptors.

37 Regarding the offensiveness or character of the emitted dust, I agree with the assessment that the type of dust would generally be considered to have a low offensiveness. I caveat this with regard to asbestos-derived dust, which I consider would be highly offensive due to its classification as a known human carcinogen and association with other human health. However, as discussed below, I consider the proposed mitigation measures regarding asbestos containing materials to be appropriate in this regard mitigating these concerns.

38 In conclusion, I agree with the conclusions reached that the potential effects of dust emissions from the continued operation of the quarry and proposed operation of the managed fill will be low, largely due to the very low frequency of exposure to winds that blow from the site towards the sensitive receptors.

4.1.5 Mitigation measures

Asbestos

[2] EPA Victoria. Separation Distance Guidelines. Environment Protection Authority Victoria. Policy and Regulation Branch. August 2024.

[3] IAQM 2016. Guidance on the Assessment of Mineral Dust Impacts for Planning – Version 1.1. Institute of Air Quality Management. United Kingdom.

39 The measures that have been proposed to manage asbestos containing materials measures include the following:

- Avoidance of delivery, handling, disturbance or filling of asbestos waste during strong winds (> 5 m/s as an hourly average and/or > 7 m/s as a 10-minute average).
- Compliance with a site management plan that sets out methods for handling asbestos waste and monitoring of asbestos.
- The WAC, which sets out the conditions that asbestos contaminated materials must meet in order to be received or deposited on site. This includes:
  - The material must be appropriately contained to prevent airborne release of asbestos fibres, including at a minimum wrapped in 200 µm gauge polythene/plastic.
  - Soil containing asbestos fibres and/or fragments do not exceed 5% by mass.
  - Loads of asbestos in soils shall be lined with 200 µm gauge polythene/plastic and wetted during loading so the moisture content is at least 15%. All liners are to be taped and then covered prior to transport.
- The updated Site Management Plan (SMP) describes that:
  - Asbestos or asbestos containing material must not be accepted to the managed fill after 4 pm Monday to Saturday.
  - Water sprays/mist will be used to control dust at the tipping face where asbestos is being deposited.
  - The tipping face will be progressively covered using proprietary dust suppressant polymer, plastic sheeting (pegged or sand bagged) or a minimum of 100 mm of clean fill.
  - Deposited material to be covered within 2-hours of being tipped.
  - Independent ambient monitoring for asbestos is to be undertaken monthly when asbestos fill material is received, tipped and deposited on site, with the purpose being to check the effectiveness of control measures. Monitoring is to be undertaken at four locations on the boundary of the asbestos disposal area.
  - Tigger action responses in relation to ambient asbestos monitoring where there is an exceedance of 0.01 fibres per millilitres of air sampled, which includes ceasing filling, notifying Worksafe, investigating the cause, implementing further controls. Where the concentration is above 0.02 fibres per millilitres of air, ECan must be notified.

40 Provided these measures are implemented, I agree with the conclusions of the air quality assessment regarding asbestos.

General dust measures

41 The applicant proposes to operate the quarry and landfill in accordance with a Site Management Plan (SMP), a draft copy which details measures relating to dust mitigation. I have reviewed the measures set out in the draft SMP provided with the application and consider them to be appropriate and reflective of industry good practice, the scale and nature of activities and the receiving environment.

42 In addition to the measures set out in the SMP, the applicant has also proposed conditions of consent that require wind monitoring and corresponding actions to be undertaken in the event that specified wind speed thresholds are exceeded, which include restricting the receipt and placement of materials into the landfill.

43 A key source of dust for quarries, mines and earthworks is from vehicles driving over unpaved surfaces on site. The applicant has proposed measures that include the routine application of

water onto frequently trafficked surfaces using a water cart and the restriction of vehicle speeds. Information has also been provided to demonstrate sufficient water is available for this purpose.

Water availability for dust suppression

44 A key constraint for the mitigation of dust will be the availability of water. The original AEE advised that 90 m³ of water would be available via storage for dust suppression, which in my experience would not be sufficient for many small quarry operations during prolonged periods of dry weather in summer. The applicant's response to the s92 request for further information on this matter provided the following advice:

- The RFI response to the air quality questions provided information regarding the amount of water that would be needed based on a water balance model approach that considered the following:
  - Measured rainfall and evaporation rates from representative locations.
  - A permitted water-take of 100 m³/day.
  - On-site water storage to enable the supply of at least 400 m³/day.
  - An area of 1.4 ha of exposed surface requiring dust suppression, comprising the main haul road, backfilling of the landfill floor with cohesive soils of which 25% of the total area would require dust suppression, and active material storage not otherwise stablished with polymer or grass).
- Based on the model, the applicant determined that up to 185 m³/day would be required for dust suppression, without depleting the water storage.

45 Having reviewed the approach and outputs, I agree with the applicant's finding in this regard. However, I consider that the applicant should clarify the total volume of water storage capacity that would be needed to ensure 400 m³/day (the rate from storage described in the balance model) is available. The RFI in response to general questions (not air quality specific) advises that there would be 200 m³ of storage, however, this seems at odds with the need for up to 400 m³/day from storage. I also note that the applicant expresses the amount of water storage when describing the inputs to its water balance model as being in units of m³/day rather than m³. Given these considerations, I consider that the applicant should clarify and justify the amount of on-site storage that will be provided in order to supply up to 400 m³/day and that this should be imposed as a condition of consent (i.e., the volume of water storage required for dust suppression).

4.1.6 Conclusions and recommendations in relation to the quarry and filling operation

46 In summary, I agree with the findings of the air quality assessment relating to dust effects associated with the ongoing operation of the existing limestone quarry and the operation of the proposed managed fill.

47 I provide the following recommendations:

- The applicant clarify and justify the amount of on-site water storage that will be provided in order to supply up to 400 m³/day and that this should be imposed as a condition of consent (i.e., the volume of water storage required for dust suppression).
- That there be a condition requiring water sprays/mists be operated at the tip head to control emissions from asbestos disposal at all times when asbestos waste is being received and deposited.
- That there be a condition requiring compliance with asbestos waste acceptance criteria, receipt and disposal, mitigation and monitoring measures and trigger responses as set out in the Site Management Plan.

4.2 Lime processing plant

4.2.1 Nature of discharges and emission rates

48 The lime processing plant is used to dry the quarried limestone so that it is suitable for sale as agricultural lime (ag-lime, dried calcium carbonate). A rotary dryer heated via a coal fired furnace (with a heat output of 1.79 MW) is currently used to dry the crushed lime, with emissions of combustion gases (in particular sulphur dioxide (SO_2) and oxides of nitrogen (NO_2)) and PM_{10} (from both combustion and limestone) being discharged via a stack. The applicant has proposed[4] to replace the coal fired furnace with two 154 kW diesel fired furnaces and to cease using coal (combined energy output of 308 kW). However, details of this change were very limited, and no updated assessment of the air quality impacts of the change has been provided.

49 The original application proposal (with the plant continuing to be fired on coal) included provision for a new multicyclone to be installed to controlled particulate matter emissions from the process. This would have been an upgrade to the existing simple cyclone system. As part of the revised application to fire the plant using diesel fired units, the applicant no longer proposes to carry out this upgrade on that basis that it considers that emissions *of "particulate matter from the plan would be negligible with the removal of coal."* I do not agree with this statement as it appears to ignore the component of particulate emission associated handling and drying of limestone. While I agree that the particulate derived from combustion of diesel will be lower than from coal combustion, I consider that a significant proportion of particulate matter emissions from the plant is be comprised of fine limestone particulate that will be carried over from the dryer.

50 The revised air quality assessment provided as part of the s92 response clarified that the discharges from the lime processing plant would occur via a new 11 m high stack (also to be installed within 6 months of consent being granted), replacing the existing 6 m high stack. Furthermore, it clarified that the new stack would be configured so that the discharge can occur without any obstruction to vertical flow from the stack, which contrasts with the existing 6 m high stack that has a cowl (rain cap) fitted that affects the dispersion properties of the stack. However, with the latest amendments for replacing the coal furnace with diesel fired units it is unclear whether these changes to the stack are now proposed.

51 I note that the discharge to air from the existing coal fired furnace did not meet the permitted activity requirements of Rule 7.20 of the CARP and was therefore a discretionary activity under Rule 7.63. With regard to the now proposed diesel fired units, the combined thermal output of those units is below the permitted activity threshold of 2 MW of Rule 7.20(6)(b)(ii). However, it is not clear from the updated application information whether the other requirements of Rule 7.20 for the diesel fired units would be met, notably Conditions (1) and (3) which relate to discharges occurring vertically and unimpeded, and to the minimum required stack height.

52 I have requested further detail of the proposed changes and an assessment of associated impacts. However, I understand that proposes to defer provision of any such assessment to the applicant's expert evidence to the hearing. Given the absence of this information and my concern about its incorrect assumption regarding particulate matter discharge from the plant, I am unable to conclude that the potential effects of particulate matter discharges from the operation of the lime processing plant would be acceptable.

53 Notwithstanding the above, a key consideration of the original application was the discharge of sulphur dioxide from the processing plant. SO_2 emissions occur when coal is burned due the high sulphur content of coal. The most recent revised proposal to fire the plant on diesel

[4] Email from B Hamilton (WSP on behalf of the applicant) to K Nagy (ECan) dated 26 November 2024.

removes this concern as diesel has a very low sulphur content. Consequently, I agree with the applicant that SO_2 impacts are no longer a concern.

54 The revised air quality assessment also clarified that the lime processing plant will only be operated for a maximum of 4-hours per day and between 11 am and 3 pm – an updated assessment has been provided to reflect this restriction. The purpose of this restriction in operating hours is to ensure that the operation of the processing plant targets times of the day when conditions are most conducive to good dispersion and dilution of emissions from the stack. It is unclear to me from the updated application information whether the restricted hours is still part of the application or not.

55 The original air quality assessment (Section 2.4) described the lime processing plant as producing 'quick lime' (calcium oxide). This is relevant as the production of quick-lime through calcination of limestone at higher kiln temperatures gives rise to more significant emissions of carbon dioxide (CO_2), which is liberated from the limestone during its manufacture (along with other contaminants such as SO_2). Clarification was provided as part of the s92 response and the updated air quality assessment that the lime processing plant will only be used for the production of ag-lime (dried calcium carbonate). For this reason, I recommend a condition of consent restricting the plant to the drying of limestone to produce ag-lime (dried calcium carbonate) and not allowing calcination of limestone to produce quick-lime (calcium oxide).

4.2.2 Assessment approach

56 Discharges from the reconfigured lime processing plant have been assessed using dispersion modelling. I have reviewed the model approach, inputs and configuration and consider them to be appropriate and in-line with industry good practice.

57 The dispersion model is used to predict off-site concentrations of contaminants emitted from the lime processing plant stack. The predicted concentrations have then been added to estimated background contaminant concentrations to give predicted cumulative concentrations. The predicted cumulative concentrations have then been assessed against published air quality assessment criteria.

4.2.3 Background contaminant concentrations

58 There is no publicly available background monitoring data for key contaminants discharges from the lime processing plant, which is to be expected given the relatively remote location of the site. For this reason, background concentrations are estimated based on published information from the Ministry for the Environment and the New Zealand Transport Agency in the air quality assessment. I have reviewed the background concentrations used and consider that they are reasonable in the context of the receiving environment.

4.2.4 Assessment criteria

59 Air quality assessment criteria for ambient PM_{10}, $PM_{2.5}$, SO_2 and nitrogen dioxide (NO_2) concentrations are set out in Table 6-1 of the air quality assessment. The chosen criteria follow MfE (2016) guidance that provides recommendations on criteria to be used for such assessments (such as the National Environmental Standards for Air Quality, NESAQ) and a recommended hierarchy of criteria published in various sources. I agree with the selection of air quality criteria used in assessment.

60 Air quality assessment criteria are comprised of two components, being (1) a concentration typically expressed in micrograms per cubic meter ($\mu g/m^3$) and a time- period over which the concentrations are averaged (typically expressed as a 1-hour, 24-hour or annual average). Criteria with a 24-hour or longer averaging period are applicable to locations where a person may reasonably be exposed for those averaging periods (such as a residential location). By comparison, criteria with a 1-hour averaging period apply at all locations beyond a site.

4.2.5 Dispersion modelling results

61 The results of the dispersion modelling assessment are presented in Section 7.2 of the revised air quality assessment. However, that assessment was based on mitigation proposed for the plant using a coal fired furnace, including modifications to the stack, upgraded particulate emission control and restricted hours of operation. It is unclear whether these mitigation measures are now proposed with change to diesel-firing. No updated modelling has been provided with the subsequent amendments to the proposal for the plant to be fired using a diesel fired unit. Accordingly, I consider that there is significant uncertainty whether the latest amendments would give rise to unacceptable off-site effects relative to assessment criteria. I understanding that the applicant will provide an updated assessment as part of its evidence.

4.2.6 National Environmental Standards for Air Quality and site boundary considerations

62 With regard to predicted SO_2 concentrations, the original air quality assessment reported 1-hour average concentrations that predicted that SO_2 concentrations at the site boundary would exceed the ambient standard for SO_2 concentrations specified in the NESAQ of 570 $\mu g/m^3$(zero allowable exceedances). This had significant implications due to the requirements of Regulation 21 of the NESAQ, that stipulate the following:

> Regulation 21 of the NESAQ: *"A consent authority must decline an application for a resource consent to discharge sulphur dioxide into air if the discharge to be expressly allowed by the resource consent is likely, at any time, to cause the concentration of sulphur dioxide in the airshed to breach its ambient air quality standard."*

63 Regulation 14(2) of the NESAQ clarifies that the ambient air quality standards do not apply to the site on which the resource consent is exercised. This means Regulation 21 of the NESAQ must be assessed at the site boundary.

64 Because of the implications of Regulation 21 and 14(2) of the NESAQ, understanding what comprises the site boundary is important for this application. In this regard there was ambiguity as to what comprised the site boundary for the lime processing plant as presented in the original air quality assessment and wider application documents. The s92 request sought clarification of the following matters:

- A site plan for each air discharge permit clearly denoting the site boundary.
- Updated contaminant contour plots for the dispersion modelling results that over-lay the site boundary relating to the lime processing plant discharges.
- Clarification of the legal authority to include "… parts of riverbed and road reserve…," within the site boundary for CRC24###8.

65 The applicant's s92 response confirmed that the site boundary for the lime processing plant comprises Protranz Land and areas of the legal road reserve and riverbed they occupy and operate on. With regard to the authority to include the riverbed and road reserve as part of the site boundary, the s92 response refers to 'Lysaght versus Whakatane District Council' court case, where WSP noted that *"a resource consent cannot confer a right to use land which the consent holder does not own, or have the right to occupy, so as to enable exercise of the consent".* They go on to state that whether the applicant has legal documentation in relation to occupying crown land is not a matter that needs to be considered for these resource consent applications which are to address environmental effects. My interpretation of statement from the 'Lysaght versus Whakatane District Council' court case is that it does not support the applicants position on this matter. Furthermore, I consider the matter of addressing environmental effects in relation to the site boundary is a relevant consideration due the need to assess environmental effects at the site boundary and the requirements of

the NESAQ as I have set out above. Ultimately, this is a legal/planning matter that I consider the applicant should address at the hearing.

66 Notwithstanding the above, the latest proposal for replacing the coal fired furnace with a diesel fired unit will result in a significant reduction in SO_2 emissions compared with coal and therefore in my opinion would readily meet the NESAQ for SO_2.

4.2.7 Emission testing frequency

67 The applicant's proposed conditions of consent provided for the initial stack emission testing to confirm PM_{10} emission rates between 6 and 9-months following commissioning and then once within 5 years following that. No testing is proposed to be required regarding SO_2 emissions.

68 In my experience, it is standard practice for stack emission testing to be undertaken for a plant of this nature on an annual basis, or in some circumstances (e.g. where there is a good record of compliance with emission limits), on a once every 2-year basis. It would also be standard practice for testing to confirm SO_2 emissions rates, which I consider to be a key indicator of potential environmental effects for this application.

69 ECan's s92 request sought the following in relation to emission testing:

- A justification for the frequency of proposed emission testing, noting that most discharge sources of this nature that T+T has had experience with require testing either every year or, at most, every two years.
- A consideration of whether routine testing for SO_2 should be undertaken, especially in light of the dispersion modelling predictions provided for SO_2.

70 In response to this, the applicant now proposes the following:

- *"A two-yearly testing requirement is reasonable, after the initial testing for compliance with Condition 9.*
- *The dispersion modelling predictions now indicates that SO_2 to be compliant with the NES, such that in-stack testing should not be undertaken.".*

71 I accept that a testing frequency of once every two years is reasonable given the scale and nature of the lime-processing plant and its remote location. Given the proposal to replace the coal fired furnace with a diesel unit, I accept that testing for SO_2 should be excluded from the testing requirements. However, I am of the opinion that testing for PM_{10} should occur even with the firing of the plant on diesel, due to the likelihood for non-combustion related particulate matter (i.e., residual limestone particles) to be emitted from the stack, as I have described above.

4.2.8 Conclusions and recommendations in relation to the lime processing plant

72 The applicant had provided a revised air quality assessment associated with its lime processing plant (and coal fired furnace) that involved:

- A new multicyclone for particulate control capable of aching a PM_{10} discharge concentration of 250 mg/m^3 dry STP and corrected to 12% CO_2 and an emission rate of 0.29 g/s.
- A new taller 11 m high stack with unimpeded vertical flow.
- Restricted hours of operation (4 hours per day between 11 am to 3 pm).

73 This revised assessment (coal fired furnace) concluded that the effects of the discharges to air would be minor, which I agreed with, which I agreed with.

74 The applicant has subsequently revised its application proposal to include replacement of the existing coal fired furnace with a diesel fired unit. This will beneficially significantly reduce SO_2 discharges and has less stringent requirements regarding the NES-GHG (which I discuss later in

Section 4.3). However, important details of this proposed change have not been provided, including whether the particulate control system and stack would be upgraded. The applicant has also advised that particulate emissions will be negligible with the change from coal to diesel, which I do not agree with. Consequently, I consider that insufficient information has been provided to date in relation to the revised proposal to conclude whether the effects of the discharges to air are likely to be acceptable in relation to the criteria. I understand that the applicant will be provided an updated assessment of the lime processing plant by way of evidence to the hearing.

4.3 Greenhouse gas emissions from the lime processing plant

75 Appendix N of the application sets out an emission reduction plan (ERP) in relation to greenhouse gas emissions (namely carbon dioxide (CO_2)) from the operation of the coal fired furnace that forms part of the lime processing plant. The provision of the ERP is to address the requirement of the NES-GHG, which came into effect on 27 July 2023.

76 The NES-GHG relates to the discharge of greenhouse gases from certain combustion appliances used for generating process heat. It includes the need for a resource consent to discharge contaminants into air (Regulations 6 to 10), the requirement for and content of an ERP (Regulation 13 and 15), matters for discretion and consent duration (Regulation 17 and 18), and requirements regarding consent conditions (regulation 19).

77 The applicant's application originally covered the use of a coal fired furnace for operating the lime processing plant. However, it has subsequently advised an amendment to the application to fire the plant using two 154 kilowatt diesel fired units. It considers that the change from coal to diesel firing of the plant means that the application is permitted under the NES-GHG. Regulation 10 of the NES-GHG relates to appliances that burn fossil fuels other than coal and sets out requirements for resource consent where certain criteria area not met. A relevant criterion in this instance is whether or not the site is classified as a 'low-emission site'.

78 Regulation 3 of the NES-GHG defines a 'low-emission site' as meaning a site that, each year, emits less than 500 tonnes of carbon dioxide equivalent of greenhouse gases from heat device that burn any fossil fuel and is not a backup device.

79 The applicant has not provided information to clearly set-out whether the firing of two 154 kW (i.e., a combined 308 kW) diesel fired appliances would fall within the classification of a 'low-emission site'. However, to check this I have calculated the fuel consumption from 308 kW of diesel in an external combustion appliance assuming the following:

- Diesel calorific value of 42,800 kJ/kg.
- Thermal efficiency of 75%.
- A fuel density 0.83 kg/L.

80 Based on these assumptions, I calculate the plant could consume up to 75 L /h of diesel. Based on a CO_2 emission factor[5] for diesel of 2.671326212 kg CO_2-e/L, I calculate the plant would need to operate for no more than 2,495 hours per year (approximately 28% of hours in a year), and consume no more than 187,000 L of diesel per year, in order to fall within the 500 t CO_2-e/yr criterion to be classified as a low emission site.

81 Based on my understanding of the application and frequency of operation of the lime processing plant, this should be achievable. However, in the absence of any information on peak annual fuel usage and greenhouse gas emissions emissions to understand whether greenhouse gas consent is required, I consider a limit of 187,000 L/year equating to the low emission site threshold should be applied as a condition.

[5] https://environment.govt.nz/publications/measuring-emissions-a-guide-for-organisations-2024-detailed-guide/

5 Consideration of Submissions

82 A total of 549 submissions were received in relation to the application with a further 24 late submissions received. Of the total of 573 submissions received, 57 were in support, 6 were neutral, 2 were neutral but opposed specific aspects, and 508 opposed the application.

83 From the summary of submissions that I have been provided with I understand that concerns regarding air quality, air discharges or landfill gas were raised in approximately 25% of received submissions.

84 The following summarises the key concerns relating to air quality raised in submissions and my response to those matters.

- The location is a very high wind environment with a number of extreme wind events occurring locally, and the ability to manage air quality impacts during such conditions. In response to this, I note that high wind conditions are not unique to this location but occur over much of inland Canterbury, in particular during Nor-west wind conditions. However, I consider the applicant's control measures, including wind monitoring triggers, are reasonable and note that the nearest sensitive receptors would not be downwind of the site during strong winds from the northwest.
- Concern regarding the meteorological data used to inform the air quality assessment by WSP and the degree to which this can be relied upon. I consider that the applicant's wind modelling undertaken for the purpose of informing the dust assessment and dispersion modelling is reasonable and likely to be provide broadly representative conditions that might be expected for the site location. This is a standard approach for air quality assessments when publicly available measured wind data is not available for a location.
- Dust impacting on human health, especially the particles smaller than ten microns (PM_{10}) that are associated with dust discharges. In response to this, I consider that the proposed mitigation measures in relation to the ongoing quarry and proposed landfill operation are appropriate and represent industry good practice. Provided these mitigation measures are implemented and monitored for their effectiveness, and given the separation distance to the nearest receptors, I am satisfied that ambient PM_{10} concentrations derived from the quarry and landfill operation would be well within human health air quality criteria. However, I am unable to draw this conclusion with regard to the discharges from the lime processing plant due to the lack of information available associated with the diesel firing configuration of the plant.
- The need for imposing conditions, including a comprehensive reference monitor for PM_{10} to assess compliance with the NESAQ. In response to this, I do not consider that reference standard instrumental monitoring to assess compliance with the NESAQ is required. In my experience, there are only rare examples where this sort of monitoring is required in relation to an activity, such as when the activity is within or in close proximity to a polluted airshed (such as that for Christchurch City or Rangiora). Notwithstanding this, real-time dust monitoring as a pro-active dust management tool is required ECan for quarry operations within 500 m of a sensitive receptor, and would be a reasonable requirement in this instance.
- Concerns regarding exposure to asbestos and strong winds spreading asbestos fibres. In response to this concern, I note the proposed measures for dust control in relation to asbestos filling operations, including wind speed thresholds will address this concern.
- Contaminated dust impacting on neighbouring properties. In response to this, I consider contaminated dust should not impact on neighbouring properties provided the dust mitigation measures are implemented and monitored for their effectiveness.

- Exposure to landfill gas (including dioxins) and the absence of any landfill gas extraction and treatment system. In response to this, I note that the nature of proposed fill material, which restricts organic or putrescible material, means that landfill gas generation is very unlikely to be generated to the extent that requires an extraction and treatment system.
- Managing dust when there is no water available for dust suppression (i.e., from the Karetu River during dry periods). In response to this, I have reviewed the applicant's proposal regarding the amount of water available for dust suppression. In this regard I note my earlier recommendation for the applicant to clarify the water storage volume that would be maintained for dust suppression.
- Assessment does not account for receptors downwind in prevailing strong wind conditions. In response to this, I note that the assessment has appropriately focused on receptors within 500 m, none of which are downwind during strong winds that can occur from the northwest.
- Discharges to air from the lime kiln. As described earlier, there remains a number of aspects concerning the lime processing plant which means that I do not have sufficient information to advise whether I agree with the applicant that effects of discharges to air from the lime processing plant would be less than minor.
- A submission from the Wirtitsch family sets out that they own the land at 144 Quarry Road immediately adjacent to the site, and that their residence is within 250 m of the proposed landfill site, expressing concern regarding air quality impacts on them. The Wirtitsch residence was not identified or included in the assessment by WSP. However, from inspecting Google Earth imagery, it appears that development has occurred towards the northern end the Wirtitsch property in two areas between 2018 and 2023. I have identified what may be a residence at two locations as shown in Figure 5.1 The closer of the two locations is approximately 230 m to the northwest of the proposed landfill footprint and approximately 270 m due north of the lime processing plant. I note that neither location would be downwind of the lime processing plant or landfill under prevailing winds or strong winds that can occur from the northwest. I also note that these locations are further setback from the lime processing plant and landfill footprint that Receptor R1 and are therefore likely to experience lower potential impacts than those described in the air quality assessment for R1.

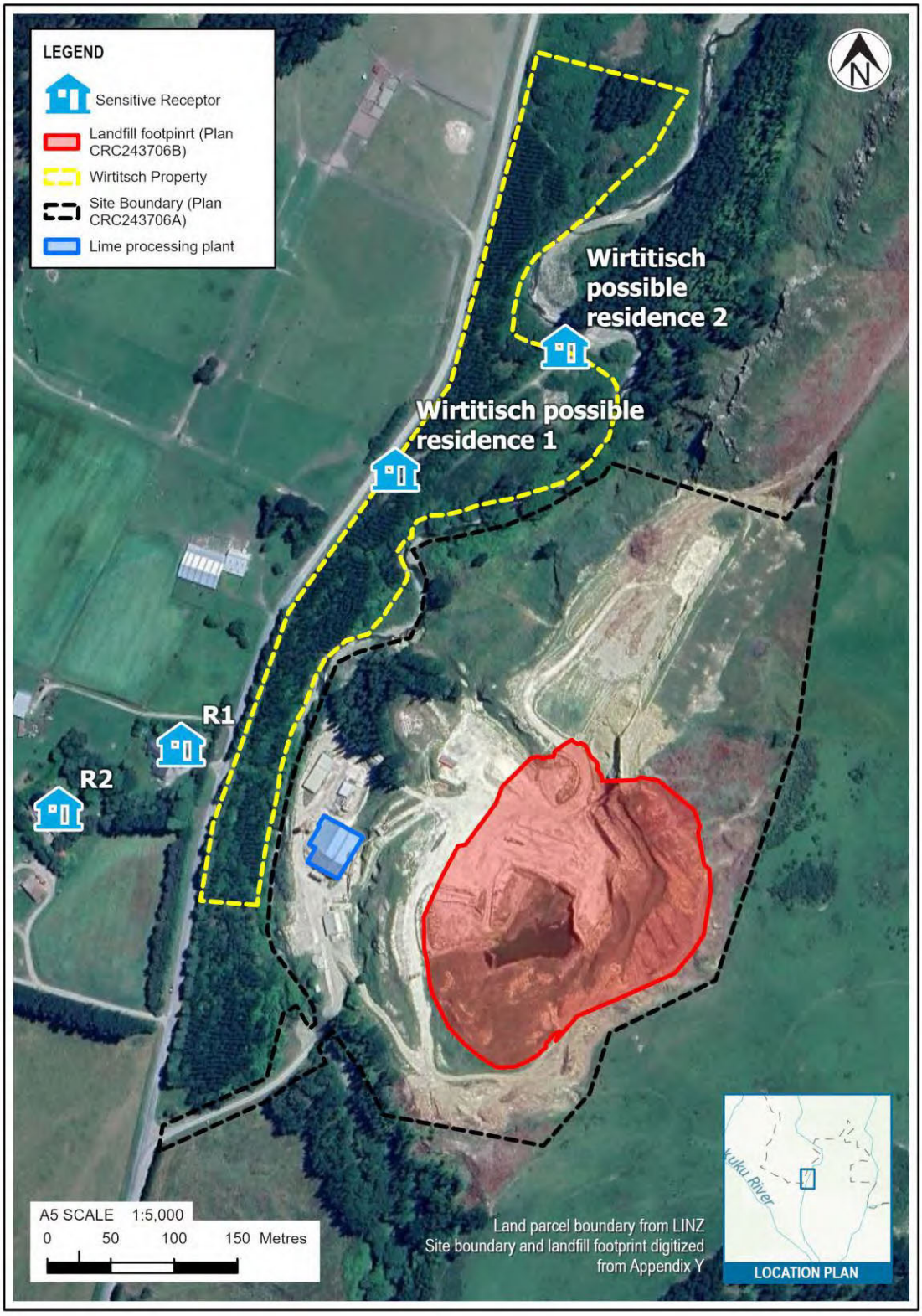


Figure 5.1: Location of sensitive receptors (including possible Wirtitsch residence(s) to the Whiterock site boundary, landfill footprint and lime processing plant. Site boundary and landfill footprint digitised from applicant's draft condition set plans for CRC243706.

6 Conclusions and Recommendations

85 With regard to the quarry operation and proposed landfill, I consider that, provided the mitigation measures are implemented as proposed and monitored for their effectiveness , associated dust effects are likely to be low and unlikely to give rise to offensive or objectionable effects beyond the site boundary. I also consider that the measures for managing discharges to air associated with asbestos waste receipt, handling and disposal to be appropriate. Notwithstanding this I have recommended the following:

- The applicant clarify and justify the amount of on-site storage that will be required and that this should be imposed as a condition of consent (i.e., the volume of water storage required for dust suppression).
- That there be a condition requiring water sprays/mists be operated at the tip head for asbestos disposal at all times when asbestos waste is being received and deposited.
- That there be a condition requiring compliance with asbestos waste acceptance criteria, receipt and disposal, mitigation and monitoring measures and trigger responses as set out in the Site Management Plan.

86 With regard to the lime processing plant, I understand discharges to air from this activity are to be incorporated into the application for CRC243706, in light of plans to replace the existing coal fired furnace with two diesel fired units. This change is likely to significantly reduce SO_2 discharges and has less stringent requirements regarding the NES-GHG. However, important details of the change to diesel have not been provided, including whether the particulate control system and stack would be upgraded. The applicant has also advised that particulate emissions will be negligible with the change from coal to diesel, which I do not agree with and an updated assessment of the impacts of particulate emissions from this source has not been provided.

87 Given the above considerations, I do not have sufficient information to advise whether I agree with the applicant that effects of discharges to air from the lime processing plant would be less than minor.

88 With regard to the requirements of the NES-GHG, I have recommended that a condition of consent that limits the consumption of the diesel for firing the plant to 187,000 L/year, with a requirement to record the fuel used each year. This is to ensure that the site falls within a 'low emission' site classification under the NES-GHG.

Report prepared by:

Richard Chilton

Technical Director Air Quality

Tonkin & Taylor Ltd

7 March 2025

7-Mar-25
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Appendix 16: CRC, Addendum to report, prepared by Dr Michael Massey

Science Advice

Date	13 March 2025
To	Katie Nagy (Principal Consents Planner)
CC	
From	Michael Massey (Principal Science Advisor, Contaminated Land and Waste)

CRC243699 et al Site Selection Process

Key Messages

- Proximity of the Karetu River was explicitly not considered in the site selection process for the proposed Loburn Landfill; economic factors such as haulage were prioritised
- The WasteMINZ Technical Guidelines for Disposal to Land (2023) instruct the prioritisation of "the risks of pollution of water bodies used for drinking water," including the Karetu River, as well as the consideration of environmental and cultural values associated with wetlands, surface water, and groundwater

Introduction and Purpose

I have been asked to provide specific commentary on the site selection process for the proposed Loburn Landfill (consent number CRC243699 and others), in the context of the WasteMINZ Technical Guidelines for Disposal to Land (2023). The purpose of this advice is to provide the processing Consents Planner with additional information for their s42A hearing report. *This advice functions as an addendum to my own s42A technical report.*

Data and analysis

The key information I have considered are the proposed Loburn Landfill site's proximity to the Karetu River, and the use of the river as a drinking water source for the local community (detailed in the reports by subject matter experts). Another relevant point I have considered is access and transport of contaminated soil and construction and demolition waste, which aside from potential discharges (e.g., dust) is not generally something the Regional Council regulates—traffic and access are District Council matters. Furthermore, I have considered the cultural advice expressed by the rūnanga in their hearing submission. As I am not an expert on social or cultural matters, my commentary focuses on technical matters.

I have also considered Appendix T of the application, "Site Selection and Wider Community Benefits," which outlines matters such as haulage distance to other landfills and the impending final closure of Burwood Landfill in Christchurch. This report states, *"Rivers and lakes are a risk factor but were not added to the risk feature list because it eliminated all potential sites as the network of rivers and lakes in the south island is extremely widespread."* **Based on this statement, the proximity of the Karetu River was not considered as a factor in the site selection process.**

Interpretation

The WasteMINZ Technical Guidelines for Disposal to Land (2023), as part of the site selection process, direct the consideration of "the proximity of water bodies or wetlands," as well as "the risks of pollution of water bodies used for drinking water or aquaculture." Also important, the Guidelines note, are "social and cultural issues associated with the site," including consultation with manawhenua: *"Consultation with the community, including tangata whenua, is a critical component of any landfill/fill site selection process."*

Traffic and access are also key social issues highlighted in the Technical Guidelines, and I consider it important to mitigate potential impacts of the haulage of contaminated material through the town of Loburn. Haulage was considered in the site selection process.

Economic factors such as haulage were weighted heavily in the site selection process. Regarding economic assessment, the Technical Guidelines (2023) state only that, *"A preliminary economic assessment should be undertaken for shortlisted sites so that the costs of developing and operating a disposal facility at the different sites can be compared."* The Guidelines do not suggest that the economic assessment takes precedence in site selection, over potential environmental impacts or social concerns.

Many of the submitters commented on the proximity of the river to the proposed landfill. **By my reading, it appears that the river was explicitly excluded from consideration in the site selection process.** Wetlands also appear to have not been considered.

Proximity to the Karetu River and wetlands is a key driver for the technical risk assessments conducted by the subject matter experts, and for the proposed mitigation measures and monitoring. The use of the Karetu River as drinking water supply seems particularly important to have considered. **Excluding these critical drivers of sensitivity and risk from the site selection process, and focusing largely on economic factors, seems to be contrary to both the letter and spirit of the Technical Guidelines for Disposal to Land (2023).**

Attachments: *none*

File reference: (SharePoint or TRIM)

Invitation to provide written comments on a project under the Fast Track Approvals Act 2024

You have been invited to provide written comments to the Minister for Infrastructure (the Minister) on an application to refer a project under the Fast-track Approvals Act 2024 (the Act) to the fast-track process.

Please upload comments directly via the portal by completing this template.
Before the due date, for assistance on how to respond or about this template or with using the portal, please email contact@fasttrack.govt.nz or phone 0800 FASTRK (0800 327 875).

Written comments must be received by MfE, on behalf of the Minister for Infrastructure, no later than the due date.

Important information

Your personal information will be held by MfE and be used in relation to the project application and process. You have the right to access and correct personal information held by MfE.

A copy of your comments, including all personal information, will be provided to the Minister and the applicant.

If you are a corporate entity making comments on this application, your full contact details will be publicly available.

For individuals, your name will be publicly available, but your contact details (phone number, address, and email) will not be publicly available.

A copy of your comments will also be published on the Fast-track website. If you believe any of the information you have provided is confidential or sensitive and should be withheld from publication, please highlight the information concerned and provide an explanation to support your request for withholding it. Your comment and explanation will be decided by the Ministry on whether to withhold the information from publication.

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All information held by MfE is subject to the Official Information Act 1982.

More information on the fast-track approvals process and providing comments can be found at Process overview | Fast-track website

Your written comments on a project under the Fast Track Approvals Act 2024

Project name	FTAA–2505-1062 **Whiterock Quarry and Managed Fill Project**

Before the due date, for assistance on how to respond or about this template or with using the portal, please email contact@fasttrack.govt.nz or phone 0800 FASTRK (0800 327 875).
All sections of this form with an asterisk (*) must be completed.

1. Contact Details

Please ensure that you have authority to comment on the application on behalf of those named on this form.

Organisation name (if relevant)	Waimakariri District Council		
***First name**	Kelly		
***Last name**	LaValley		
Postal address	215, High Street ,Rangiora		
***Contact phone number**	s 9(2)(a)	**Alternative**	s 9(2)(a)
***Email**	s 9(2)(a)		

2. Please provide your comments on this application

If you need more space, please attach additional pages. Please include your name, page numbers and the project name on the additional pages.

Note: All comments will be made available to the public and the applicant when the Ministry for the Environment proactively releases advice provided to the Minister for the Environment.

Managers signoff



Kelly LaValley
General Manager Planning, Regulation and Environment Management

Date : 30 September 2025

Comments on a fast-track consenting application
Fast-Track Approvals Act 2024

Fast Track Application FTAA–2505-1062 Whiterock Quarry and Managed Fill

Our Reference:	RC255288 / 250929184139
Date:	30 September 2025
To:	Hon. Chris Bishop, Minister for Infrastructure
From:	Waimakariri District Council
Fast-track project:	FTAA–2505-1062 **Whiterock Quarry and Managed Fill**

Thank you for your Invitation to provide written comments for the application for the Whiterock Quarry and Managed Fill project in Loburn under the Fast Track Approvals Act 2024. Please see below Waimakariri District Council's (WDC) comments on this application.

1. Executive Summary

Waimakariri District Council has reviewed the Whiterock Quarry and Managed Fill project proposal under the Fast-track Approvals Act 2024 and opposes the proposal being placed on the fast-track process.

Key considerations:

- **Competing Application Already Lodged** – The same application has been lodged and is being processed by Waimakariri District Council and Canterbury Regional Council. The application has been publicly notified, with 573 submissions, and is subject to hearing requests of 80 submitters. Allowing Whiterock to proceed via fast-track process would bypass the hearing process and undermine fairness and natural justice to the community who have submitted on the proposal.
- **Not a Priority Project** -The proposal is not identified in any central government or local government strategy, spatial plan, or infrastructure priority list, and therefore carries no recognised strategic weight.
- **Lack of Regional or National Benefit** – The project duplicates services already provided in North Canterbury and does not address any identified infrastructure gap. It would not deliver significant regional or national benefits.
- **Alternative Facility Already Available** – Existing infrastructure already provides secure regional capacity for residual waste disposal, making the Whiterock proposal unnecessary.

- **Environmental and Ecological Risks** – The project, under the current resource consent process, was deemed to have adverse effects on the environment, particularly concerning biodiversity and freshwater, due to its location and incomplete information provided. This was detailed in Waimakariri District Council (Annexure 1) and Canterbury Regional Council s42A Officer Reports.
- **Cultural Opposition and Values** – Based on advice received by the Council as part of the resource consent process, mana whenua (Ngāi Tūāhuriri) strongly oppose the project due to effects to cultural landscapes, mahinga kai, and kaitiakitanga.
- **Inconsistency with District Plan Objectives** – The current proposal for resource consent was identified as inconsistent with the Strategic Directions, natural environment, cultural, and ecosystems provisions of the District Plan.

2. Competing Applications

a) Any applications that have been lodged with the Council that would be a competing application or applications if a substantive application for the project were lodged. If no such applications exist, please provide written confirmation.

WDC response

- An application for a quarry and managed landfill at 150 Quarry Road Loburn, was lodged with Waimakariri District Council on the 2 April 2024 (RC245076).

- The application has been publicly notified at the request of the applicant. The project attracted 573 submissions, with 510 opposed, 57 in support, and 6 neutral.

- A hearing date has been set. Waimakariri District Council and Canterbury Regional Council planning officers have completed section 42A reports, with the Waimakariri District Council report attached as Annexure 1. The applicant has since placed the application on hold.

- Waimakariri District Council considers that a substantive application proceeding through the Fast-track process for the same, or a materially similar project, would risk undermining the fairness and integrity of the current process. This proposal has already attracted a high community interest in the project, demonstrated by the large number of submissions on the current resource consent process.

b) In relation to projects seeking approval of a resource consent under section 42(4)(a) of the Act, whether there any existing resource consents issued where sections 124C(1)(c) or 165ZI of the Resource Management Act 1991 (RMA) could apply, if the project were to be applied for as a resource consent under the RMA. If no such consents exist, please provide written confirmation.

WDC response

- There are no existing resource consents issued where sections 124C(1)(c) or 165ZI of the Resource Management Act 1991 (RMA) could apply, if the project were to be applied for as a resource consent under the RMA.

3. Specific Matters to Address

3.1 Whether the project has been identified as a priority project in a central government, local government, or sector plan or strategy (for example, in a general policy statement or spatial strategy), or a central government infrastructure priority list and whether the project would have significant regional or national benefits.

WDC Response

- The project has not been identified as a priority in any central government infrastructure strategy, sector plan, or local government policy document. It does not appear on a national or regional infrastructure priority list, nor has it been advanced through any spatial or waste management strategy prepared under statute.

- Canterbury has a Class 1 regional landfill at Kate Valley, and our understanding is that it is about half full with suitable room for expansion, despite the frequent misconception among the industry regarding the regional landfill capacity. The regional landfill reached its halfway point approximately in late 2024[1], after 19 years of operation, and has another 15 years until consent expiry. It is further understood that there is ample room for expansion beyond the current consented area and it was always intended that the landfill would be expanded and consented in stages[2].

- The existing Kate Valley Landfill is expressly recognised in the Christchurch and Waimakariri Waste Management and Minimisation Plan (WMMP) as the region's primary facility for residual waste disposal.

- Kate Valley is the region's established, consented, and operating landfill. It was set up through a regional planning process, with substantial investment, and has the capacity to meet the region's waste disposal needs into the future.

- Kate Valley was specifically set up as a public/ private partnership between Christchurch City Council, and the District Councils of Ashburton, Hurunui, Selwyn and Waimakariri, and the private sector to manage Canterbury's waste streams and provide assurance to the community that no further small-scale localised landfills will be developed across the region. This approach also had the support of Canterbury's Papatipu Runanga. Kate Valley is 15 km further from Christchurch CBD than the proposed location of the Whiterock landfill.

- Kate Valley already provides this service; there is no evidence provided demonstrating the need for a second landfill. Establishing a privately-owned landfill would duplicate existing infrastructure, fragment waste streams, and undermine the coordinated regional approach that led to Kate Valley being chosen and developed. This proposal is therefore unnecessary, inefficient, and inconsistent with good planning outcomes

[1] Capacity milestone reached at Kate Vall ey Landfill - Transwaste
[2] Ibid

- Accordingly, Waimakariri District Council does not consider the project to be a priority, nor one that would deliver significant regional or national benefits. This is particularly so given the existing statutory waste management framework and the established role of Kate Valley Landfill in providing for the region's waste disposal needs.

3.2 Any high-level commentary regarding the project's alignment with the Council's relevant plans, policies, and/or strategies (including any proposed plans).

WDC Response

- The applicant has highlighted that the project presented for FTAA referral is essentially the same as that presented in the RMA application, with minor changes that have resulted from a review of Waimakariri District Councils' s42A reports and feedback from submissions. The Hon Minister is referred to **Annexure 1**, which contains the Waimakariri District Council s42A report prepared for the RMA proposal.

a) Partially Operative Waimakariri District Plan (Decisions Version) Objectives and Policies

- The s42A officer report (Annexure 1) concluded the proposal to be inconsistent with the Objectives and Policies of the Partially Operative District Plan. In summary the key issues were as follows:

i. SD - Rautaki ahunga - Strategic Directions

- As the project stands, WDC considers the project is contrary to the natural environment direction (as detailed in Annexure 1) for the following reasons:
    a) There will potentially be short-term loss of ecosystems, habitat and indigenous biodiversity during construction of the landfill and operation.
    b) The natural character of freshwater bodies and wetlands will not be preserved, enhanced or restored.
    c) The land being used is crown land and public access restricts anyone else from using the road reserve to access the Karetu River.
    d) An integrated approach which recognises the importance of ki uta ki tai to Ngāi Tahu and the wider community, and the inter-relationships between ecosystems, natural processes and with freshwater has not fully occurred.

ii. SASM - Ngā whenua tapu o ngā iwi - Sites and Areas of Significance to Māori

- WDC acknowledges the formal submission received during the resource consent process which outlines that Te Ngāi Tūāhuriri opposes the project due to the failure to protect culturally significant waterbodies and customary use and fails to integrate cultural values.

iii. ECO - Pūnaha hauropi me te rerenga rauropi taketake - Ecosystems and indigenous biodiversity

- WDC consider the project does not fully align with the direction due to its initial biodiversity loss and uncertainty regarding mitigation effectiveness. While long term restoration efforts are proposed, they do not offset the immediate ecological damage, meaning there is no immediate net gain in indigenous biodiversity.

4. Other Comments

- The Waimakariri District Council s42A officer report (Annexure 1) for the resource consent hearing recommended decline due to the following reasons:
  a) Adverse effects on indigenous fauna and habitat;
  b) Significant effects on Tangata Whenua values;
  c) Inconsistent with the NPS-IB;
  d) Tension with the objectives and policies of the Operative and Proposed District Plans relating to Māori values, terrestrial ecology, water and land, and water margins;
  e) Not meeting the purpose of Part 2 of the RMA, in particular sections 6(e) and (f);
  f) Contrary to the Iwi Management Plan; and
  g) Absence of a sufficient site selection process as defined by the WasteMINZ guidelines.

- Further, advancing this project through the Fast-track process would effectively allow the applicant to bypass the comprehensive scrutiny that applies to the existing notified application, despite both seeking to provide for the same residual waste function. This creates an imbalance between applicants and submitters as well as undermining public confidence in the fairness of the planning system. The applicants requested public notification setting expectations of public input in decision making.

- The consultation that was undertaken with the Council prior to the referral application was limited to notification that a referral under FTAA would be sought and seeking confirmation of the matters listed in Attachment 9 of the referral application. No further engagement was sought on the proposal. It should be noted, however, that at this same time work was progressing on the RMA proposal.

5. Conclusion

Overall, the proposed Whiterock Quarry and Managed Fill project does not justify referral to the Fast-track consenting process. The project is not identified as a priority in any central or local government strategy, and the Council does not consider it will provide significant regional or national benefits.

To the contrary, it duplicates infrastructure already established at Kate Valley, which is recognised as the region's primary residual waste facility.

Allowing this project to proceed through Fast-track raises issues of natural justice when a competing application is already before the Council, has been publicly notified, and subject to hundreds of submissions and hearing requests. Such an approach risks undermining the integrity of the planning process, public participation, and the statutory framework.

The proposal also raises material concerns in relation to cultural values, ecological effects, and alignment with the Strategic Directions, Sites and areas of significance to Māori, and Ecosystems and indigenous biodiversity provisions of the Partially Operative District Plan. While the quarrying activity at the site has an established history, the introduction of a landfill/managed fill component potentially creates additional and significant adverse effects that are not adequately mitigated.

For the above reasons, Waimakariri District Council opposes the referral of this project to the fast-track consenting process.

Annexure 1- Waimakariri District Council's s42A report for the RMA application RC245076

WAIMAKARIRI DISTRICT COUNCIL

SECTION 42A REPORT

FILE NO:	RC245076
DATE:	24 March 2025
REPORT TO:	Independent Hearings Panel
FROM:	Senior Resource Management Planner – Tim Johnston
SUBJECT:	Publicly notified land use consent application for the establishment of a landfill and associated quarrying at 150 Quarry Road, Whiterock.
ACTIVITY:	Waimakariri Operative District Plan – Discretionary Activity Waimakariri Proposed District Plan - Restricted Discretionary Activity
RECOMMENDATION:	Decline

INTRODUCTION

1. My name is Timothy Barrie Johnston, and I have prepared a Section 42A report for this resource consent application.

2. I am a Senior Resource Management Planner and employed by the Waimakariri District Council. I hold a Bachelor of Science in Geography and Environmental Management from Otago University.

3. I have had six years of resource management experience. I have prepared consent recommendations for a range of resource consents including land development projects, large residential developments, landfills, discharges to land, water and air, surface and groundwater takes and coastal permits.

4. This report is prepared under the provisions of section 42A of the Resource Management Act 1991 (RMA). This section allows a council officer, consultant or any other person commissioned by the consent authority to provide a report to the decision-maker on a resource consent application made to the Council and allows the Hearing Panel to consider the report at the hearing.

5. Section 41(4) of the RMA allows the Hearing Panel to request and receive, from any person who makes a report under section 42A "*any information or advice that is relevant and reasonably necessary to determine the application*".

6. This report will provide the Hearing Panel with information and advice related to:

    a) The background to the application;
    b) Details of the notification of the application and submissions received;
    c) An outline of the relevant legal and planning provisions;

d) An audit of the assessment of environmental effects provided by the applicant;
e) An assessment of Council policy relevant to the applications;
f) Recommendations in relation to the matters specified in section 104 and Part 2 of the RMA; and
g) Recommendations on the decision to be made by the Hearing Panel including comments on whether the application can be granted or should be refused; if the application is to be granted what measures are required to avoid, remedy or mitigate any adverse effects, and what monitoring could be undertaken.

7. This report draws on conclusions made in technical reports provided by a number of experts, each expert has prepared a report in accordance with Section 42A of the RMA, conclusions made in each report are referenced in this report. The following appendices attached to this report, include:

a) **Appendix 1**- Herpetology Section 42A report, prepared by Dr Mandy Tocher, LizardExpertNZ,(Note also attached to CRC Planning Report)

b) **Appendix 2**- Avifauna Section 42A report prepared by Hamish Dean, SLR Consulting, Hamish Dean

c) **Appendix 3**- Vegetation and Wetland Section 42A report, prepared by Dr Stephen Rate, SLR Consulting. ,(Note also attached to CRC Planning Report)

d) **Appendix 4**- Geotechnical Section 42A report, prepared by Clive Anderson, Tonkin + Taylor. (Note also attached to CRC Planning Report)

e) **Appendix 5**- Transportation Section 42A report prepared by Alan Gregory, Tonkin + Taylor,

f) **Appendix 6**- Landscape and Natural Character Section 42A report prepared by Naomi Crawford, Glasson Huxtable.

8. It should be emphasised that any conclusions reached, or recommendations made in this report are not binding on the Hearing Panel. It should not be assumed that the Hearing Panel will reach the same conclusion or decision having considered all the evidence to be brought before it by the applicant and submitters.

9. Following the initial, high-level review of the applicant's AEE by Waimakariri District Council staff and external experts, a request for further information (RFI) under Section 92(1) of the RMA was sent on 20 June 2024. A response to the RFI was received in late August and early September 2024.

10. The proposal, as amended by the RFI responses and further correspondence with the applicant, has been considered in this report.

11. I undertook a site visit on 30 June 2024, together with Regional Council staff, technical experts acting on behalf of the Wamakariri District Council (WDC) and Canterbury Regional Council (CRC), the applicant and the applicant's experts.

12. This resource consent application is being processed on a joint basis with CRC as resource consents are required from both Councils and the applications have been publicly notified. Accordingly, all resource consent applications will be considered concurrently by the Hearings Panel.

13. While this is not a hearing before the Environment Court, I can confirm that I have read the Code of Conduct for expert witnesses contained in the Environment Court of New

Zealand Practice Note 2023 and that I have complied with it when preparing my evidence. Other than when I state I am relying on the advice of another person, this evidence is within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

APPLICANT

14. Protranz International Limited

PROPERTY LOCATION

15. 150, 154 ,174 176 Quarry Road, Loburn.

LEGAL DESCRIPTION

16. Lot 1 DP 388690, Lot 2 DP 497185, Lot 4 DP 755, Part 2 DP 755, Crown - Riverbed and Road Reserve

ZONING

17. Operative Waimakariri District Plan – Rural

18. Proposed Waimakariri District Plan – Rural General

DESCRIPTION OF PROPOSED ACTIVITY

19. Protranz International Limited (The Applicant) has applied for resource consent to continue existing quarrying operations and establish and operate a construction and demolition waste (C+D waste) landfill at 150 150, 154 ,174,176 Quarry Road (the site). The site is shown in Figure 1.

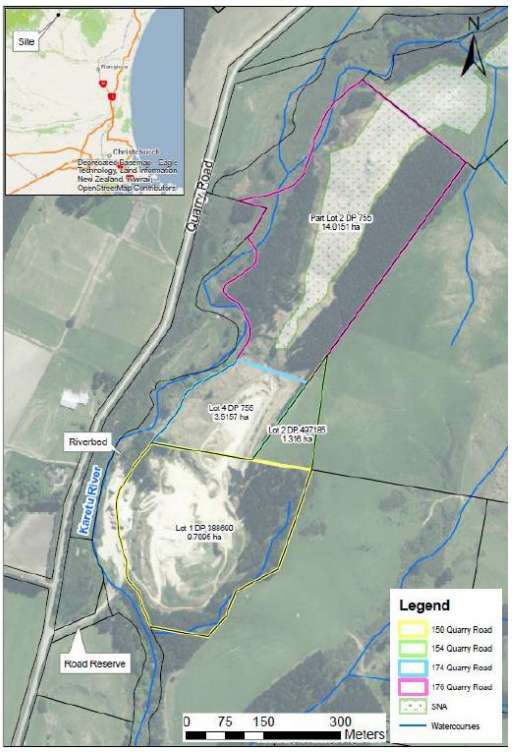


Figure 1 – Location of applicant's site

20. A detailed description of the proposal is provided in the AEE (pages 29 to 48). Further details, specifically on the landfill design and operation, are provided in the Landfill Engineering Report (Appendix 3 of the AEE), the Landfill Management Plan (Appendix 8 of the AEE) and the engineering drawings (Appendix 2 of the AEE). Proposed resource consent conditions were proffered in Appendix 10 of the AEE.

21. I adopt Ms Katie Nagy Canterbury Regional Council, s42A officer's report description.

22. The proposal includes the following:

    a) Earthworks and clearance within waterway margins

    b) General earthworks for information of a landfill

    c) Bridge structure within a waterway setback

    d) Increased rate of mineral extraction

    e) Operate a managed fill landfill

    f) Construction of outfall within a sites and Areas of Significance to Maori

    g) Earthworks and stockpiling associated with quarrying and landfill construction

23. The applicant has labelled the proposed landfill as a Class 3 Managed Landfill in accordance with the WasteMINZ Guidelines (2023), with the inclusion of inert and sorted construction and demolition (C&D) waste and other specific inert wastes including contaminated soils and asbestos.

24. I note that the proposal is more of a hybrid approach and should not be classified as a Class 3 Managed Landfill.

25. A liner design consistent with the Class 1 Landfill requirements is proposed for the site as shown in Figure 2 of this report.

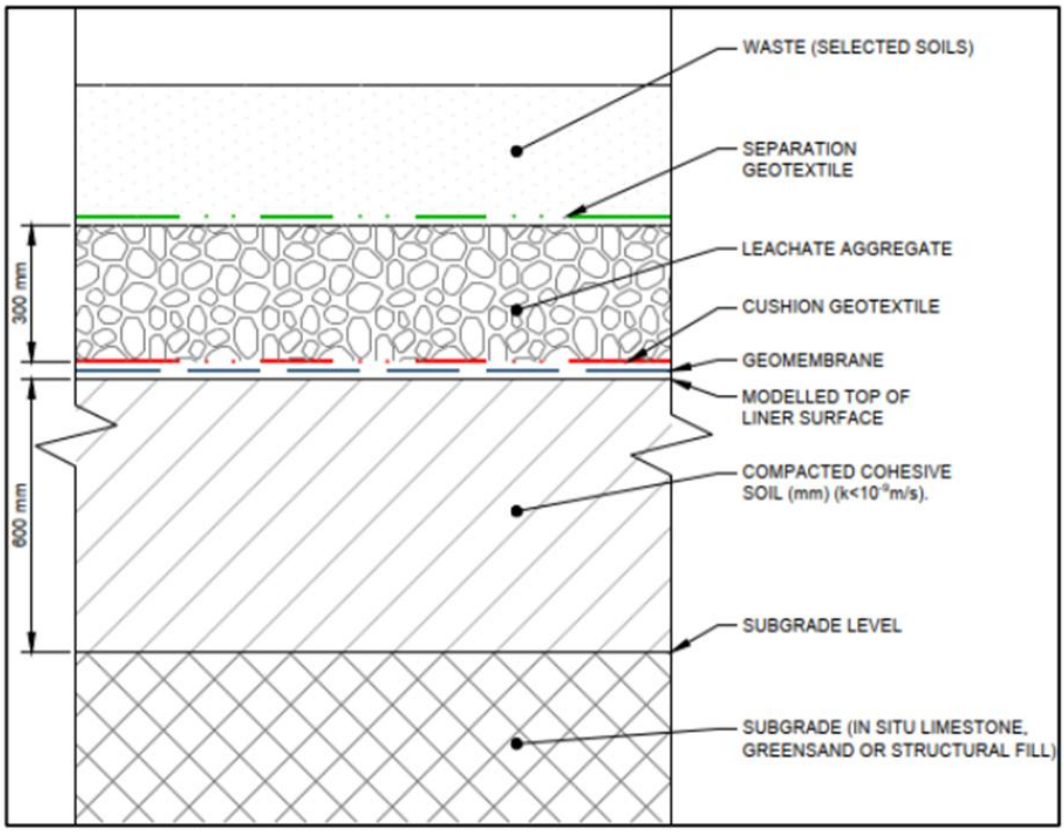


Figure 2: Landfill Liner Design

26. Leachate extraction will be designed to capture any mobilised contaminants.

27. The total airspace capacity of the landfill will be 500,000m^3 across a 4.0 ha waste placement footprint, with an average landfilling rate of 30,000 tonnes per year determined by demand. It is expected that the landfill will have a lifespan of approximately 20 years.

28. Prior to the commencement of the landfilling activity, a perimeter fence will be established around the landfill footprint. Fencing will be akin to a deer type fence and be constructed to a minimum 2.2 m in height and include security features that inhibit climbing or similarly restricts ease of access to the site.

29. Operating hours of the site will be restricted to 0700 to 1900 hours Monday to Saturday excluding public holidays.

30. Development of the landfill will occur in two stages in the existing quarry pit area. It is proposed to form a suitable floor and slopes.

31. Average vehicle movements per day associated with the operation of the combined lime quarrying and landfill activities are expected to be:

    a) 18 truck and trailer movements (9 vehicles)
    b) 6 service trucks (3 vehicles)
    c) 10 staff light vehicle movements (5 vehicles)
    d) 2 servicing light vehicle movements (1 vehicle).

32. The applicant has proposed fencing of the Significant Natural Area, riparian planting and wetland enhancement as per the below figure 3

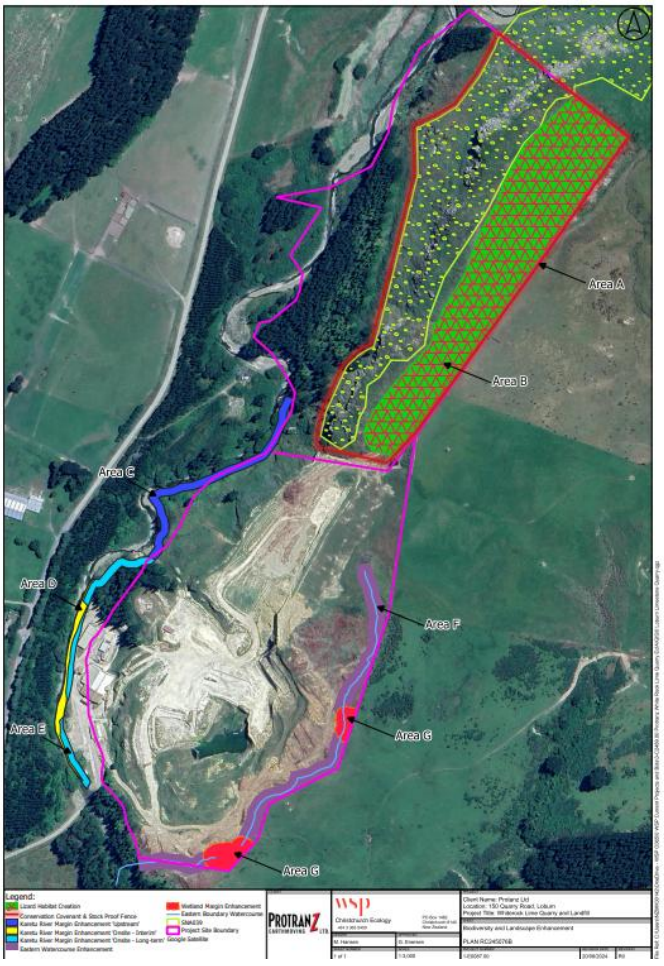


Figure 3;Applicant proposed ecological rehabilitation

Schedule 1

Column 1 Requirement by Consent Holder	Column 2 Applicable Area	Column 3 Objective to be achieved	Column 4 Timeframe
Conservation Covenant - *Register the area of land within 176 Quarry Road, Loburn (Part Lot 2 DP755) identified as "Area A" demarcated by the red boundary in **Plan RC245076C** as a conservation covenant with the Department of Conservation.*	A	➢ To provide additional enhancement opportunities and protection of naturally rare or distinctive ecosystems in perpetuity associated with SNA039 as identified and mapped in the Waimakariri District Plan. ➢ Provide a buffer protection area to the southeast of SNA039 in perpetuity which will provide additional protected areas for greater biodiversity enhancement.	Within 3 months of exercising the resource consent.
Stock Exclusion Fencing - *Install stock proof fencing around the perimeter of "Area A" demarcated by the red boundary in **Plan RC245076C.***	A	➢ Create a "habitat island" that support specialised plant communities and native fauna. ➢ Provide a safe refuge for relocated lizards and ongoing protection for the covenanted area from livestock. ➢ Provide clear on-ground identification of the conservation convent area.	Within 12 months of exercising the resource consent.
Lizard Habitat Creation - *Mass planting of suitable habitat (rank grass) for targeted lizard species within Area A identified in green and red hash in **Plan RC245076C.***	B	➢ Offset the loss of lizard habitat within the operational quarrying and landfill area. ➢ Provide an enhanced area of habitat for lizard species that fall within the geographical range of the site.	Within 12 months of exercising the resource consent.
Karetu River Margin Enhancement 'Upstream' - *Planting of a 10 m riparian margin in indigenous species on the true left bank identified as dark blue in **Plan RC245076C*** between NZTM50 BW23:5555-2179 and BW23:5536-2157. - *Undertake gradual removal of pest willow tree species as indigenous species mature.*	C	➢ General ecological and landscape enhancement. ➢ Improve the cultural health of the Karetu River and support Mahinga Kai opportunities. ➢ Indigenous riparian enhancement planting will replace gradually removed willow trees. ➢ Provide stabilisation of the banks of the Karetu River from erosion and scour. ➢ Provide habitat and a food resource for indigenous birds known on-site or that are present within proximity to the site.	Completed by the second planting season following exercising of the resource consent.
Karetu River Margin Enhancement 'Onsite-Interim' - *Planting of a riparian margin with an average width of 2-3 m with indigenous species where practicable along the true left bank identified as yellow in **Plan RC245076C** between NZTM50 BW23:5530-2155 and BW23:5528-2129.*	D	➢ Provide interim protection of the existing bund while the lower terrace is being actively used for limestone processing activities. ➢ Where a genuine conflict arises between the location of the site security fence and the requirement to achieve an average of 2-3m, the security of the site shall take precedence. ➢ The objective of the planting is to provide stabilisation of the bund and bank and achieve an ecological function at the low flow edge. The type of planting should reflect this objective and the potential need to undertake ongoing maintenance of the fence or bund (i.e., limit plantings to lower ground cover species).	Completed within the first planting season following the granting of resource consent.

Column 1 Requirement by Consent Holder	Column 2 Applicable Area	Column 3 Objective to be achieved	Column 4 Timeframe
Karetu River Margin Enhancement **'Onsite – Long-Term'** - *Planting of a 10 m riparian margin in indigenous species on the true left bank identified as dark blue in **Plan RC245076C** between NZTM50 BW23:5536-2157 and BW23:5528-2129.*	E	➢ Provide long term stabilisation of the banks of the Karetu River from erosion and scour. ➢ General ecological and landscape enhancement. ➢ Improve the cultural health of the Karetu River and support Mahinga Kai opportunities. ➢ Provide habitat and a food resource for indigenous birds known on-site or that are present within proximity to the site.	Completed within the first two planting seasons following the completion of limestone processing activities at the site.
Eastern Watercourse Enhancement - *Planting of a 10 m riparian margin in indigenous species on both margins identified as purple on **Plan RC245076C** between NZTM50 BW23:5563-2156 and NZTM50 BW23:5535-2120.* - *Where a 10 m margin cannot be achieved due to private property constraints, the planting shall cease at the legal boundary.*	F	➢ General ecological and landscape enhancement. ➢ Provide habitat and a food resource for indigenous birds known on-site or that are present within proximity to the site. ➢ Bank stabilisation through erosion and scour protection without compromising the flood carrying capacity. ➢ Enables complimentary lizard habitat to be naturally formed around riparian margins.	Completed by the third planting season following exercising of the resource consent.
Wetland Margin Enhancement - *Planting of a 10 m riparian margin of indigenous species.* - *Where a 10 m margin cannot be achieved due to private property constraints, the planting shall cease at the legal boundary.*	G	➢ General ecological and landscape enhancement. ➢ Improve the cultural health of the Karetu River and support Mahinga Kai opportunities. ➢ Provide habitat and a food resource for indigenous birds known on-site or that are present within proximity to the site.	
Stock Exclusion - *Install stock proof fencing to keep stock out of the eastern watercourse* -	F	➢ Erosion protection of the beds and banks of the waterway ➢ Protection of indigenous planting and associated habitats	Prior to plant-ing occuring

33. The applicant has provided a draft set of conditions in Appendix Y of the application.

SITE DESCRIPTION

34. A detailed description of the site is provided in the AEE. I also note the Canterbury Regional Council s42 A officer's report has provided a comprehensive description.

35. In summary:

a) The quarrying and landfill application site comprises an area across three adjoining properties being at 150, 154 and 174 Quarry Road, Loburn Canterbury as shown in Figure 1 and 4 of this report.



Figure 4: Existing Quarry Site

b) Existing quarry infrastructure at the site comprises a weighbridge (and building) adjacent to the site access with a site office to the northeast providing for onsite staff amenities. Further north are the main processing facilities including a furnace and rotary kiln, crusher, lime and urea silos, conveyor belt machinery and storage sheds for machinery and bunkers for coal storage. The coal storage area comprises two covered bunker stores.

c) The proposal lies within the rohe of Te Ngāi Tūāhuriri Rūnanga. The Karetu River is classed in the Proposed District Plan as a site of significance to iwi. The Karetu River SASM 028 is classified as a Nga Wai being a tributary to the Okuku River and which is identified as having Mahinga Kai environments, habitats and taonga species.

d) Three main lithological units exist within the quarry including the Tokama Siltstone, Whiterock Limestone, and Berrydale Greensand which are all part of the Motonau Group 5. The lithological units from youngest to oldest includes Loess, Kowai Formation, Tokama Siltstone, Whiterock Limestone and Berrydale Greensand.

e) The Significant Natural Area (SNA 039) as identified in the Proposed District Plan at 176 Quarry Road is owned by Protranz. SNA039 is known as the Whiterock Limestone Vegetation and described as containing indigenous grassland, shrubland and indigenous limestone rock outcrop vegetation. Notable flora on site includes at risk-declining species such as speargrass *(Aciphyllasubflabellata),* matagouri/tūmatakuru *(Discaria toumatou)* and New Zealand linen flax (*Linum monogynum).* It also contains threatened-nationally endangered species such as *Gingidia enysii var. enysii* and Weka Pass sun hebe *(Heliohebe maccaskillii),* kānuka *(Kunzea serotina)* (threatened-nationally vulnerable), and Waipara gentian *(Gentianella calcis subsp. waipara)* (threatened-nationally critical).

f) Two activities and or industries on the Ministry for the Environment Hazardous Activities and Industries List (HAIL) have been identified as occurring or have occurred within isolated areas of the site. These HAILs are A17 – Storage tanks

or drums for fuel, chemicals or liquid waste, associated with an Above Ground Storage Tank (AST) for diesel, and E3 – Cement or lime manufacture using a kiln including the storage of wastes from the manufacturing process.

g) Flood modelling for 1 in 200-year and 1 in 500-year flood events identifies the Karetu River, and the western part of the site, which includes the main accessway and buildings, as being within the High Hazard zone.

h) The site falls within the Oxford Ecological District (ED) of the Canterbury Foothills Ecological Region.

i) The site contains significant indigenous vegetation and fauna habitats, particularly for lizards (Canterbury grass skink, Waitaha gecko) and wetland plant species.

j) The site is not within an outstanding landscape area or within any of the sub areas, nor contains a prominent ridge.

k) There are two dwellings within 250 metres of the site both are located on the same property to the west of the site. I note these dwellings are within Hurunui District.

l) Quarry Road is not on a school bus or other bus route, the closest school being North Loburn School, about 8 km from the site located on Loburn Whiterock Road.

m) The Site is approximately 1.5km North of the intersection with Loburn Whiterock Road and Taaffes Glen Road

n) The accessway and quarry buildings are in Crown Land.

DISTRICT PLAN REQUIREMENTS

Operative Waimakariri District Plan

36. The application site is within a Rural zone. In assessing the proposed activity regard has first been given to the definitions in the District Plan and what definitions the activity would fall within. The following definitions are considered relevant:

Earthworks
Earthworks means the disturbance of land by excavating, placing or replacing soil or other material, and includes driveway and access construction, and land drainage works, but excludes earthworks involving:

a. cultivation for, or harvesting of agricultural and horticultural crops;

b. domestic gardening;

c. digging of postholes for the construction of fences;
d. works for research and monitoring such as coring, water bores and use of piezometers;

e. maintenance and enhancement of any wetland; or

f. ripping in of water pipes.

Landfill
Landfill means an area used for the disposal of solid waste into or onto the land other than a farm landfill.

Structure
Structure means any building, equipment, device, or other facility made by people and which is fixed to land; and includes any raft" (section 2 Resource Management Act 1991).

37. Following an analysis of the above it is considered that the proposed activity falls within the definition of being a landfill. This includes that all facilities ancillary to that activity such as internal roads, buildings and the transfer area are considered to also be part of a 'landfill'. The formation of the landfill, together with the establishment / building of transfer areas etc are also considered to constitute earthworks.

38. In addition, consideration has been given to whether the landfill would constitute a 'structure'. On the basis of the definition and that the landfill will be made by people, including careful construction via a series of cells, it is considered that the landfill could potentially also constitute a 'structure' but it is less clear whether a landfill could be considered to be 'fixed to land'. While uncertainty does exist as to whether the landfill would constitute a structure, a conservative approach has been taken and the landfill has been assessed as being a 'structure'. This ensures a comprehensive assessment of all relevant rules and avoids any later risk of it being identified that other rules might be applicable. It is anticipated this issue can be explored further, as part of later assessments, if considered necessary.

39. On the basis of the above, the various provisions of the District Plan have been assessed, and resource consent is required for the following reasons:

Chapter 23 Land and Water Margins	
Rule	**Comment**
23.1.1.3 There shall be no earthworks: a. within 20m of any river or lake; or b. within 50m of any wetland.	The proposal will undertake earthworks within 20 metres of the Karetu River. The earthworks include the earth bund, installing fencing, and constructing the bridge. Therefore, it does not comply with this rule.
23.1.1.4 There shall be no vegetation clearance: a. within 20m of any river or lake; or b. within 50m of any wetland	The proposal will undertake vegetation clearance within 20 metres of the Karetu River. The vegetation clearance is required to construct the earth bund, bridge and other erosion sediment controls required. Therefore, it does not comply with this rule.
23.1.1.8 Earthworks, including the extraction of minerals, in the Rural Zones, other than in the	The applicant has detailed that they assume the continuation of the quarrying activity and landfill construction activities will not be within the threshold of this rule.

bed of any river, shall not involve the disturbance of more than 1000m2 of soil and/or rock per any 1ha.	I agree with the applicant's assumption, therefore the proposal does not comply with this rule.
Rule 23.3.1 Any land use that does not comply with one or more of the conditions under Rules 23.1.1.1 to 23.1.1.6 is a discretionary activity (restricted), except where exempted by Rule 23.1.2.	As the proposal does not comply with Rule 23.1.1.4 and 23.1.1.4, earthworks and vegetation clearance within 20 metres of the Karetu River is a restricted discretionary activity.
23.3.2 Any land use involving earthworks, including the extraction of minerals, that does not comply with Rules 23.1.1.7 to 23.1.1.10 is a discretionary activity (restricted), except where exempted by Rule 23.1.2.	As the proposal does not comply with Rule 23.1.1.8, all earthworks are a restricted discretionary activity.
23.4.2 Landfills (excluding offal pits) and solid waste transfer stations are discretionary activities.	Under this rule landfilling is a discretionary activity.
Chapter 27 Natural Hazards	
Rule	**Comment**
27.1.1.2 Any structure shall be set back a minimum of 10m from the edge of the bed of any river, edge of any public drain, edge of any wetland, or the centreline of any stopbank, whichever is the further from the river or wetland, except where a different setback is provided for in Rule 27.1.1.1.	A new bridge structure will be within the 10m setback requirement. As there is no existing bridge, the exemption listed under 27.1.2.2 which applies to the replacement, maintenance and minor upgrading of an existing utility, does not apply. Therefore the proposed bridge does not comply with this rule is classified as a discretionary activity under Rule 27.2
27.2.2 Except as provided by Rules 27.3 or 27.4, or where exempted under Rule 27.1.2, any land use which does not comply with one or more of the conditions under Rule 27.1.1, is a discretionary activity (restricted).	

40. Overall, the proposal is considered to be a **discretionary activity** under the provisions of the Operative Waimakariri District Plan 2005.

Proposed Waimakariri District Plan

41. Consideration has been given to the applicability of the Proposed Waimakariri District Plan (PDP) which was publicly notified in September 2021. The hearings have been completed, but no decisions have been issued yet.

42. WDC has been granted a time extension for decisions to be released, until the end of June 2025. Therefore, the PDP provisions are subject to submissions and do not have legal effect yet. The only rules that have legal effect are those set out in Section 86B(3) and rules relating to subdivision and density in the General Rural Zone which were granted immediate legal effect status by the Environment Court.

43. The site is identified as being within the General Rural Zone. The applicant has undertaken an assessment of the relevant rules, which I have reviewed and delated the relevant rules to the proposal that have legal effect below.

SASM - Ngā whenua tapu o ngā iwi - Sites and Areas of Significance to Māori	
Rule	**Comment**
SASM-R4 **Earthworks and land disturbance associated with other activities** *This rule applies to Wāhi Tapu/Wāhi Taonga, Ngā Tūranga Tūpuna and Ngā Wai in SASM-SCHED1 except where SASM-R1 to SASM-R3 apply.* ***Activity status: PER*** *Where:* 1. *the earthworks and land disturbance is limited to:* a. *planting of trees;* b. *gardening;* c. *building foundations, septic tank and swimming pool installations where the combined volume of earthworks is 350m³ or less;* d. *freestanding sign foundations to a maximum depth of 200mm or to the depth already disturbed (whichever is the greater);* e. *drain and track maintenance;* f. *cultivation, stopbanks, roadworks and other activities*	The proposal breaches this rule as the applicant is proposing to undertake earthworks within SASM 028 for building a structure, being a bridge. The applicant is of the opinion that the bridge is a building and that the earthworks for "building foundations" are therefore a permitted activity. I note the definition of building is as follows: ***BUILDING*** *means a temporary or permanent movable or immovable physical construction that is:* *a) partially or fully roofed; and* *b) is fixed or located on or in land;* In my opinion the bridge is a structure but does not fall into the definition of a building as it is not roofed. Therefore, the earthworks related to the bridge do not meet any of the activities under SASM-R4. Therefore, the earthworks within the nga wai is a restricted discretionary activity.

	within land previously disturbed by previous earthworks to the depth already disturbed; *g. cultivation to a maximum depth of 200mm;* *h. a customer connection between a building, other structure, site, and infrastructure as per EI-R4; and* *i. the drilling of a well or bore.*	

44. Overall, the proposal is considered to be a **restricted discretionary activity** under the 'legal effect' provisions of the Proposed Waimakariri District Plan 2021.

Summary

45. Overall, the entire proposal is a **Discretionary activity** under the Operative District Plan. Under the Proposed District Plan, land use consent is only required for the earthworks for construction of the bridge, and this is a **Restricted Discretionary** activity.

46. Where more than one activity is proposed, and those activities are inextricably linked, best practice is that the activity statuses are bundled and the most restrictive activity status applies to the entire proposal.

47. In relation to the district council consents, I consider it is appropriate to bundle all activities together as a discretionary consent.

SUBMISSIONS

48. Submissions closed on 09 October 2024.

49. During late November 2024, the CRC became aware of issues with the online submission form on the CRC's website. Several submitters reported that submissions were not recorded, despite having received an automated email confirming receipt of the submission.

50. The applicant was advised of this issue on 11 December 2024. The week prior to Christmas, a notice was published on the CRC's website and the local papers used for the original notification, requesting that submitters notify their missing submission by the 31st January 2025 and requesting proof of the original confirmation email for late acceptance of the submission.

51. In total, 573 submissions were received. Of those, 24 were re-submissions. A summary of submissions is outlined below:

    a 510 submissions oppose the proposal in whole or in part;

    b 6 submissions indicated a neutral position in whole or in part;

    c 57 submissions support the proposal in whole or in part.

52. Of the submissions received, 89 indicated that they wish to be heard.

53. A full summary of submissions received is included in Appendix 3 of the CRC Officer Report.

54. The following is a list of the key issues raised by submitters that I will be addressing further in my report:

a) **Rural Amenity** – submissions focus on preserving rural character, scenic values, and minimising industrial impact, including that traffic noise and visual pollution reduce rural amenity.

b) **Cultural Matters** - submissions focus on water contamination, heritage protection, and land use conflicts. Te Rūnanga o Tūāhuriri specifically highlight the Karetu River's cultural significance. The submissions cite potential harm to Māori heritage and local communities.

c) **Traffic Matters -** 243 of the submissions raised concerns around the increase in heavy traffic, the routing of vehicles through the rural road network, increase in safety risk, maintenance liability for the local road network and concerns of increased traffic around North Loburn School.

d) **Terrestrial Ecology** - submissions focused on habitat destruction, re-homing concerns, and water contamination risks.

e) **Natural Hazards** - Concerns that the site is in an earthquake-prone area, risk of landfill containment failure, risk of flooding impacting landfill stability and leading to contaminated runoff, land stability and the potential for erosion to undermine the landfill structure.

f) **Recreation** - Submitters have raised concerns that the proposal will negatively affect walking, cycling, hiking, and horse riding in the area. Loss of access to public spaces and concerns that the landfill will limit access to popular recreational spots. Health and safety for recreational users, including risks from increased traffic, air pollution, and water contamination that could make the area unsafe for outdoor use.

55. In relation to water quality, aquatic ecology and air discharge matters, I defer to the reporting planner Ms Nagy's s42A report for CRC.

SECTION 104 OF THE RESOURCE MANAGEMENT ACT 1991

56. Under Section 104, when considering an application for a resource consent and any submissions received, the consent authority must, subject to Part 2, have regard to–

(1) (a) any actual and potential effects on the environment of allowing the activity; and

(ab) any measure proposed or agreed to by the applicant for the purpose of ensuring positive effects on the environment to offset or compensate for any adverse effects on the environment that will or may result from allowing the activity; and

(b) any relevant provisions of—

(i) a national environmental standard:

(ii) other regulations:

(iii) a national policy statement:

(iv) a New Zealand coastal policy statement:

(v) a regional policy statement or proposed regional policy statement:

(vi) (vi) a plan or proposed plan; and

(c) any other matter the consent authority considers relevant and reasonably necessary to determine the application.

(2) When forming an opinion for the purposes of subsection (1)(a), a consent authority may disregard an adverse effect of the activity on the environment if a national environmental standard or the plan permits an activity with that effect.

57. All matters listed in s104(1) are subject to Part 2 of the Act which contains its purposes and principles

58. In addition, Section 104B of the Act relates to the determination of applications for discretionary activities. It states that after consideration of an application, a consent authority may grant or refuse the application and if granted, may impose conditions under section 108.

59. Section 104(1)(a) of the Act requires that the Council have regard to any actual and potential effects on the environment of allowing the activity. 'Effect' is defined in section 3 of the Act as including:

a) Any positive or adverse effect; and
b) Any temporary or permanent effect; and
c) Any past, present, or future effect; and
d) Any cumulative effect which arises over time or in combination with other effects– regardless of the scale, intensity, duration or frequency of the effect, and also includes –
e) Any potential effect of high probability; and
f) Any potential effect of low probability which has a high potential impact.

60. Section 104(2) of the RMA directs that the decision maker may disregard an adverse effect on the environment of an activity if a rule in the District Plan permits an activity with that effect, a concept known as the permitted baseline. The application of the permitted baseline is discretionary, and case law has established that the permitted baseline test relates to the effects of non-fanciful hypothetical activities which could be carried out as of right under the District Plan, as well as any existing lawfully established activity on the site. The existing environment also includes any activity for which resource consent has been granted.

61. Quarrying is a restricted discretionary activity in the Rural Zone and landfill is a discretionary activity. Therefore, there is no permitted activity or other activity of a similar scale that is permitted that could provide an appropriate baseline against which to consider the effects of the proposal.

ACTUAL OR POTENTIAL ENVIRONMENTAL EFFECTS

62. I have considered the matters raised in the application and further information requests. I also note that in assessing the actual and potential effects of the proposal, I have considered the following expert assessments:

63. The applicant's assessment of actual and potential effects (pages 69 to 93 of the AEE) which focuses on the following effects:

a Effects on water quality;

b Effects on water quantity;

c Effects on aquatic ecology;

d Effects on water users;

e Effects on terrestrial ecology;

f Effects on land stability;

g Effects from fire and flood hazards;

h Effects on air quality and human health;

i Effects of greenhouse gas emissions;

j Effects of transportation;

k Effects on Te Ngai Tūāhuriri Runanga values and use;

l Effects on landscape values;

m Effects on amenity and recreation values;

n Effects on wider community;

o Containment failure risks.

64. As a discretionary activity, the consent authority's discretion is unrestricted and all actual and potential effects of the activities must be considered.

65. Given the nature of the proposal, I consider that the following District matters provide for the principle actual or potential adverse effects to be considered:

a Effects on amenity and character (visual, landscape, nuisance).

b Effects on terrestrial ecology;

c Effects on land stability;

d Effects from fire and flood hazards;

e Effects of transportation;

f Effects on Te Ngai Tūāhuriri Runanga values and use;

g Positive effects

66. I have not provided an assessment of effects on groundwater, water quality, drinking water, stormwater management and landfill design, as these effects have been comprehensively considered by Ms Nagy.

67. In considering the potential effects of the proposal, I have turned my mind to the following potential or actual adverse environmental effects.

Rural Amenity and Character

68. The proposal will be located in the Rural Zone of the Operative District Plan and General Rural Zone of the Proposed District Plan. Therefore, it is important to understand the effects of this type of proposal on the amenity and character of the rural zone and local environment and whether the location is appropriate.

69. I do acknowledge that the quarry is existing, however the effects from the proposed activity should be understood together with the quarry activities and the landfill activity.

70. The anticipated effects on the rural landscape have been considered as part the Landscape Assessment lodged in support of the application (in the RFI response supplied by the Applicant). The Applicant's landscape expert from WSP provided an assessment of the current landscape value of the site, as set out in the Table below.

LEGAL SITE	DESCRIPTION	CURRENT LANDSCAPE VALUE
150 Quarry Road	Broadly characterised as an open lime quarry landscape on the upper portion of the site (quarry pit) with the associated quarrying and processing infrastructure on the lower terrace. Access to the site is via a gravel road from Quarry Road which crosses the Karetu River via a ford.	Very low
154 Quarry Road	Includes a triangular area above the quarry bench currently comprising pasture grass.	Low
174 Quarry Road	Comprises a benched hillslope area from previous lime extraction originally under lease, which has had quarry overburden spread to the west over time.	Very Low
176 Quarry Road	SNA. Whiterock Limestone Vegetation containing indigenous grassland, shrubland, and indigenous limestone rock outcrop vegetation.	Moderate

71. The applicant has assessed the visual amenity effects on the surrounding environment which is in table 6.1 of the landscape assessment in the RFI. In summary the Applicant has detailed:

"From properties on Quarry Road where the Proposal will not be visible, other landscape effects are considered including the increase in vehicle movements. Overall, the landscape effects during the operation of the Proposal will be at most low. At the conclusion of the Proposal, the effects will be very low. There will also be positive effects during and at the conclusion of the Proposal due to returning the proposal site to a landform to a landscape more in line with the former character, habitat enhancement in riparian areas, wetland areas and within the SNA and disestablishment of built form such as the buildings."

72. Ms Naomi Crawford on behalf of Council has undertaken an assessment of the visual and landscape values in Appendix 6 of this report. In summary:

a. *"The Application is adequately described, key aspects of the statutory context are discussed, the landscape context and character are covered appropriately, potentially effected neighbours are correctly identified, and an assessment of effects is undertaken using the TTatM prescribed 7-point scale. The assessment is supported by helpful graphics including site location maps, plans, character images, a viewpoint location map and supporting panoramas.*

b. *The Site is screened by topography to the north and east. The area is also visually contained by the hillscapes and roadside vegetation. Ms. Back assessed the effects of the Application on landscape values when viewed from ten locations. She determined that the visual effect on the residents of 144 and 179 Quarry Road will be* ***low*** *during the works and* ***very low*** *following disestablishment of the landfill (presumably adverse). Visual effects at all other locations were determined to be* ***very low****. I agree with the above findings. However, I would also include numbers 62 and 12 Quarry Road within the above property cluster. Number 62 Quarry Road (which is a dwelling located close to the roadside, plus a secondary dwelling immediately next door) was not accessed by Ms. Black as part of her LVA. This property is located closer to the quarry than some of the properties previously assessed. Again, the visual effect on the residents of this address are likely to be* ***low*** *due to the approximate 835 metre distance from the quarry.*

c. *Number 12 Quarry Road is also located next to the road but at a distance of 1.3km. Adverse visual effects are likely to be* ***very low****.*

d. *It is my understanding that the SNA will be avoided by the Application and will be protected by fencing it off from the rest of the Application Site. If appropriate, the Applicant may also like to consider further rehabilitation or enhancement of this area.*

e. *Submitters concerns in relation to landform centre around the modification of the river and the possibly of earthworks within the waterway. The Applicant has confirmed that there will be no central pier used in the new bridge crossing the Karetu River. However, further information is needed on the location of bunds and their locations and dimensions near the waterway. It is not clear whether the existing bunds beside the river are being utilised and stabilised. Without this information, it is difficult to quantity the effect of the Application on landform.*

f. *upon completion quarrying and then landfill activity, the site will be rehabilitated into a pastoral landuse, much like the surrounding hillscape. The addition of the aforementioned further planting areas and the rehabilitation of the disturbed areas of the site will result in long-term* ***entirely positive effects on landcover****."*

73. Ms Crawford agrees with the applicant in principle around visual amenity and rural landscape with recommendations made in Ms Crawfords s42 A report on the proposed conditions which I agree with and recommend the changes if the consent was to be granted.

74. Further, Rural Character is defined in the operative district plan under Objective 14.1.1. as:

a) *the dominant effect of paddocks, trees, natural features, and agricultural, pastoral or horticultural activities;*

b) *separation between dwellinghouses to maintain privacy and a sense of openness;*

c) *a dwellinghouse clustered with ancillary buildings and structures on the same site;*

d) *farm buildings and structures close to lot boundaries including roads;*

e) *generally quiet – but with some significant intermittent and/or seasonal noise from farming activities;*

f) *clean air – but with some significant short term and/or seasonal smells associated with farming activities; and*

g) *limited signage in the Rural Zone.*

75. The proposal is using an existing site that has been disturbed by quarrying and is extending the margin of the quarry activities slightly which as detailed by Ms Crawford will not have significant visual effects on the surrounding environment.

76. Noise from the site will predominantly consist of vehicle movements including the arrival and departure of delivery trucks and the operation of mule vehicles, but also the loading and unloading of vehicles both at the container terminal area and also at the dump face of the landfill.

77. Due to the scale of the site and surrounding area, it is not anticipated that noise will be of such a level as to be a nuisance, but noise is likely to be audible from the surrounding area such that persons will be aware of the operation of the activity. This can lead to impacts on a person's appreciation of the amenity and character of the area.

78. The applicant has provided a noise assessment (Appendix V) and detailed that the operational areas of the quarry and proposed landfill are at least 180 m from the nearest resident. Also, that the proposed haul road access will be approximately 150 – 160 m from the nearest residential dwelling, which again provides a substantial separation distance from a potential vibration source.

79. I concur with the applicant's noise assessment and consider that noise is sufficiently addressed and can be appropriately managed through the proposed hours of operation and number of truck movements.

80. The proposal will have limited signage, with one sign at the site entrance and internal signage for health and safety purposes.

81. I note that, due to the location of suitable rock formations and the nature of the activities, quarries and landfills are usually located in rural areas. Overall, I am of the opinion the proposal is best suited in the Rural Zone, is not out of character and the effects on rural character would be less then minor. In terms of amenity values including visual, noise from operations and traffic, I consider the effect to be minor.

Natural Character

82. The proposed site is directly adjacent to the Karetu River classified as a 'Significant Site to Māori' and adjacent to a Significant Natural Area. Therefore, the surrounding environment, in my opinion, has significant natural character values that need to be protected and enhanced.

83. The Applicant is proposing works within the margins of the Karetu River to construct a bridge, install a bund (which has been undertaken already) and riparian planting. In terms of the SNA, the applicant is proposing fencing and weed control methods within the SNA.

84. The Applicant's Landscape expert has assessed the natural character, and provided the following assessment:

"The current natural character is degraded with many years of quarrying operations altering the form of the hillside and natural concourse of the Karetu River (with the ford and berms). Effects on natural character resulting from the proposed landfilling are considerably diminished with the bulk of the Proposal occurring within the existing quarried space. The proposal includes positive effects such as:

a) The removal of the ford and the inclusion of a bridge structure, which will generate a short duration adverse effect but a permanent positive effect by returning to a natural rivercourse through removing vehicle movements through the waterway as well as removing the need for ongoing maintenance of the ford.
b) Removal of buildings and access tracks.
c) Indigenous riparian planting of the Karetu River, eastern watercourse and onsite wetland areas which will improve the riparian surrounds.
d) Return to a more natural landform, with vegetation (pasture grass) re-established in keeping with surrounding agricultural properties.
e) Fencing for protection and enhancement of the SNA, including increasing the suitability of the area for fauna such as lizards."

85. Ms Crawford has undertaken a **landscape** natural character assessment in her s42A report which in principle Ms Crawford agrees with the applicants assessment that the effects will be positive due the Karetu River being degraded.

86. In summary Ms Crawford has detailed the following:

*"The Application will result in **positive effects** on natural character due to:*

i. Less disturbance to the riverbed due to traffic no longer moving through it.

ii. Additional riparian planting of the Karetu River, eastern watercourse and onsite wetland areas.

iii. *Longterm removal of buildings and access tracks and a return of the land to pastoral grass (removing much of the existing quarry scar). "*

87. Ms. Crawford has provided recommendations including on conditions in Appendix 6 of this report. However, I am of the opinion the key recommendation is that prior to consent being(if) granted is for the applicant to provide a detailed landscape plan and cross sections.

88. I agree with Ms Crawford and the applicant that the rehabilitation of the river margins will be positive and begin to restore the natural character of the Karetu River.

89. However Natural Character involves the landscape features along with the freshwater ecosystems, water quality and Cultural Values.

90. Therefore, taking into account the cultural effects assessments and I defer to CRC technical experts and planning reports for wetlands, freshwater ecosystems and water quality.

91. I am of the opinion the natural character of the riparian margins landscape values is enhanced but other features of natural character are potentially adversely affected with the current form of the proposal.

Effects on Terrestrial Ecology.

92. The Applicant has undertaken an assessment of terrestrial ecology within the AEE and Appendix G being the Ecological Impact Assessment (EcIA).

93. SLR Consulting Ltd and LizardExpertNZ were engaged to review the assessment methodology presented by the applicant and audit the applicant's conclusions in relation to terrestrial effects expected to arise from the proposal. The s42A reports of Dr Mandy Tocher (herpetology) can be found in **Appendix 1** of this report.

94. Hamish Dean,SLR Consulting Ltd has addressed terrestrial ecology, including bats, birds and mammalian pests. The s42A report can be found in **Appendix 2** of this report.

95. Dr Stephen Rate, SLR Consulting Ltd was engaged to review the proposal's effects on vegetation and wetlands. The s42A report can be found in **Appendix 3** of this report.

Herpetofauna

96. The site contains lizards, Canterbury Grass Skink, and Waitaha geckos as detailed by Dr Tocher evidence in **Appendix 1** of this report.

97. In February 2025, the Applicant obtained a DOC permit to salvage and relocate lizards which was provided to the Council alongside the Lizard Management Plan.

98. Dr Mandy Tocher has undertaken a review of the applicants' assessment and lizard management plan which evaluates the effects on indigenous lizard populations and their habitats.

99. Dr Tocher has identified concerns about the lizard survey and effects assessment. In summary:

a) The survey was inadequate as it lacked a permit to handle lizards, leading to misidentification of species.
b) The extent of lizard habitats affected by quarry activities is underestimated.
c) The pre-mitigation effects assessment, which rated the impact as "negligible," is flawed.
d) The applicant referenced a Department of Conservation (DOC) salvage permit in the Application, but no valid permit existed at that time.
e) The DOC permit later issued (107310-FAU) is considered unlawful as it allows incidental harm to lizards, conflicting with recent case law.
f) Avoidance and remediation measures are insufficient.
g) Lizard salvage from 1.9 ha is planned, but the actual affected area may be much larger (~4.5 ha).
h) Proposed pest control and habitat enhancement actions are vague and may not adequately compensate for habitat loss.

100. Submissions raised concerns about the impact on lizards, questioning the effectiveness of the relocation plan and the underestimation of effects.

101. To better understand the effects on lizards, Dr Tocher recommends that the applicant fully identifies affected lizard species and estimated population. The LMP should be revised prior to consent being granted (if granted) to improve clarity on habitat and avoidance strategies, align with best practice principles for lizard salvage and relocation, and assess residual effects and apply compensation following the NSP-IB principles.

102. Further, I agree with Dr Tocher's following statement:

"that managing effects over indigenous lizard habitats are very clearly within the mandate of the RMA (1991) and its planning tools overseen by WDC and ECAN. This is especially so for significant fauna habitats occupied by grass skinks (and perhaps Waitaha gecko) that are addressed in the RMA as a Part II matter (Section 6c), and feature prominently in the NPS-IB."

103. I am of the opinion that requiring a survey and updating a lizard management plan after the consent being granted to address potential effects, is potentially not lawful.

104. This forms part of my opinion that the consent should not be granted until the decision makers are satisfied that all the critical and adverse effects are identified as detailed on the quality planning website[1] which states the following:

"It has become relatively common in these situations to either provide for subsequent management plans or some technical matter to be approved by a council representative after consent has been granted. However, this type of condition is not lawful because it leaves a decision to a subjective discretion.

Instead of requiring management plans conditions must provide clear performance or environmental standards that are to be certified by an appropriately qualified and experienced person as being achieved. This approach is appropriate for both simple and complex applications, with requirements responding to the issues to be addressed

[1] https://www.qualityplanning.org.nz/node/917

varying from being relatively minimal, to stringent and complex for complex developments.

Critical actual or potential adverse effects need to be identified, appropriately avoided, remedied or mitigated with conditions before a decision to grant is made and not left to be addressed via a future management plan. Management plans should be limited to non-critical operational processes that lie behind a performance or operational standard. For example, a certified Noise Management Plan could be used to complement noise limits specified by other conditions."

105. Overall, I am of the opinion there is uncertainty around the effects on lizards. At this stage I am of the opinion the proposal fails to meet RMA requirements for protecting indigenous fauna, and without stronger mitigation and compensation measures, significant residual effects on lizard populations are likely.

Avifauna

106. The applicant provided an assessment and detailed that:

"an existing low ecological value and a resultant negligible magnitude of effect on avifauna, a pre mitigated level of effect on avifauna is assessed as very low. Avifauna utilising the SNA to the north are not expected to experience any disturbance from proposed activities due to the distance from the project site.

Notwithstanding a very low level of effect on avifauna, bird management protocols will be incorporated into the overarching ecology management plan for the project. Protocols will include an Accidental Discovery Protocol (ADP) for all 'Threatened' and 'At Risk' species that could utilise vegetated habitats onsite during development. Example protocols will likely include site walkovers pre vegetation clearance"

107. Mr Hamish Dean's s42A report is attached in Appendix 2 of this report. Mr Dean has reviewed the applicants' sections in the EcIA relating to Avifauna.

108. Mr Dean is of the opinion the assessment of effects on avifauna were understated given that habitat for indigenous bird species is being destroyed and there is potential for nests. The assessment on kārearea (NZ Falcon) may be slightly understated because there is at least potential for a greater level of effect than has been assessed which is further discussed in Appendix 2 of this report.

109. Mr Dean on behalf of Council has undertaken a review of the applicant's assessment of Avifauna and concluded the following:

"I consider that the proposal is likely to have only a Low level of effect on avifauna with two exceptions:

a) Potential adverse effects on kārearea could be of a Moderate level and need to be managed;
b) Potential downstream adverse effects on threatened avifauna in the Okuku and Ashley/Rakahuri rivers resulting from contaminants entering the Karetu river need to be carefully considered."

110. Mr Dean has reviewed the submissions in relation to avifauna and has detailed the following:

"large number of submissions mentioned effects on birds or wildlife in general. These varied in the level of specificity but were generally relating to the following potential or perceived effects on birds:

a. Adverse effects on birds resulting from contaminants entering the environment via dust or discharge of leachate. This included concern about impacts on the bird habitats of the Ashley River downstream of the site;

b. *Disturbance of birds by increased levels of noise from traffic and other activity associated with the site;*

c. *Non-specific effects on flora and fauna from the activity as a whole; and*

d. *An increase in scavenger birds."*

111. Mr Dean has detailed that the only concern is around kārearea and no other bird species and that he is of the opinion that scavenger birds and rodents will not be an issue due to the type of waste.

112. Mr Dean has provided recommendations to ensure the effects on avifauna are mitigated, in particular on kārearea. Mr Dean recommended the following:

a) *"a suitably qualified and experienced ecologist to undertake a search for kārearea nests prior to any expansion of earthworks or vegetation clearance during their peak breeding season (September to March). If nests are found, the area should be avoided, and an appropriate buffer set up until the chicks have fledged.*
b) *The applicant's ecologist should be required to provide a brief report to the consenting authority on the findings of any such nest search and the management measures to be undertaken.*
c) *an advice note on compliance with the Wildlife Act 1953 should also be included.*
d) *Monitoring recommendations made by Ms Tiernan (CRC Expert), including the addition of PFAS/PFOS monitoring as a means of assessing potential risk on downstream avifauna*."

113. Overall, after reviewing Mr Dean's evidence and the Applicant's assessment, I consider the effects on Avifauna will be less than minor, as long as the recommendations by Mr Dean are adopted to ensure the kārearea are protected.

Wetland

114. I note the CRC Planning officer, Ms Nagy has comprehensively assessed effects on wetlands due to the National Environmental Standards for Freshwater being triggered, which is the responsibility of the Regional Council.

115. Therefore, the effects assessment is more suited to be undertaken by Ms Nagy.

Vegetation

116. The applicant has detailed that:

"the earthworks associated with landfill development and track widening is likely to result in the clearance of scattered exotic shrubs and some amenity plantings around the fringes of the existing excavated area equating to approximately 5 ha. Potential bund improvements, designed to manage flood risk associated with the Karetu River may also require the removal of a small number of exotic trees and shrubs."

Due to the minor shift away from the existing baseline condition of the site, the magnitude of effect is however low with changes arising from the loss or alteration of vegetation within the site being discernible. On closure of the landfill, the vegetation cover across the site will be substantially increased and well in excess of the 5-ha removed during the construction phase.

In combination with negligible baseline values, the increase in vegetation cover at project completion, the inclusion of stock fencing around the SNA and proposed enhancement planting around riparian margins with indigenous planting, the resultant effect on vegetation is considered positive with their being a net gain."

117. The site adjoins a Significant Natural Area which is known as the Whiterock Limestone Vegetation and described to contain indigenous grassland, shrubland and indigenous limestone rock outcrop vegetation

118. The Applicant reiterated in the RFI response that the proposal does not seek to undertake works within the SNA. However, as per the application a stock proof fence is proposed to protect the SNA area. In most part, this fence already exists but it is proposed to upgrade the fence to ensure it achieves the objective of stock proofing the SNA.

119. The evidence of Dr Stephen Rate is attached Appendix 3 of this report. Mr Rate has reviewed the applicants' sections in the EcIA relating to vegetation. Dr Rate focuses on potential impacts on terrestrial vegetation and wetlands. The report evaluates the applicant's assessment and mitigation proposals, and recommends further actions.

120. In summary, Dr Rate's evidence has highlighted:

a) *It was noted that the highest ecological values lie within the Significant Natural Area (SNA 039), which will not be directly affected in terms of vegetation.*
b) *The quarry operations will primarily impact exotic vegetation; significant indigenous vegetation is within the SNA.*
c) *The proposed mitigation (redirecting groundwater, planting native vegetation) is uncertain in effectiveness.*
d) *Some mitigation measures are appropriate (e.g., fencing riparian margins, hydroseeding, wetland plantings).*
e) *A Wetland Management Plan (WMP) should be developed to ensure no net loss of wetland function.*
f) *Additional weed control is necessary to manage impacts from fencing the SNA.*

The concerns of the submitter regarding potential adverse effects on terrestrial vegetation has been addressed by the applicant and Dr Rate's evidence in Appendix 3 of this report.

121. Overall, I am of the opinion the effects on terrestrial vegetation can be managed appropriately to ensure the effects are less than minor. I acknowledge that there remain issues around the wetland assessment, but I defer this to Ms Nagy, as she has completed a comprehensive assessment on wetlands.

Geotechnical effects

122. The Applicant provided a geotechnical assessment (Appendix E) and slope stability assessment (Appendix Q) as part of the application.

123. An assessment was undertaken by Tonkin and Taylor reviewing the applicant's AEE and submitter's concerns. The evidence of Mr Clive Anderson is attached in Appendix 4.

124. In summary Mr Anderson has detailed the following:

a) *Movement on the observed small-scale faults within the quarry is unlikely during the life of the landfill. There is no evidence of movement on these faults since the overlying loess soils were deposited following the end of the last ice- age about 12,000 years ago (Ref Appendix E Section 5.1.2). Therefore, a loss of contaminants caused by short fault rupture of any containment structure is unlikely during the life of the landfill.*

b) *The impact of the wedge failure mechanisms on the landfill design was queried during my initial review of the application. The applicant's response states that the wedge failures are "relatively uncommon", of "small volume and do not significantly affect the overall stability of the slopes. The wall liner detail can accommodate any small-scale wedge failures that occur following slope cutting". I observed these potential failure mechanisms during my site visit on 25 June 2024 and based on my geotechnical experience and engineering judgement I concur with the Applicant.*

c) *A further Section 92 question was in regard to the potential for existing landslides to move further and enter the quarry area. The reviewer agrees with the explanation provided by the applicant that this is considered a low risk as the slope between the existing landslide and the quarry is 'considerably flatter'.*

d) *The Applicant's proposed bench heights of 15 m max together with benches of 8m minimum width are endorsed from a stability and safety perspective.*

e) *the proposed landfill design is properly executed in the detailed design and then construction, then there is no geotechnical impediment to developing the proposed landfill. However, this conclusion is totally dependent on the proposed containment system being properly constructed. This is because the local geology and topography would not provide effective long-term containment of fugitive leachate.*

125. Overall, I consider that the risk of failure of the landfill in terms of geotechnical should be considered low but could still lead to a high impact consequence if failure was to occur, which could lead to significant regional effects as identified in Ms Nagy's report.

Effects of transportation

126. The anticipated effects resulting from traffic generation and effects on the network have been considered as part the Transport Assessment lodged in support of the application.

127. The proposed local transportation network consists of Loburn Whiterock Road which is approximately 14.5 km long and links Dixon Road (Arterial Road) with Quarry Road (Collector Road), passing through the villages of Loburn and North Loburn.

128. The application notes that the quarry and landfill operations will result:

"*on average 36 vehicle* movements *per day which equates to approximately 14% of the threshold that the operative district plan anticipates before consideration is given to a high trip generating activity. Based on the annual average daily traffic volumes for Quarry Road, the proposal is expected to result in an overall increase of 24% for vehicle movements on Quarry Road while on Loburn Whiterock Road an increase of 18% is expected"*

The Assessment of Effects prepared by WSP concludes the following: The proposed vehicle movements are also well below the proposed district plan thresholds.

On the basis of the activity generating a small fraction of the district plans high trip generating threshold and the minor increase in expected movements on the surrounding road network, traffic impacts on the network associated with the proposal are assessed as negligible."

129. I do note that the Applicant has undertaken an effects assessment based on the Operative District Plan's permitted activity rule of 250 vehicle movements per day and the Proposed District Plan's high traffic generation threshold for activity within a Rural Zone being:

a) Greater than 200 vehicle movements per day (average).
b) Greater than 50 heavy vehicle movements per day (average).

130. In my opinion, care should be undertaken when using the above numbers for an activity that is a discretionary activity. As I note, roads throughout the district vary in the ability to handle certain volumes of traffic movements and contain specific characteristics in the environment (e.g. schools nearby, high crash rates, traffic speeds, undersized roads) that need to be considered when consent is being sought for a new activity.

131. Mr Aaron Gregory from Tonkin and Taylor has provided evidence on behalf of Council. Mr Gregory s42A report is attached as Appendix 5 of this report.

132. Mr Gregory provides a more detailed analysis, however in summary, the key findings are as follows:

a) *the proposal has the effect of increasing the existing heavy vehicle movements on Quarry Road to 24, a net increase of 18 to 20 truck movements, or 10 trucks in each direction. This represents a 50% increase in average daily heavy vehicle movements on Quarry Road, or an overall increase in average daily traffic (ADT) of approximately 12%. As the total traffic is likely to remain between 150 and 200 vehicles per day, I do not consider this to be a significant change.*

b) *A Section 92 query was raised about the potential impact the proposed activity has on the existing high crash rate on the route to the site. The Applicant's response stated most of the crashes occurred at night and none involved heavy vehicles and concluded that as the proposed activity would generally result in traffic generated in day light that there was no reason to consider that there would be an identifiable increase in crashes resulting from the proposed activity. I agree with the Applicant's assessment of risk.*

c) *Whilst there are minor safety risks associated with this, there are likely to be ongoing maintenance liabilities for Council as continued overrunning will result in edge break on the seal of Quarry Road.*

d) *The sensitivity test carried out referred to in paragraph 30 above, examines the scenario of doubling the landfill volume and I anticipate that an infrequent intensification of daily traffic to 40 truck movements is unlikely to have a significant detrimental effect*

e) *the traffic generation through the proposed activity, being a lime quarry and landfill operation, will not present any significant detriment to the safety and efficiency of the existing transport network if the aforementioned changes to the conditions and mitigating measures are enacted.*

133. Mr Gregory addresses the 243 submissions related to traffic matters within his report. The main concerns raised by the submitters were increase in heavy traffic, increase in safety risk, increase in maintenance liability for the local road network and the routing of vehicles through the rural road networks, in particular past North Loburn School.

134. Mr Gregory is recommending the following*:*

1. Truck movements do not exceed 40 on any one day,
2. A condition should be included with the effect that the entrance to the site will be sealed to a sufficient width for a length of 20m to allow for two-way traffic.
3. Provide a W18-4 "trucks operating" sign in advance of the site entrance.
4. Carry out a baseline assessment of Loburn Whiterock Road and include an appropriate review and repair clause to the satisfaction of the road controlling authority.

135. I agree with Mr Gregory's recommendations, in particular changing the applicant's suggested condition from an average to a maximum of cars per day, as this will provide certainty of the transport effects.

136. Overall, after reviewing the Applicant's AEE, Mr Greogory's evidence and the concerns raised by the submitters, I am of the opinion that the effects on the transport network and user's safety will be less than minor.

Effects on Te Ngai Tūāhuriri Runanga values and use

137. The application details that the proposal lies within the rohe of Te Ngāi Tūāhuriri Rūnanga.

138. Th application site is not mapped as being a Runanga sensitive area, silent file area, statutory acknowledgement area or subject to any other Ngāi Tahu layers.

139. The Karetu River is identified in the Proposed District Plan (SASM028) as an area of significance to Māori as it is a tributary of the Ōkuku River, which is recognised as having mahinga kai environment, habitats and taonga species.

140. The applicant has provided an assessment of the proposal against the Mahaanui Iwi Management Plan 2013 (Mahaanui IMP) and the Ngāi Tahu Freshwater Policy (NTFWP) in section 10.9, and Appendix X of their AEE.

141. Actual and potential adverse effects on cultural values have been assessed in the applicant's application (see section 8.12 of the AEE). In summary, the Applicant states that:

1. *"It is acknowledged that the site, and Karetu River in particular, is an area of significance to Māori due to mahinga kai values, and habitat of taonga species.*
2. *The level of effects on cultural values is therefore stated to be strongly associated with effects on the Karetu River and its water quality, and consequently effects on mahinga kai.*
3. *The applicant references an attempt to engage with Te Ngāi Tūāhuriri Runanga, but in the absence of a response has deferred its assessment to the consents process".*

142. WDC sought advice on the potential effects of the proposed activity on cultural values from Mahaanui Kurataiao Limited.

143. A response was received, dated 23rd April 2024, which provides a position on behalf of Te Ngāi Tūāhuriri Rūnanga following presentation of the proposal to Kaitiaki representatives of the Rūnanga. The response includes an assessment of relevant objectives and policies and an outline of the values that are associated with the project site area.

144. In summary, "*Te Ngāi Tūāhuriri Rūnanga are opposed to the granting of this resource consent and consider themselves to be an adversely affected party due to the proximity of Karetu River, the impact on (and risk to) the cultural landscape, mahinga kai, taonga species and water quality."*

145. The Runanga has provided further comment via a submission. These are addressed in the next section.

Submission

146. Following notification of the proposal, Te Ngāi Tūāhuriri Rūnanga provided a submission outlining the following:

a) *The proposed site is located between both the Ōkūkū and Rakahuri rivers, both of these awa and their surrounding environment are of significant cultural value to Ngai Tūāhuriri.*
b) *This ongoing connection with the Rakahuri River, and its tributaries, continues into the modern day, where the Ngāi Tahu Claims Settlement Act 1998 provides for two customary fishing entitlement areas, being the Taerutu Reserve (schedule 113(b)) and Te Aka Aka Reserve (schedule 113(c)).*

147. Te Ngāi Tūāhuriri Rūnanga request that the application be declined and state that "*the potential for significant long-lasting harm to the cultural heritage and customary food gathering practices has not been avoided, remedied or mitigated.*

The Karetu River is a significant cultural landscape which would be adversely affected. The proposal is inappropriate at the head of the catchment and would diminish the mauri of the waterway.

The Applicant failed to engage with Ngai Tūāhuriri during the site selection process and has therefore failed to abide by industry best practice, represented by the WasteMINZ Guidelines (2023). Ngai Tūāhuriri Runanga were approached following site selection, at which stage the options for meaningful input were reduced to a level that are described as pointless.

Overall, the proposal:

i *poses an unacceptable risk of contaminant discharge;*

ii *has an unacceptable cumulative impact on the lower wetland;*

iii *creates an unacceptable construction phase impact on the river and biota;*

iv *uses an unacceptable assessment of the magnitude of effects;*

v *fails to provide relevant information; and*

vi *suffers from a lack of clarity about the degree of impact from the current unmitigated impacts on the receiving environment."*

Summary

148. Based on the submission by mana whenua, who are the cultural experts, I consider that there is a potential for significant effects on mana whenua from the proposal as currently sought.

149. If consent is to be granted, it is my opinion that conditions around ongoing consultation with mana whenua are strongly recommended alongside management plans that integrate cultural values.

150. Based on the feedback from MKL and the assessment of effects above, I have also undertaken a review of the IMP and commented on the relevant policies. This is set out below in the other matters section of this report.

Fire & Natural Hazards

151. It is understood that landfills can be more vulnerable to the risk of fire. Active on-site management is required to reduce any potential risk. The Applicant has detailed a combination of measures to manage this risk including:

- The lack of putrescible material.
- Permanent presence of large earth moving machinery that can be quickly utilised to address any fire.
- For fires occurring outside of the landfill footprint such as within buildings on the lower terrace of the site, adequate onsite storage and couplings for the delivery of water for firefighting purposes will be available.
- Fire Emergency Management Plan

152. Generally, it is considered that the risk of fire can be controlled through the use of conditions and management plans such that potential effects can be reduced but given the risk associated with fire and the potential impacts if a fire was to occur, careful management of this issue is required

153. With regards to risk from natural hazards, it is considered that the position of the landfill potentially reduces some risks, such as flooding but heightens other risks such as slippage due to a seismic event. This matter, including the design of the landfill, its' containment and structural design are matters that need to be considered in assessing the potential effects of the proposal. I do note that Ms Nagy and the CRC Landfill Engineer have provided a comprehensive assessment of natural hazard effects relating to the landfill design. Therefore, the outcome of their assessment will determine if there are potential effects on the proposal from natural hazards and likewise whether the proposal will exacerbate any natural hazard risks.

Crown Land

154. The proposal includes existing structures, bunds, riparian planting, a bridge, access to the site and other ancillary activities to the quarry and landfill, which are located within Crown Land, being the land adjacent to the Karetu River which is administered by LINZ.

155. I am not aware of any formal agreement between the Crown and the applicant. There is no evidence that the applicant has landowner approval. The applicant considers that land ownership is not an RMA function. However, the encroachment of these ancillary activities associated with the quarry and landfill onto riparian land has the potential to affect the Karetu River.

156. As discussed in this report, the technical expert and CRC planning officer's reports consider there is potential for adverse effects. Consequently, in my opinion, the location of the ancillary activities on Crown Land is relevant in considering the application. Mitigation measures could include moving some of these activities away from the river and rehabilitating the land.

Public Access

157. The proposal includes access to the quarry via Crown Road reserve, from Quarry Road to the Karetu River, and Crown riverbed.

158. The applicant currently has a security fence, gate and camera located on the Crown Road Reserve which restricts access to the site. This also restricts access to the Karetu River. The public are entitled to use the road reserve to access the Karetu River, as I am not aware of the applicant having any formal agreement restricting public use.

159. Further, it is recognised in the applicant's AEE that there are no obvious public access points (paper roads etc) to the Karetu River immediately downstream of the site other than the Loburn Whiterock Road bridge which is 2 km downstream. Public access is available to the Karetu River where its confluence meets the Grey River approximately 6 km from the site, off Loburn Whiterock Road.

160. For access to the site for the landfill operation, the applicant is proposing that a new 23m single span bridge will be constructed across the Karetu River, to replace the existing ford crossing.

161. The current security gate (which is potentially unlawful) will remain in the same location, in the Crown Land and will continue to prevent public access to the Karetu River. It is noted that if public access was available to the river in this location, the intensification of truck movements and cautionary signs about contaminated waste would be likely to deter people from using the access.

162. Therefore, I am of the opinion the proposal creates adverse effects on public access to the Karetu River due to the restrictions in place, and the further intensification of activity on the site.

163. I recommend the applicant either move the security gates to the proposed bridge, or provide a new public access point to the Karetu River in another location that avoids the waste disposal heavy vehicles.

Site Rehabilitation, Liability and Long-Term Management

164. The applicant proposes capping the landfill post-closure to restrict rainfall infiltration into the landfill. The final landform will be revegetated to support final land uses such as light grazing or natural state vegetation as shown in figure 3 of this report.



Figure 3: Applicants proposed remediation – Current (left) and Rehabilitated (right)

165. The rehabilitation of the site will have a significant impact on the scale of effects from the proposed activity. These effects are also relevant in the long-term management of the site, including when the landfill has ceased operation. For example, the liner of the landfill has a specified life, and it needs to be determined whether there is the potential for environmental impacts beyond this period.

166. As part of any long-term management of the site, and ongoing maintenance and rehabilitation, the applicant needs to detail how these issues will be addressed including any questions as to the legal arrangements for the site, how the area will be maintained and monitored after the closure of the landfill and what mechanisms will be in place for long term responsibility of the landfill. These details need to be addressed before it can be determined that any long-term effects from the proposal can be adequately managed.

167. In assessing the potential effects of the proposal, it is recognised that the landfill will be operational for a long period of time and once completed, the landfill site will continue to need to be actively managed. Submitters have expressed concerns regarding the long-term management of the site and also responsibility for the site both during and after the landfill activity has been completed.

168. The applicant has proposed a bond, and a Landfill Closure and Aftercare Plan will be prepared within 5 years of landfilling commencing and updated every 5 years thereafter. This is to detail the activities required for closure of the landfill and during the aftercare period.

169. Key activities required for closure and aftercare include:

- Removal of facilities not required during the landfill aftercare period (Closure): Site office and weigh bridge, lime processing plant, kiln, maintenance workshops and bulk storage sheds

- Removal of any erosion and sediment control and stormwater facilities no longer required.

170. Aftercare activities:

- Maintenance of the landfill access roads remaining post closure

- Ongoing maintenance of the leachate removal and collection system and removal of leachate long term

- Ongoing operation and maintenance of the groundwater drainage system

- Maintenance of the landfill cap, including filling any areas that may have been subject to differential settlement, repair of any surface erosion

- Ongoing environmental monitoring and reporting as required by consents and responding to contingent events.

171. While the Applicant has acknowledged the aftercare requirements, a more detailed consideration of the proposal is required through the resource consent process, and significant measures can be implemented. There does remain a risk that an unforeseen event may occur, and consequently necessary measures need to be put in place to manage this risk.

172. Further, as the landfill is a long-term proposal, further consideration should be in place around ecological values, landscape values, natural character and cultural values within the aftercare and closure plan. In addition, I note Dr Massey from CRC has recommended a longer minimum aftercare period. Whether this is feasible or not, it should be strongly considered if consent is granted, as land use consents are forever attached to the land unless a duration is formally conditioned.

173. On this basis, it is considered that the Applicant needs to provide a comprehensive plan, supported by financial measures, to adequately address any unforeseen events.

Positive effects

174. The Applicant considers there to be some positive effects with respect to terrestrial ecology, landscape values and the wider community, including:

a) A contribution to the longevity of Kate Valley landfill, by diverting inert construction and demolition waste to an alternative deposition site;
b) A reduction of cost for depositors, particularly for contaminated soils, with will provide a roll-on effect and economic benefit to end users;
c) A reduction of roadside and riverbank dumping by providing competitive pricing for deposition of material;
d) Reduction in greenhouse gas emissions due to shorter cartage distances from waste source.

175. Several Submitters were in support of the proposal for the following reasons:

a) **Economic Benefits:** The project is seen as beneficial for the local economy and the construction industry, providing employment opportunities and supporting business growth.
b) **Efficient Waste Management:** Supporters emphasize the need for additional managed fill facilities in the Canterbury region, especially with existing landfills nearing capacity. This project would help manage construction and demolition waste effectively.
c) **Cost-Effective Solution:** The landfill offers a cost-effective option for disposing of waste, reducing illegal dumping and avoiding the overuse of higher-class landfills like Kate Valley.
d) **Reduced Environmental Impact:** By providing a dedicated facility for inert waste, the project minimizes the risk of inappropriate waste disposal, leading to better environmental outcomes.

e) **Support for the Construction Industry:** The landfill supports the ongoing development in the region by providing a reliable disposal option for construction materials.

176. I do agree with the Applicant and Submitters in support that the proposed purpose-built deposition site for soil and inert construction and demolition waste materials, in principle, could provide benefit for the industry. However, careful consideration around site selection is required to ensure the positive effects outweigh the negatives.

Effects Conclusion

177. Overall, the above assessment considers various aspects, including:

a) **Terrestrial Ecology:** The site hosts significant indigenous flora and fauna, including lizards. The lizard management plan was criticized for being insufficient, potentially affecting species like the Canterbury grass skink and Waitaha gecko.
b) **Land Stability:** The geotechnical assessment found the risk of significant land instability to be low. However, potential risks from earthquakes and flooding exist.
c) **Transportation:** Increased heavy vehicle traffic could impact local road safety, especially near North Loburn School. Recommendations include traffic limits and speed restrictions.
d) **Cultural Impact:** Te Ngāi Tūāhuriri Rūnanga strongly opposes the project due to its proximity to the culturally significant Karetu River. Concerns include contamination, loss of mahinga kai (food gathering areas), and diminished cultural values.
e) **Access Impact:** Potential restrictions on access to the Karetu River and risks from increased traffic.

f) **Amenity and Character:** Not out of character for a rural zone and is efficient use of land by using an existing quarry site. However potential loss of amenity relating to cultural and community perception of pleasantness.

g) **Natural Character-** The river margins and landform will be rehabilitated therefore rehabilitating part of the natural character. However, I note that cultural, wetlands, freshwater ecosystems and water quality will be impacted by this proposal which also makes up natural character.

h) **Positive effects:** the proposal will be a purpose-built deposition site for soil and inert construction and demolition waste materials which, in principle, could provide benefit for the industry.

178. Other matters such as water quality, wetlands, landfill design, air quality and human health, I defer to Ms Nagy's S42A officer report as these are matters best addressed by CRC experts and within the jurisdiction of CRC.

179. Overall, I am of the opinion the proposal will have adverse effects that are more than minor on cultural values and terrestrial ecology, in particular on lizards.

Relevant Statutory Provisions (Section 104(1)(b))

180. Section 104(1)(b) requires the decision maker to have regard to the relevant provisions of the following documents:

a A national environmental standard;

b Other regulations;

c A national policy statement;

d A New Zealand coastal policy statement;

e A regional policy statement or proposed regional policy statement;

f A plan or proposed plan.

181. Of relevance to this application are the following documents and provisions:

a National Policy Statement for Indigenous Biodiversity (2023)

b Canterbury Regional Policy Statement

c Operative Waimakariri District Plan

d Proposed Waimakariri District Plan

National Policy Statement for Highly Productive Land

182. The NPS-HPL came into force in October 2022. Clause 3.5(1) requires that regional councils must map the highly productive land in their region, being most Class 1-3 land. Until that work is done, Clause 3.5(7) specifies that highly productive land is all Class 1-3 land as mapped by the NZ Land Resource Inventory (NZLRI). Using the NZLRI, the site is Class 4 land and therefore is not highly productive land. As a result, the NPS-HPL does not apply to the site.

183. **National Policy Statement for Indigenous Biodiversity 2023 (NPS-IB)**

184. The NPS-IB came into force on the 4th August 2023. It is applicable to the management of indigenous biodiversity in the terrestrial environment of Aotearoa New Zealand and prioritises its mauri and intrinsic value. This recognises that the health and wellbeing of people and communities is dependent on the health and wellbeing of indigenous biodiversity and that people have a responsibility to care for it in return.

185. The Canterbury Regional Policy Statement (CRPS) 2013 (revised 2017) made territorial authorities:

"solely responsible for specifying the objectives, policies and methods for the control of the use of land for the maintenance of indigenous biodiversity on all land outside of wetlands, the coastal marine area, and beds of lakes and rivers"

186. While this new national policy direction must be "given effect to" through the future development of regional policy statements, regional plans, and district plans, consent decision-makers must "have regard to" the relevant provisions of the NPS-IB as soon as it took effect on 4 August 2023.

187. This means that, where activities requiring consent under a District Plan/s would have effects on terrestrial indigenous biodiversity, and those effects are within the discretion of consent decision makers, the policy direction of the NPS-IB is relevant to those decisions, needs to be 'weighed' against other matters in Section 104 of the RMA and carries significant weight (as it post-dates the CRPS and all WDC plans).

188. The sole objective of the NPS-IB is:

"*The objective of this National Policy Statement is:*

a. to maintain indigenous biodiversity across Aotearoa New Zealand so that there is at least no overall loss in indigenous biodiversity after the commencement date; and

b. to achieve this:

i. through recognising the mana of tangata whenua as kaitiaki of indigenous biodiversity; and

ii.by recognising people and communities, including landowners, as stewards of indigenous biodiversity; and

iii.by protecting and restoring indigenous biodiversity as necessary to achieve the overall maintenance of indigenous biodiversity; and

iv. while providing for the social, economic, and cultural wellbeing of people and communities now and in the future."

189. This is informed by 17 general policies which provide direction on how this objective is to be met. I have provided an assessment of the policies I consider relevant below:

Assessment of the NPS-IB	
Policy	**Comment**
Policy 1: Indigenous biodiversity is managed in a way that gives effect to the decision-making principles[2] and takes into account the principles of the Treaty of Waitangi.	In my opinion, the proposal does not align with Policy 1 of the NPS-IB, as it does not ensure meaningful consultation, active participation of tangata whenua, or integration of Māori values into decision-making. The concerns raised by Te Ngāi Tūāhuriri Rūnanga further reinforce that the principles of the Treaty of Waitangi have not been adequately considered. If consent was to be granted, I would strongly recommend that the applicant continue to seek participation from Te Ngāi Tūāhuriri Rūnanga.
Policy 2: Tangata whenua exercise kaitiakitanga for indigenous biodiversity in their rohe, including through: ` *a. managing indigenous biodiversity on their land; and* *b. identifying and protecting indigenous species, populations and ecosystems that are taonga; and* *c. actively participating in other decision-making about indigenous biodiversity.*	Although Iwi have participated via a submission, I am of the opinion the proposal is inconsistent with Policy 2 as iwi will have no further opportunity for active participation in decision making about indigenous biodiversity. If the application is granted, I recommend that further consultation is undertaken with iwi to allow for active participation in the management of the Karetu River and the indigenous biodiversity affected by this proposal.

[2] Consistent with this, the decision-making principles that must inform the implementation of this National Policy Statement are as follows: (a) prioritise the mauri, intrinsic value and wellbeing of indigenous biodiversity: (b) take into account the principles of the Treaty of Waitangi (Te Tiriti o Waitangi): (c) recognise the bond between tangata whenua and indigenous biodiversity based on whakapapa relationships: (d) recognise the obligation and responsibility of care that tangata whenua have as kaitiaki of indigenous biodiversity: (e) recognise the role of people and communities (including landowners) as stewards of indigenous biodiversity: (f) enable the application of te ao Māori and mātauranga Māori: (g) form strong and effective partnerships with tangata whenua.

Policy 3: A precautionary approach is adopted when considering adverse effects on indigenous biodiversity.	The precautionary approach requires avoiding adverse effects where possible and fully understanding risks before approving activities. Given the uncertainties in wetland impacts, lizard habitat effects, and long-term contamination risks, I am of the opinion the proposal is inconsistent with this policy.
Policy 8: The importance of maintaining indigenous biodiversity outside SNAs is recognised and provided for.	The proposal acknowledges the importance of indigenous biodiversity outside SNAs through proposed riparian planting but lacks immediate protective measures. While long-term vegetation cover may improve, short-term biodiversity losses are not fully mitigated, meaning the proposal is inconsistent with Policy 8.
Policy 13: Restoration of indigenous biodiversity is promoted and provided for.	The proposal does not meet Policy 13 because it lacks short-term restoration efforts, delays meaningful restoration for decades, and mischaracterizes remediation as restoration. While some long-term restoration is proposed, the uncertainty around implementation and effectiveness raises concerns.
Policy 15: Areas outside SNAs that support specified highly mobile fauna are identified and managed to maintain their populations across their natural range, and information and awareness of highly mobile fauna is improved.	The proposed site contains one highly mobile fauna being the Karearea. As long as the recommendations from Mr Dean are adopted, I am of the opinion the effects would be less then minor on the Karearea. Therefore, the proposal is consistent with this policy to ensure the population are managed and the awareness of the Karearea is improved. In addition to Mr Dean's recommendation of surveying the site for nesting prior to works, I would recommend a survey of the site and surrounding area over time to continue to provide further information and awareness of the Karearea. For completeness, I note lizards are not classed as highly mobile fauna under the NPS-IB.

190. In my opinion, I consider the proposal is inconsistent with the NPS-IB, particularly with the polices related to tangata whenua participation, precautionary biodiversity management, and restoration efforts. While I acknowledge the proposal does include riparian planting, the lack of immediate protections, incomplete assessments, and reliance on future mitigation results in the application being inconsistent with the NPS-IB.

191. Recommendations for alignment with NPS-IB:

a) Engage with tangata whenua to incorporate their role in decision-making and site management.

b) Adopt a stronger precautionary approach by avoiding biodiversity loss rather than relying on mitigation.

c) Ensure immediate protections for biodiversity outside SNAs.

d) Improve monitoring and reporting on highly mobile fauna and wetland restoration efforts.

e) Strengthen indigenous planting plans with clear weed management and survival rate targets.

Canterbury Regional Policy Statement

192. The Canterbury Regional Policy Statement (RPS) became operative on 15 January 2013 and provides an overview of the significant resource management issues facing the Canterbury Region, including issues of resource management and Ngāi Tahu.

193. An assessment of the objectives and policies which are considered relevant to the proposed activity are detailed below:

<table>
<tr><td colspan="2">Assessment of the CRPS</td></tr>
<tr><td colspan="2">Chapter 9 Ecosystems and Biodiversity</td></tr>
<tr><td>Objective 9.2.1:

Halting the decline of Canterbury’s ecosystems and indigenous biodiversity</td><td rowspan="2">In my opinion the proposal does not meet Objective 9.2.1, as it contributes to the decline of indigenous biodiversity in Canterbury through habitat loss and uncertain mitigation and offsetting. Addressing these gaps would require further survey work, stronger precautionary measures, and habitat restoration.</td></tr>
<tr><td>Objective 9.2.3:

Protection of significant indigenous vegetation and habitats.</td></tr>
<tr><td>Objective 9.3.4:

Promote ecological enhancement and restoration To promote the enhancement and restoration of Canterbury’s ecosystems and indigenous biodiversity, in appropriate locations, where this will improve the functioning and long term sustainability of these ecosystems.</td><td>In my opinion, the proposal does not fully align with Objective 9.3.4 because it focuses on mitigation rather than proactive restoration, and its long-term ecological success is uncertain. While riparian planting and habitat restoration are positive steps, delayed implementation and lack of robust management plans reduce the effectiveness of the proposal in promoting ecosystem sustainability.</td></tr>
<tr><td colspan="2">Chapter 11 Natural Hazards</td></tr>
<tr><td>Objective 11.2.1: Avoid new subdivision, use and development of land that increases risks associated with natural hazards.</td><td>As discussed in the applicant’s assessment and above in my report, the proposal will not increase the risk associated with flooding nor exacerbate the flood risk beyond the application site.

The proposed bridge will be designed in accordance with the Engineering Code of Practice and meet the permitted standards of CRC rules around design standards.

Therefore, I consider the proposal to be consistent with the Natural Hazards chapter.</td></tr>
<tr><td>Chapter 12 Landscape</td><td></td></tr>
</table>

Objective 12.2.2 Identification and management of other landscapes The identification and management of other important landscapes that are not outstanding natural landscapes. Other important landscapes may include: 1. natural character 2. amenity 3. historic and cultural heritage	The applicant is proposing riparian planting to rehabilitate the natural character in terms of landscape values. I acknowledge this is a positive. However, I am still of the opinion the proposal is inconsistent with this objective, as the applicant has not sufficiently managed the cultural aspects of the landscape appropriately as per the submission. I note there are also concerns around the potential impacts on wetlands and water quality from the proposal. However, I defer to CRC, as the experts.
Chapter 13 - Heritage	
Objective 13.2.2 Historic cultural and historic heritage landscapes Recognition that cultural and heritage values are often expressed in a landscape setting and to make provision for the protection of such landscapes from inappropriate subdivision, use and development.	In my opinion, the proposal is inconsistent with Objective 13.2.2, as it threatens a cultural heritage landscape, lacks tangata whenua involvement, and does not include strong protection measures. Without clearer recognition of cultural protection and active engagement with mana whenua, the proposal should provide clearer recognition of cultural protection and active management with mana whenua. I recommend if the consent was granted, mana whenua are provided the opportunity to have ongoing input in the project throughout its lifespan.
Objective 13.3.2 Recognise places of cultural heritage significance to Ngāi Tahu To recognise places of historic and cultural heritage significance to Ngāi Tahu and protect their relationship and culture and traditions with these places from the adverse effects of inappropriate subdivision, use and development.	

Summary

194. Overall, I consider the proposal is inconsistent with the CRPS as the proposal creates tension with the objectives and polices relevant to terrestrial ecology, landscape values and Maori values.

<u>Operative Waimakariri District Plan</u>

195. The objectives and policies of the Waimakariri District Plan that I consider relevant are set out in the following table. In reviewing these provisions, I have also considered the applicant's assessment of these matters, and I have stated where I agree with the Applicant's assessment.

Operative Waimakariri District Plan (2005)	
Chapter 2- Maori	
Objective 2.1.1 Effective and appropriate processes and practices that acknowledge the status of tangata whenua as treaty partner and take into account the principles of the Treaty of Waitangi (Te Tiriti o Waitangi).	The applicant has undertaken an assessment of the iwi management plan and assessed cultural values. However, did not consult iwi directly prior to the site being selected. During the consenting process and submission period Tangata Whenua has provided advice on the proposal. As detailed in this report above, Iwi do not support the proposal due to the proximity of the
Policy 2.1.1.1 In identifying tangata whenua, Te Runanga o Ngai Tahu is recognised as the iwi authority and Te Ngai Tuahuriri as manawhenua.	

	Karetu River, the impact on (and risk to) the cultural landscape, mahinga kai, taonga species and water quality." I note that although the proposal over time may be acceptable to western science, but there still will remain the issue of the cultural landscape and spiritual aspects to the water quality and taonga species that may not be recognised. If consent is to be granted, I strongly recommend that ongoing consultation is provided as a requirement in the consent conditions, to ensure iwi have the chance to provide their expertise and input in the management of the landfill over its lifetime, to ensure manawhenua and kaitiakitanga is recognised throughout the life span of the proposed landfill and the closure and after care. I am of the opinion the proposal is contrary to the objectives and policies of the Maori chapter.
Policy 2.1.1.2 Provide for the participation of tangata whenua in the management of the District's natural and physical resources.	
Objective 2.1.2 Recognition and provision for the manawhenua concept and practice of kaitiakitanga in the management of natural and physical resources.	
Policy 2.1.2.1 To have particular regard to manawhenua and spiritual kaitiakitanga in the management of natural and physical resources.	
Objective 2.1.3 Recognition and protection of wahi taonga that is culturally, spiritually and/or physically important to Ngai Tuahuriri.	
Policy 2.1.3.2 Avoid, remedy or mitigate adverse effects on the cultural and traditional values associated with wahi taonga identified in this District Plan.	
Objective 2.1.4 Recognition of the importance of mahinga kai to Ngai Tuahuriri and provision for protection of associated resources and access to them	
Policy 2.1.4.1 Enable the enhancement of mahinga kai and surrounding taonga, consistent with the principles of kaitiakitanga, to provide a sustainable resource that meets the needs of future generations.	
Chapter 3 Water	
Objective 3.3.1 Maintain and enhance the water quality of confined and unconfined groundwater aquifers.	I have reviewed the CRC planning officers report and technical experts on groundwater. I am of the opinion that there remains uncertainty around maintaining groundwater quality in the long term. Therefore, I consider the proposal to be inconsistent with this objective. However, I do defer to CRC assessment as the authority over groundwater.
Policy 3.3.1.1 Avoid or mitigate the adverse effects of the use, development and protection of land on the water quality of confined and unconfined groundwater aquifers.	
Objective 3.4.1 Public access to and along the rivers of the Waimakariri District is maintained or enhanced.	The applicant considers the proposal is not inconsistent with these objectives and policies. I disagree with the Applicant, as there is no public access provided to the Karetu River via the paper road and the applicant has not proposed any other alternative access. As a result, public
Policy 3.4.1.1 Maintain and enhance public access to and along rivers of the District where access does	

not conflict with conservation values, the legal rights of private property owners and public safety.	access is not maintained and the applicant has no lawful right to block access, currently. Overall, I consider the proposal will be inconsistent with this objective and policy.
Chapter 4 - Land and Water Margins	
Objective 4.1.1 Maintain and enhance the life-supporting capacity of the land resource in the District. Policy 4.1.1.1 Promote sustainable land management practices that avoid or mitigate environmental impact such as soil loss, soil structure deterioration, soil nutrient depletion, land contamination, and non-point pollution of waterways. Policy 4.1.1.3 Land use activities should avoid, remedy, or mitigate adverse effects on environments susceptible to degradation such as river and stream margins, aquatic habitats, wetlands, coastal dunes, areas of significant indigenous vegetation and significant habitat of indigenous fauna.	As detailed in the CRC report, the landfill design is adequate in the short term to ensure contaminants being placed in the land are managed appropriately. However, in the long term, questions remain around how the contaminants will be manged without causing adverse effects on the Karetu River. I acknowledge the site is an existing quarry so the soil quality and structure are already compromised, and the proposal is an appropriate use of the land. However as discussed in this report, the effects on cultural values are a significant concern and there remains uncertainty around the management of lizards. Further, non-point source pollution of the waterway may not be able to be avoided or mitigated in the long term as discussed in the CRC reports (which I defer to, for the assessment of aquatic habitats and water quality). The site is surrounded by SNA, Wetlands, and the Karetu River and the proposal does not promote sustainable land management practices. The applicant has not provided significant offsetting or compensation for the proposed activity. The contaminants will be everlasting which have been detailed in Ms Nagy's report and Dr Massey from CRC. For the above reasons, I am of the opinion the proposal is inconsistent with this objective and policies.
Chapter 6 - Indigenous Vegetation Fauna and Habitats	
Objective 6.1.1 Safeguard indigenous biological diversity and ecosystem integrity, and recognise and provide for the protection of significant indigenous vegetation and significant habitats of indigenous fauna.	While some mitigation measures are proposed, the proposal does not provide sufficient certainty that the project will safeguard biodiversity and maintain ecosystem integrity. The disturbance of wetlands, lizard habitats, and native vegetation suggests that the proposal is inconsistent with Objective 6.1.1.

Policy 6.1.1.1 Identify areas of significant indigenous vegetation and significant habitats of indigenous fauna.	Stronger conditions, such as additional conservation commitments, habitat restoration, and stricter monitoring requirements, would be required to align more closely with this objective and policy. The proposed project does not strongly align with Policy 6.1.1.1 in terms of preserving significant indigenous habitats but includes mitigation strategies to compensate for the potential loss of biodiversity. As detailed in Ms Tocher's report, the proposal is lacking in Lizard Management. In addition, as detailed in Mr Rate and Ms Nagy's reports, concerns remain around wetland management. Therefore, I am of the opinion the proposal is inconsistent with this objective and polices.
Policy 6.1.1.4 Avoid or remedy adverse effects of activities on the ecological integrity of areas of significant indigenous vegetation and significant habitats of indigenous fauna including vegetation and habitat sites identified in the District Plan.	
Policy 6.1.1.5 Avoid, remedy or mitigate the adverse effects of activities on the intrinsic values of indigenous ecosystems, including effects on: a. integrity, form, functioning and resilience; and b. indigenous vegetation, habitats and indigenous fauna.	In my opinion, the proposal is inconsistent at this stage with Policy 6.1.1.5, as it does not avoid or adequately remedy ecosystem impacts. While some mitigation is proposed, it is reactive rather than proactive, and biodiversity losses remain likely due to incomplete assessments and uncertain restoration efforts.
Policy 6.1.1.6 Maintain and enhance the ecological integrity of vegetation and habitat sites identified in the District Plan and the attributes which make them significant.	The proposal is inconsistent with Policy 6.1.1.6, as it does not fully protect or enhance significant vegetation and habitat sites. There is insufficient information on lizard habitat impacts, uncertain mitigation outcomes, and a lack of proactive ecological enhancement measures. I do acknowledge the applicant has proposed riparian planting and other mitigation, however further details are required to understand if its just mitigation or its offset to provide positive effects to the environment.
Objective 6.2.1 Maintain, enhance and, where appropriate, restore wetland ecosystems.	After reviewing Mr Rate's evidence, I am of the opinion that there is uncertainty around the effects on the lower wetland from the proposal and that further thought is required around how the wetland will be maintained and the ecological integrity safeguard. Therefore, I am of the opinion the proposal is inconsistent with this objective and policy.
Policy 6.2.1.1 Safeguard the ecological integrity and natural functioning of wetlands.	
Chapter 8 - Natural Hazards	
Objective 8.2.1 The community's desired level of protection from flood events is achieved through an appropriate combination of measures to modify the level of	As discussed in the applicant's assessment and above in my report, the proposal will not increase the risk associated with flooding nor exacerbate the flood risk beyond the application site.

flooding, modify susceptibility to damage and deal with the consequences of floods. Policy 8.2.1.2 In areas identified in the District Plan as having a history of localised flooding, and in areas adjacent to water bodies, give specific consideration to the consequences and probability of flooding at the time of subdivision or land use consent, to avoid or mitigate a flood hazard. Policy 8.2.1.4 Avoid, remedy, or mitigate the adverse effects of activities that impede or redirect the movement of floodwater on a site, and/or exacerbate flood risk.	The proposed bridge will be designed in accordance with the Council's Engineering Code of Practice and will meet the permitted design standards of CRC rules. Therefore, I consider the proposal to be consistent with the Natural Hazards chapter.
Chapter 11- Utilities and Traffic Management	
Policy 11.1.1.5 New developments and activities in relation to their traffic generation characteristics should: a. locate on or establish primary access to an appropriate level of road within the road hierarchy; b. not have vehicular access to an inappropriate level of road in the hierarchy; and c. provide cycleways along arterial, strategic and collector roads where: i. necessary to provide an identified transport or recreation function; and ii. alternative opportunities do not exist within the road hierarchy.	The connection of the proposed activity, including utilisation of the roading network has been highlighted including the need to address impacts on the network. This includes the need to maintain or enhance the community's social, economic and cultural wellbeing, and its health and safety with regards to the network. Mr Gregory has determined that the transport network can accommodate the number of vehicle movements associated with the proposed activity but that specific measures will be required at various points. I consider that, with the recommendations proposed by Mr Gregory, the application is consistent with this policy.
Chapter 12 - Health Safety and Wellbeing	
Objective 12.1.1 Maintain the amenity values and a quality of environment appropriate for different parts of the District which protects the health, safety and wellbeing of present and future generations, and ensure that any potential adverse environmental effects from buildings and structures, signs, glare, noise and hazardous substances are avoided or mitigated. Policy 12.1.1.5	These provisions seek to maintain amenity values and the characteristics that impact the amenity values of an area. This includes the effects of structures, noise and hazardous substances. Recognition needs to be given to the existing amenity of the area which includes an operational quarry and as such the character of the site is different to that of an undeveloped site.

In the Rural Zones maintain the amenity values and quality of the environment by ensuring that the land is not dominated by dwellinghouses.	
Policy 12.1.1.10 Control noise to a level that is not unreasonable, measured against the character and circumstances of the zone. Policy 12.1.1.11 Avoid noise adversely affecting the amenity values and health and safety of people on neighbouring sites or zones.	The Applicant has provided a noise assessment and the proposal will comply with the permitted noise rules of the operative district plan. I am of the opinion noise from the site will not be unreasonable and will not be out of character for the zone. Therefore, I am of the opinion that the proposal is consistent with the objective and policies.
Objective 12.1.3 Protect people, vegetation, animals, and other natural and physical resources, from the adverse effects resulting from the discharge of contaminants to air. Policy 12.1.3.1 Locate and/or design activities, that lead to the discharge of contaminants to air, so that any adverse effects on people, vegetation, animals and/or other natural and physical resources are avoided or mitigated.	I defer to the CRC planning officer in relation to air discharge. I have reviewed CRC technical expert evidence and relying on that assessment, I am of the opinion that the proposal is consistent with this objective.
Chapter 14 - Rural	
Objective 14.1.1 Maintain and enhance both rural production and the rural character of the Rural Zones, which is characterised by: a. the dominant effect of paddocks, trees, natural features, and agricultural, pastoral or horticultural activities; b. separation between dwellinghouses to maintain privacy and a sense of openness; c. a dwellinghouse clustered with ancillary buildings and structures on the same site; d. farm buildings and structures close to lot boundaries including roads; e. generally quiet – but with some significant intermittent and/or seasonal noise from farming activities; f. clean air – but with some significant short term and/or seasonal smells associated with farming activities; and g. limited signage in the Rural Zone.	The applicant has detailed that the existing site comprises a limestone quarry which has existed since circa 1950's and has stated that: *"Upon completion of the landfilling activity the site will be capped and revegetated to be suitable for light livestock grazing (i.e sheep) or for ecological purposes consistent with the adjacent SNA.* *The proposal will enhance both rural production and the rural character of the zone.* *During construction activity / operation, nuisance activities (noise / dust) will not compromise the rural amenity character which has been informed by relevant technical assessments.* *The odour generation risk of the inert waste accepted is negligible and will not be detected off site."* I disagree with the Applicant that the proposal will enhance the rural character, however, I agree that the proposal is consistent with the rural zone character.

Policy 14.1.1.3 Maintain and enhance the environmental qualities such as natural features, air and noise levels, including limited signage and rural retail activities that contribute to the distinctive character of the Rural Zones, consistent with a rural working environment.	I am of the opinion the proposal is inconsistent with this policy due to the potential effects it could have on natural features surrounding the site, including cultural features such as the Karetu River and the terrestrial ecology within and surrounding the site. Therefore, the proposal would not maintain the local environmental qualities.

Summary – Operative District Plan Objectives and Policies

196. Overall, I am of the opinion the proposal is consistent with the zone and traffic objectives and policies. However, there is tension with the objectives and policies relating to ecology, water, land and water margins and significant tension with Māori objective and polices.

197. Therefore, I am of the opinion the proposal is inconsistent with the Waimakariri District Plan 2005.

Proposed Waimakariri District Plan

198. The Proposed Waimakariri District Plan 2021 sets out Objectives and Policies for uses across the District. I have undertaken a review of the objectives and policies of the Proposed Plan. I consider the following Objectives and Policies from the Proposed District Plan are key to my final recommendation and the decision makers decision.

Proposed Waimakariri District Plan (Post Hearing)	
SD - Rautaki ahunga - Strategic Directions	
SD-O1 **Natural environment** Across the District: 1. there is an overall net gain in the quality and quantity of indigenous ecosystems and habitat, and indigenous biodiversity; 2. the natural character of the coastal environment, freshwater bodies and wetlands is preserved or enhanced, or restored where degradation has occurred; 3. outstanding natural features and outstanding natural landscapes are identified and their values recognised and protected; 4. people have access to a network of natural areas for open space and recreation, conservation and education, including within riparian areas, the coastal environment, the western ranges, and within urban environments; and 5. land and water resources are managed through an integrated approach which recognises the importance of ki uta ki tai to Ngāi Tahu and the wider community, and the inter-relationships between	I am of the opinion the proposal is contrary to SD-01 for the following reasons: a) There will potentially be short-term loss of ecosystems, habitat and indigenous biodiversity during construction of the landfill and operation. b) The natural character of freshwater bodies and wetlands will not be preserved, enhanced or restored. c) The land being used is crown land and public access restricts anyone else from using the road reserve to access the Karetu River. d) An integrated approach which recognises the importance of ki uta ki tai to Ngāi Tahu and the wider community, and the inter-relationships between ecosystems, natural processes and with freshwater has not fully occurred.

ecosystems, natural processes and with freshwater.	
SD-O4 **Rural land** Outside of identified residential development areas and the Special Purpose Zone (Kāinga Nohoanga), rural land is managed to ensure that it remains available for productive rural activities by: 1. providing for rural production activities, activities that directly support rural production activities and activities reliant on the natural resources of Rural Zones and limit other activities; and 2. ensuring that within rural areas the establishment and operation of rural production activities are not limited by new incompatible sensitive activities.	I am of the opinion the proposal is consistent with SD-04 as the site has been an established quarry for over 60 years, and the proposal will not remove any active rural production land from use. In addition, the Applicant will, in the long term, restore the site to a rural environment which will be consistent with the rural environment.
SD-O5 **Ngāi Tahu mana whenua/Te Ngāi Tūāhuriri Rūnanga** Te Ngāi Tūāhuriri Rūnanga's role in the management of natural and physical resources is recognised, so that: 1. Ngāi Tūāhuriri's historic and contemporary connections, and cultural and spiritual values, associated with the land, water and other taonga are recognised and provided for; 2. the values of identified sites and areas of significance to Ngāi Tūāhuriri are protected; 3. Ngāi Tūāhuriri can retain, and enhance access to sites of cultural significance; 4. Māori land is able to be occupied and used by Ngāi Tūāhuriri for its intended purposes and to maintain their relationship with their ancestral land; 5. recognised customary rights are protected; 6. Ngāi Tūāhuriri are able to carry out customary activities in accordance with tikanga; and 7. Te Ngāi Tūāhuriri Rūnanga are able to actively participate in decision-making and exercise kaitiakitanga.	In my opinion, the proposal is contrary with the Ngāi Tahu Mana Whenua / Te Ngāi Tūāhuriri Rūnanga objective due to: 1. Lack of support from mana whenua, and not further requirment to cosult which prevents meaningful long term input. 2. Potential harm to cultural landscapes and water bodies, including significant sites for customary fishing and mahinga kai. 3. Failure to adequately protect kaitiakitanga. Ngāi Tūāhuriri strongly opposes the proposal due to its long-term cultural and environmental risks, indicating that the proposal does not meet the objective's intent.
TRAN - Ranga waka - Transport	
TRAN-O4 **Effects of activities on the transport system** Adverse effects on the District's transport system from activities, including reverse sensitivity, are avoided, remedied or mitigated.	I agree with the applicant that the proposal will be consistent with this objective and policies. As detailed above, in the Operative District Plan assessment, the connection of the proposed activity, including utilisation of the roading network has been highlighted including the need to address impacts on the network. This
TRAN-P4 **New activities**	

New activities: 1. locate on or establish primary access to the classification of road within the District Plan road hierarchy best able to accommodate the level and type of traffic generated; 2. provide safe entry and exit for vehicles to and from a site to a road without compromising the safety or efficiency of the road corridor or rail corridor; 3. where a site has two or more road frontages, provide access from the classification of road within the District Plan road hierarchy best able to accommodate the level and type of traffic generated; 4. provide safe and efficient access, including ease of access by service and emergency service vehicles; and 5. provide facilities for safe active transport, including through marked on-road cycle lanes, separated cycle lane, sealed road shoulders with sufficient width to safely accommodate cyclists, off-road formed cycle paths, cycling end-of-journey facilities for staff, shared use path and footpaths.	includes the need to maintain or enhance the community's social, economic and cultural wellbeing, and its health and safety with regards to the network. Mr Gregory has determined that the transport network can accommodate the number of vehicle movements associated with the proposed activity but that specific measures will be required at various points. I consider, with the recommendations adopted by Mr Gregory, that the application is consistent with the objective and policies.
TRAN-P15 **Effects of activities on the transport system** Ensure, to the extent considered reasonably practicable, that other activities do not compromise the safe and efficient operation, maintenance, repair, upgrading or development of the transport system, including through: 1. managing access to the road corridor, and activities and development adjacent to road/rail level crossings, particularly where it is necessary to achieve protection of the safe and efficient functioning of the transport system, including those parts of the transport system that form part of critical infrastructure, strategic infrastructure and regionally significant infrastructure; 2. avoiding, remedying or mitigating adverse reverse sensitivity effects on the transport system; and 3. providing for ease of access for service and emergency service vehicles.	
HS - Matū mōrearea - Hazardous Substances	
HS-O1 **Hazardous substance use, storage and disposal**	I defer to CRC in relation to hazardous substances (e.g. the landfill design leachate ponds).

Hazardous substance use, storage and disposal activities are located, and in the case of flood events, managed, so that: 1. risk to people, property and the environment from any major hazard facility is minimised, including avoiding unacceptable risk to sensitive activities; 2. risk to any sensitive area is minimised; and 3. risk to land and water as a result of flood events is minimised.	
SASM - Ngā whenua tapu o ngā iwi - Sites and Areas of Significance to Māori	
SASM-O1 **Ngā tūtohu whenua** The historic and contemporary cultural significance for Ngāi Tūāhuriri mana whenua, of and their relationship with ancestral lands, water, sites, wāhi tapu, wāhi taonga and coastal environment is recognised and provided for.	The proposal does not align with SASM-P5, as it fails to adequately protect culturally significant waterbodies and Ngāi Tūāhuriri customary uses. The opposition from Ngāi Tūāhuriri, risks to wetland health, and failure to integrate cultural values into design decisions all contribute to a high potential for negative cultural and environmental impacts.
SASM-P5 **Ngā Wai** Recognise the cultural significance of the waterbodies, repo/wetlands and those parts of the coastal environment identified as Ngā Wai, and manage the effects of land uses, and activities on the surface of water, to: 1. protect the health of these waterbodies and associated coastal waters, including by maintaining their natural character where it is high and enabling enhancement where it is degraded, including through the reinstatement of original water courses where practicable; 2. recognise historic and contemporary Ngāi Tūāhuriri customary uses and values associated with these waterbodies and coastal waters and enhance opportunities for customary use and access; 3. ensure any land uses adjoining these sites, or structures and activities on the surface of water do not adversely affect taonga species or Ngāi Tūāhuriri customary uses in these areas; 4. ensure new land uses do not create an additional demand for the discharge of sewage or stormwater directly into Ngā Wai, and where the opportunity arises, reduce the need for existing land uses to discharge untreated wastewater or stormwater into these areas; 5. protect the health, natural functions and processes of riparian margins and the coastal environment from the adverse effects of adjoining land use activities; and 6. provide for opportunities for the recognition of cultural values within the design, location and installation of infrastructure, while enabling their safe, secure and efficient installation.	

ECO - Pūnaha hauropi me te rerenga rauropi taketake - Ecosystems and indigenous biodiversity	
ECO-O1 **Ecosystems and indigenous biodiversity** Overall, there is an increase in indigenous biodiversity throughout the District, comprising: 1. protected and restored SNAs; and other areas of indigenous vegetation and habitat of indigenous fauna that are maintained or enhanced.	The project does not fully align with ECO-O1 due to its initial biodiversity loss and uncertainty regarding mitigation effectiveness. While long-term restoration efforts are proposed, they do not offset the immediate ecological damage, meaning there is no immediate net gain in indigenous biodiversity.
ECO-P4 Maintenance and enhancement of other indigenous vegetation and habitats Maintain and enhance indigenous vegetation and habitats of indigenous fauna that do not meet the significance criteria in ECO-APP1 by: 1. continuing to assess the current state of indigenous biodiversity across the District; 2. restricting indigenous vegetation clearance or modification of habitat of indigenous fauna, by recognising that indigenous vegetation within: a. the Lower Plains Ecological District and High Plains Ecological District has been widely destroyed, fragmented and degraded by land use and pests and therefore clearance of any remaining indigenous vegetation needs to be restricted in order to protect what remains; and b. the Oxford Ecological District, Torlesse Ecological District and Ashley Ecological District, has a larger proportion of indigenous vegetation remaining and therefore some clearance of indigenous vegetation may be acceptable; 3. recognising that the District contains species that are threatened, at risk, or reach their national or regional distribution limits in the District, and naturally uncommon ecosystems, and limiting their clearance; 4. providing information, advice and advocacy to the landowner and occupier; 5. supporting and promoting the use of covenants, reserves, management plans and community initiatives; and 6. working with and supporting landowners the Regional Council, the Crown, the QEII National Trust, NZ Landcare Trust and advocacy groups.	The project partially aligns with ECO-P4, as it includes vegetation restoration and habitat protection measures, but it still results in significant short-term habitat loss. Stronger commitments to ecological partnerships and stricter vegetation clearance controls would improve alignment with the policy.
ECO-P5 Offsetting residual effects A biodiversity offset will only be considered where there are residual adverse effects which cannot practicably be avoided, remedied or mitigated (in that order of hierarchy); and: 1. the biodiversity offset is consistent with ECO-APP2; 2. the biodiversity offset will recognise the limits to offsets due to irreplaceable and vulnerable biodiversity (including effects that must be avoided in accordance with ECO-P7 (1));	The proposal does not align with ECO-P5, as it fails to demonstrate that offsets will provide a true net gain in biodiversity.

3. there is a strong likelihood that the offsets will be achieved in perpetuity; and 4. the biodiversity offset will achieve a net gain of indigenous biodiversity if the area contains any of the following: a. indigenous vegetation in land environments where less than 20% of the original indigenous vegetation cover remains; b. areas of indigenous vegetation associated with sand dunes and wetlands; c. areas of indigenous vegetation located in 'originally rare' terrestrial ecosystem types not covered under (a) and (b) above; or habitats of threatened, and at risk, indigenous species.	
NATC - Āhuatanga o te awa - Natural Character of Freshwater Bodies	
NATC-O1 **Preservation of natural character** The preservation of the natural character of the surface freshwater environment, its wetlands, and lakes and rivers and their margins. **NATC-O2** **Restoration of natural character** Restoration of the natural character of surface freshwater bodies and their margins where degradation has occurred. **NATC-O3** **Use of freshwater body margins** The use of wetlands, and lakes and rivers and their margins are managed to preserve their natural character.	As detailed in Ms Crawford's report, the Karetu River margins are degraded currently. The applicant is proposing riparian planting along the river margins. This will contribute to restoring the natural character of the river, however further plans are required to understand the extent of the restoration of the Karetu River margins. The proposal seeks to restore the physical aspect of the river margins. However, the objectives also discuss the full surface freshwater environment. This also includes mahinga kai, water quality, and other cultural values the river has to Iwi. Therefore, I defer to CRC in relation to water quality and wetlands, where I understand there remain concerns. Iwi have raised significant concerns around cultural landscape and the freshwater impact for the proposal Overall, I am of the opinion the proposal is inconsistent with the natural character objectives.
NATC-P1 **Recognising natural character** Recognise the following natural elements, patterns, processes and experiential qualities which contribute to the natural character values of freshwater bodies: 1. freshwater bodies and their margins in their natural state or close to their natural state;	The proposal does not meet NATC-P1 because it: a) Impacts indigenous biodiversity and wetland ecosystems. b) Does not adequately incorporate Ngāi Tūāhuriri cultural values.

2. freshwater landforms and landscapes, biophysical, geologic and morphological aspects; 3. hydrological and fluvial processes, including erosion and sedimentation; 4. indigenous biodiversity, habitats and ecosystems; 5. water flow and levels, colour and clarity, and water quality; 6. the cultural values of the water body to Ngāi Tūāhuriri, including values associated with traditional and contemporary uses and continuing ability of the freshwater body to support taonga species and mahinga kai activities; and 7. the experience of the above elements, patterns and processes.	c) Concerns have been raised from CRC experts around water quality. To improve alignment, the proposal must include stronger commitments to restoring freshwater habitats and enhancing cultural values.
NATC-P3 **Customary harvesting and Ngāi Tūāhuriri values within the freshwater body and their margins** Recognise the cultural significance of wetlands, lakes and rivers and their margins, to mana whenua, and manage the effects of land use activities through limiting the size, visual appearance, and location, to ensure they do not adversely affect taonga species, mahinga kai or customary harvesting, access, and other cultural values.	The proposal is inconsistent with this policy as it does not recognise and protect Ngāi Tūāhuriri customary values as detailed in their submission.
NATC-P5 **Structures within surface freshwater body setbacks** Enable activities that have a functional need or operational need to be located within the freshwater body setbacks, provided that adverse effects on natural character values are avoided, remedied or mitigated.	I am of the opinion the bridge has a functional to be in the proposed location, for safe access to the site during rainfall events and to stop vehicles driving through the river. I agree with the Applicant that the bridge provides positive outcomes. Ms Crawford has also detailed that the natural character of the Karetu River would be enhanced with the bridge being constructed. Therefore, I consider the proposed bridge is consistent with this policy.
NATC-P6 **New and existing structures within and over freshwater bodies** Provide for new structures, and upgrades to existing structures, on the surface of freshwater where: 1. public access to, and along, the freshwater body is maintained; 2. the structure has a functional need or operational need to be located on the surface of freshwater; 3. the structure does not compromise the use of the surface of freshwater for existing users; 4. the structure does not disturb the habitat of indigenous species or hinder passage of migratory fish species; 5. the structure avoids creating new, or exacerbating existing natural hazards, or river or stream bank erosion; and	The single span bridge will be designed appropriately, will replace the existing ford crossing, and provide more secure and safer access for vehicles and persons, especially at times of higher flood flows. However, the bridge and security fencing will restrict public access to the river. In terms of cultural values, works will be undertaken in the river margins impacting the Karetu River. Therefore, I consider that the proposal is inconsistent with this policy. I recommend the security gate is relocated to the landfill side of the

6. any adverse effects to the natural character and cultural values, associated with freshwater bodies are avoided, remedied or mitigated in order to preserve those values.	bridge to enable public access to the river, or that alternative access is provided.
PA - Tomonga mārea - Public Access	
PA-O1 **Provision of public access** Public access to and along the CMA, water bodies, and to reserves with high recreational, scenic or amenity values is provided for, maintained and enhanced, where this does not create adverse effects to natural character, landscape, indigenous biodiversity, cultural or recreational values, health and safety, or the rights of private property owners.	The proposal does not align with PA-O1 and PA-P1, as it restricts public access to the Karetu River and does not provide for the maintenance or enhancement of access. This creates negative effects on recreational users and Ngāi Tūāhuriri cultural access. Therefore, I am of the opinion the proposal is inconsistent with Public Access objective and polices.
PA-P1 **Maintaining and enhancing public access** Maintain and enhance existing public access to and along the CMA, surface freshwater bodies, and reserves by managing the adverse effects of activities and development, where these would limit public access, or compromise the use or enjoyment of these areas.	
EW - Ketuketu whenua - Earthworks	
EW-O1 **Earthworks** Earthworks are undertaken in a way that minimises adverse effects on amenity values, cultural values, property, infrastructure and the health and safety of people and the environment.	The project partially aligns with EW-O1 and P1 as I acknowledge the visual amenity, noise, vibration and natural hazards effects will be mitigated and/or avoided. However, the proposal does not adequately minimise risks to cultural values, and ecological health. Stronger commitments to erosion control, sediment retention, and cultural engagement are needed to meet the objective and policy.
EW-P1 Enabling earthworks Enable earthworks where they: 1. are compatible with the character, values and qualities of the location and surrounding environment; 2. avoid, remedy or mitigate any adverse effects on any sites or areas identified as ONL, ONF, SAL, Coastal Environment Overlay, SNA, sites and areas of significance to Māori, Natural Open Space Zone, surface freshwater bodies and their margins, or any notable tree, historic heritage or heritage setting; 3. minimise erosion and avoid adverse effects from stormwater or sediment discharge from the site; 4. avoid increasing the risk to people or property from natural hazards; 5. maintain the stability of land including adjoining land, infrastructure, buildings and structures; 6. minimise the modification or disturbance of land, including any associated retaining structures, on the visual amenity values of the surrounding area; and 7. minimise adverse dust, vibration and visual effects beyond the site.	

EW-P5 **Rehabilitation** Require site rehabilitation during or immediately following the completion of earthworks activity to: 1. minimise adverse effects on amenity values, natural values, cultural values, quality of the surrounding environment and the future use of the site, and 2. encourage rehabilitation that incorporates ecological enhancement and habitat for indigenous fauna and the use of locally sourced indigenous vegetation.	The project partially meets EW-P5, as it includes rehabilitation efforts but lacks certainty on immediate ecological restoration and long-term success. To be consistent, the plan should: • Ensure rehabilitation starts immediately after earthworks. • Strengthen long-term maintenance of restored habitats. • Provide specific monitoring and success criteria to track ecological recovery. • Provide for cultural values.
EW-P6 **Water resources** Avoid adverse effects of earthworks on ground and surface water bodies that could result in water contamination and adverse effects on mahinga kai.	In my opinion the proposal is currently inconsistent with EW-P6, as it does not adequately address long-term risks of water contamination and potential adverse effects on mahinga kai.
NOISE - Te orooro	
NOISE-O1 **Adverse noise effects** Noise does not adversely affect human health, communities, natural values and the anticipated amenity values of the receiving environment.	After undertaking a review of the site and the applicant's noise assessment, I consider noise will be appropriately managed. Therefore, I consider the proposal is consistent with this objective.
RURZ - General Objectives and Policies for all Rural Zones	
RURZ–O1 Rural Environment An environment with a predominant land use character comprising primary production activities and natural environment values, where rural openness dominates over built form, while recognising: 1. the east of the District has a predominant character of small rural sites with a pattern of built form of residential units and structures at more regular intervals at a low density compared to urban environments; and 2. the remainder of the District, while having a range in the size of rural sites, has a predominant character of larger rural sites with a corresponding density of residential units and built form.	The predominant land use character of the rural environment will be retained. The built form will not change significantly with the final product resulting in remediation of the site to its likely former rural character. The proposed activities have a functional need to be located within a rural zone. Noise, odour and traffic will be managed appropriately and there will be no density issues related to the proposal. Therefore, I agree with the applicant that the proposal is consistent with the objective and policies for the rural zone.
RURZ–O2 **Activities in Rural Zones** Rural Zones support primary production activities, activities which directly support primary production, and activities with a functional need to be located within Rural Zones.	
RURZ–P1	

Amenity values and character Recognise the contribution of amenity values to maintaining the character of the zones, and maintain amenity values in Rural Zones by: 1. requiring separation between buildings on adjoining properties to maintain privacy and a sense of openness; 2. retaining generally low levels of signs, noise, traffic, odour, outdoor lighting, and built form from activities while recognising that in association with primary production and rural industry, which are part of the character of each rural zone that: a. there may be seasonal, short term or intermittent odour, noise, dust, traffic and outdoor lighting effects; and b. large buildings may have a functional need. 3. restricting the density of residential units and minor residential units that can be established on a site consistent with the character of each rural zone, unless a development right has been protected through a legacy provision or is associated with a bonus allotment.	
RURZ–P2 Rural land Maintain the availability and life supporting capacity of land in recognition of its importance for undertaking primary production, and to maintain or enhance natural environment values in Rural Zones, including by: 1. providing for primary production activities; 2. providing for those activities that directly support primary production, or those activities with a functional need to be located within Rural Zones, where: a. adverse effects on soil and highly productive land are minimised; b. the amenity values and character of Rural Zones are maintained; and c. to the extent practicable, adverse effects are internalised within the site where an activity is being undertaken. 3. ensuring subdivision and subsequent development is managed so that it does not foreclose the ability for rural land to be utilised for primary production activities including not diminishing the potential for rural land to meet the reasonably foreseeable needs of future generations.	
RURZ–P6 **Industrial activity** In relation to industrial activity: 1. provide for rural industry where the scale of the activity is compatible with the character and amenity values of the rural zone; 2. limit the establishment of industrial activity (other than rural industry) to circumstances where:	The applicant has detailed: *'The locating of the proposal within an industrial zoning is not considered reasonable with a rural location being most appropriate.*

a. there is no reasonable and available site for the activity within any Industrial Zones; b. amenity values and character of the Rural Zones can be maintained; c. the scale of the industrial activity is such that it will not affect the availability of highly productive land within the zone to be used for primary production, to the extent that the productive potential of rural land to meet the reasonably foreseeable needs to future generations is undermined; and d. the nature, scale and degree of permanent changes that will occur on the land and soil resources on the site where the activity is located is minimised. 3. ensure that any rural industry or other industrial activity does not limit or constrain the operation of any existing primary production activity in the zone, and does not have adverse effects on any sensitive activity; 4. provide for existing large-scale industrial activities outside of urban environments where these are well established and have been in continuous industrial use, in order to recognise their existing environmental effects; and 5. to the extent practicable, manage adverse effects of rural industry or other industrial activity so that they are internalised within the site and any adverse effects not internalised are minimised.	*It is considered that the proposal will maintain the amenity values and character of the surrounding rural receiving environment. Positive effects will occur at the conclusion of the activity being derived from the return of the current quarry use to a more natural form more consistent with surrounding land.* *The location is not assessed as highly productive land with the site comprising an open quarry landscape which has existed for circa 60 years'.* I agree with the Applicant's assessment that the proposal is consistent with this policy.
RURZ–P8 **Reverse sensitivity** Minimise the potential for reverse sensitivity effects by: 1. avoiding the establishment of any new sensitive activity near existing intensive indoor primary production activities, intensive outdoor primary production activities, waste management facilities, quarrying activities, mining activities, and rural industry in circumstances where the new sensitive activity may compromise the operation of the existing activities; 2. managing the establishment of new sensitive activities near other primary production activities; 3. ensuring adequate separation distances between existing sensitive activities and new intensive indoor primary production activities, intensive outdoor primary production activities, quarrying activities, mining and rural industry; and avoiding quarry, landfill, cleanfill area, mining activities adjacent to urban environments where the amenity values of urban environments would be diminished.	The applicant has detailed adequate separation distances are afforded to the activity at the site, to ensure effects are minimised on sensitive activities in the surrounding area. Technical assessments have informed nuisance related effects including noise. I agree with the applicant's assessment and consider the proposal to be consistent with this policy.
GRUZ-O1 **Purpose of the General Rural Zone** Natural and physical resources and primary production activities which contribute to the District's rural	The provisions recognise and provide for activities which contribute to the district's rural productive economy while also maintaining the character of the zone.

productive economy dominate while fragmentation of land into small rural parcels is restricted. **GRUZ–P1** **Character of the General Rural Zone** Maintain the character in the General Rural Zone which comprises: 1. primary production being the predominant land use; 2. a dominance of open space and vegetation, including paddocks, trees, agriculture and natural elements over buildings; 3. a landscape strongly influenced by patterns and processes of human activity associated with primary production, with a focus of open farmland areas and larger scale primary production activities, along with areas with natural environment values and sites and areas of significance to Māori; 4. separation between residential units and farm buildings on adjoining sites, with an overall low density of residential units and buildings; and 5. contrasts with urban environments through having a general absence of the type and scale of infrastructure and built form found in urban environments.	In this instance, the activity will establish within an existing quarry, there will be no loss of productive land and the character of the site will be maintained including a landscape influenced by patterns and processes of human activity, but it is recognised that the site will not be dominated by vegetation, trees and natural elements. For the above reasons, it is considered that the proposal is not inconsistent with the above provisions, but neither is it supported by the provisions.

Summary – Proposed District Plan Objectives and Policies

199. Overall, the proposal is consistent with the zone and traffic objectives and policies however there is tension with the ecology, water, land and water margins and significant tension with Māori objective and polices. Therefore, I am of the opinion the proposal is inconsistent with the Proposed Waimakariri District Plan 2021.

Weighting Assessment

200. In my view, there is no tension between the objectives and policies of the Proposed and Operative District Plans. The two plans have clear objectives and policies that the proposal is inconsistent with, being Māori values, ecology, water, access to Karetu River, and land and water margins.

PART 2 OF THE RESOURCE MANAGEMENT ACT 1991

201. Following the guidance of *RJ Davidson Family Trust v Marlborough District Council* [2018] I must consider whether it is necessary to resort to Part 2 in order to determine this application. The Court of Appeal has clarified how to approach the assessment of "subject to Part 2" in section 104(1). In R J Davidson, the Court of Appeal found that (in summary):

a) Decision makers must consider Part 2 when making decisions on resource consent applications, where it is appropriate to do so. The extent to which Part 2 of the RMA should be referred to depends on the nature and content of the planning documents being considered.

b) Where the relevant planning documents have been prepared having regard to Part 2 of the RMA, and with a coherent set of policies designed to achieve clear

environmental outcomes, consideration of Part 2 is not ultimately required. In this situation, the policies of these planning documents should be implemented by the consent authority. The consideration of Part 2 "would not add anything to the evaluative exercise" as "genuine consideration and application of relevant plan considerations may leave little room for Part 2 to influence the outcome". However, the consideration of Part 2 is not prevented, but Part 2 cannot be used to subvert a clearly relevant restriction or directive policy in a planning document.

c) Where it is unclear from the planning documents whether consent should be granted or refused, and the consent authority has to exercise a judgment, Part 2 should be considered.

d) If it appears that the relevant planning documents have not been prepared in a manner that reflects the provisions of Part 2, the consent authority is required to consider Part 2.

202. Although the CRPS, ODP and PDP have all been prepared having regard to Part 2, both the CRPS and ODP are under review and nearly at the stage of being replaced, and the PDP is still subject to submissions. In addition to the age of the plans, higher order documents such as the National Policy Statement for Freshwater Management (covered by CRC) and the NPS-IB have come into place after these documents were drafted. For the above reasons and due to the scale and significance of the proposal, I am of the opinion that Part 2 will provide further guidance for the decision makers to either grant or decline the consent, and I provide an assessment below.

203. The purpose of the Resource Management Act 1991 is to promote the sustainable management of natural and physical resources. This includes safeguarding of the life supporting capacity of soil. To achieve the most relevant parts of Part 2 of the Act, this application must demonstrate that the proposal will not detrimentally affect the existing and future community or impose on the finite nature of resources.

204. Part 2 of the RMA sets out the purpose (Section 5) and principles (Sections 6 – 8) of the RMA, which are discussed below.

205. Section 6 of the RMA identifies a number of matters of national importance which shall be recognised and provided for to achieve the purpose of the RMA. Of these, I consider the following of relevance:

(a) the preservation of the natural character of wetlands, lakes, rivers and their margins and the protection of them from inappropriate subdivison, use and development

(c)The protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna:

(d) the maintenance and enhancement of public access to and along the coastal marine area, lakes, and rivers:

(e) The relationship of Maori and their culture and traditions with their ancestral lands, water, sites, wahi tapu, and other taonga:

206. I consider that the proposal would not achieve matters (a) (c) (d) and (e) of Section 6 of the RMA, as the proposal may have adverse effects on the receiving environment and the mauri of the water. In addition, I have considered the submission of Te Ngāi

Tūāhuriri Rūnanga, which is in strong opposition and outlines concerns on how the proposal will affect the cultural values of the area.

207. Section 7 "Other Matters" of the RMA states: "In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall have particular regard to—"

The "Other Matters" considered potentially relevant to this proposal are:

(a) kaitiakitanga:
(b) the efficient use and development of natural and physical resources
(f) Maintenance and enhancement of the quality of the environment.

208. In relation to (b) and af) it is debatable whether the amenity values are being maintained and enhanced alongside the quality of the environment. As discussed, there remain significant cultural concerns alongside other attributes relating to terrestrial ecology and effects as discussed in Ms Nagy's report, that does not show the proposal achieves (a) and (f) of section 7 of the RMA.

209. In relation to (b) the applicant is proposing to use a quarry that is at the end of its life as a landfill, therefore it is an efficient use of the resource. However, there are questions marks around the site selection, being close to the Karetu River, Wetlands and a SNA which detract from the positives of rehabilitation of an old quarry site.

210. Section 8 of the RMA states: "In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall take into account the principles of the Treaty of Waitangi (Te Tiriti o Waitangi)." While the site does not contain an identified site of significance, it has been identified that there will potentially be cultural effects, and therefore the proposal does not achieve the purpose of Section 8.

211. In conclusion, having considered the actual and potential adverse effects of the proposal and its relationship with plan provisions, I consider there is tension between the proposal and the purpose and principles of the RMA and whether the proposal is in fact achieving the purpose of the Act as set out in Part 2.

OTHER MATTERS

212. Section 104(1)(c) allows the Consent Authority to consider other matters it considers relevant and reasonably necessary. In this instance it is considered that the Mahaanui Iwi Management Plan and the WasteMINZ Guidelines are relevant documents that should be considered.

Mahaanui Iwi Management Plan

213. This Iwi Management Plan (IMP) is a manawhenua planning document reflecting the collective efforts of six Papatipu Rūnanga that represent the hapū who hold manawhenua rights over lands and waters within the takiwā from the Hurunui River to the Hakatere River and inland to Kā Tiritiri o Te Moana. The plan provides a values based, plain language policy framework for the protection and enhancement of Ngāi Tahu values, and for achieving outcomes that provide for the relationship of Ngāi Tahu with natural resources across Ngā Pākihi Whakatekateka o Waitaha and Te Pātaka o Rākaihautū. The plan has the mandate of the six Papatipu Rūnanga, and is endorsed

by Te Rūnanga o Ngāi Tahu, as the iwi authority. As such, it is applicable to policy and planning processes under the Resource Management Act (RMA) 1991.

214. Provisions within the plan include:

- To protect the mauri of air from adverse effects associated with discharge to air activities (Policy R1.1).

- To require the improvement of water quality as a matter of regional and immediate importance and to require that water quality in the takiwā is of a standard that protects and provides for the relationship of Ngāi Tahu to freshwater (Policies WM6.1 and WM 6.2).

- To require that local authorities recognise that there are particular cultural (tikanga) issues associated with the disposal and management of waste (Policy P7.1), to actively work with local government to ensure that waste management practices protect cultural values such as mahinga kai and wāhi tapu and are consistent with Ngāi Tahu tikanga (Policy P7.2) and to require waste minimisation as a basic principle of, and approach to, waste management (Policy P7.3).

- Ngāi Tahu whānui, both current and future generations, must be able to access, use and protect mahinga kai resources, as guaranteed by Te Tiriti o Waitangi Policy TM1.1).

- To require that local and central government recognise and provide for the ability of tāngata whenua to identify particular landscapes as significant cultural landscapes (Policy CL1.1), and to require that local and central government give effect to cultural landscapes in policy, planning and decision making processes (Policy CL1.2).

215. There are also policies that are specific to the Waimakariri District which include:

- To recognise and provide for the groundwater resource beneath the Waimakariri Rakahuri Plains as a wāhi taonga resource (Policy WAI3.1), to require that water management in the catchment recognises and provides for the relationship between groundwater and surface water as a matter of priority (Policy WAI3.2) and to protect groundwater resources in the Waimakariri catchment from effects as a result of inappropriate or unsustainable land use and discharge to land activities (Policy WAI3.3).

216. In consideration of the above, it is again recognised that a number of the provisions identified above should be considered and addressed by Environment Canterbury, particularly regarding the potential effects of the proposal on water quality and the impacts of this for mahinga kai.

217. It is noted that a submission received also identifies the site as being within a cultural landscape. In reference to this, I have not been able to identify specific documentation within the management plan which identifies the site as being within a cultural landscape, but I note the following statement at page 220 of the management plan:

> *"The whole of the Waimakariri catchment can be identified as a cultural landscape. Ngāi Tahu land use and occupancy extended from the mountains to the sea (and beyond) in this catchment. The traditional place names and other cultural*

landscape features associated with the lower Waimakariri catchment are evidence of the extensive use of the area.

All along the river are kainga nohoanga, mahinga kai areas and wāhi tapu such as urupā.

However, within this larger landscape of land use and occupancy particular areas are identified as cultural landscapes with significant historical, traditional, cultural and contemporary associations. The ability to designate particular areas as cultural landscapes enables tāngata whenua to provide for the physical and cultural connections and connectivity between particular places, sites and resources, rather than "dots on maps" (see Section 5.4 Issue CL1)."

218. Ngāi Tūāhuriri Rūnanga clearly outline the significance of the environment stating the following:

"The Karetu River (which flows from Mount Karetu, to the Ōkūkū River and then to the Rakahuri River), as described above, is of cultural importance to Ngāi Tūāhuriri. Water in the Ngāi Tūāhuriri takiwā is bound to Ngāi Tūāhuriri through whakapapa, and a determinant of the welfare and mana of Ngāi Tūāhuriri. The concept of kaitiakitanga carries an obligation to protect the mauri of a resource. Ngāi Tūāhuriri is concerned that the proposed location next to a culturally significant waterway further diminishes the mauri and mana of that water and its interconnected ecosystem. Further, the Karetu River would be adversely affected should the landfill liner and/or the leachate pond fail. The proposal does not consider the cultural landscape. It is highly industrial in both nature and effects, and is consequently inappropriate at the head of a catchment adjacent to areas of high natural character, landscape values and wetlands."

219. Overall, I consider on the basis of the submission provided that there are adverse cultural effects, in particular related to the relationship of Te Ngāi Tūāhuriri Rūnanga to their ancestral lands, freshwater resources and taonga.

220. Therefore, the proposal is contrary to the Maahanui Iwi Management Plan

WasteMINZ Guideline Site Selection

221. WasteMINZ, New Zealand's leading organisation in waste management and resource recovery, has developed a series of guidelines to promote best practices across the industry. These guidelines serve as valuable resources for waste industry professionals, producers, consumers, and advertisers, ensuring environmental sustainability and public health.

222. The WasteMINZ guidelines have guidelines around landfill site selection, which highlights the following:

a) Geological & Hydrogeological Suitability: Sites should be located in areas with low permeability soils and natural barriers to prevent leachate contamination.
b) Distance from Water Sources: Avoid locations near groundwater recharge zones, rivers, lakes, or wetlands to prevent pollution.
c) Land Use Compatibility: Sites should be far from residential areas, culturally sensitive sites, and high-value agricultural land.
d) Accessibility & Infrastructure: The site must have suitable road access for waste transport and emergency response.
e) Environmental Impact: Consideration of air quality, noise, and ecological impact when selecting a site.

223. I have turned my mind to the site selection guidelines due to submissions raising concerns over the process, and also the effects that have been discussed above in my report and the technical expert's s42A reports.

224. I conclude that the proposal is inconsistent with the WasteMinz guidelines site selection process for the following reasons:

a) The Karetu River is directly adjacent to the proposed site therefore the proposal does not avoid water sources.
b) The site is within close proximity to a Significant Natural Area and no significant protection and enhancement has been proposed to the SNA.
c) Cultural advice was not sought until after the site was chosen. I concur with the Iwi that this not best practice and that the applicant should have sought cultural advice through the site selection process to be consistent with the WasteMINZ guidelines.

Summary of Statutory Assessment

225. This report has assessed the proposal to continue to operate a quarry and to establish and operate a landfill.

226. The proposal is a discretionary activity under the provisions of the Operative District Plan and Restricted Discretionary under the Proposed Waimakariri District Plan.

227. My assessment has highlighted effects on cultural values that are more than minor, alongside uncertainty of the effects on terrestrial ecology at this time, in particular from the proposed lizard management and the impact the proposal will have on the wetlands.

228. I acknowledge that the location in the Rural Zone and the use of an existing quarry is appropriate. However, I am of the opinion that the proposal is inconsistent with both Operative and Proposed District Plans as there is tension with the objectives and policies relating to cultural values, water, natural character and ecology.

229. The purpose of the Resource Management Act 1991 includes managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety while safeguarding the life supporting capacity of soil. In this instance, it has not been demonstrated that the proposal will be consistent with this purpose.

230. Therefore, I recommend that the application be declined.

Draft conditions

231. I have considered the draft conditions provided by the Applicant, along with the technical experts for WDC and CRC. I consider that the conditions of consent will develop over the course of the ordered joint witness statements. Therefore, I will provide a version of draft conditions through the planning joint witness statement as directed by the Commissioners in Minute 1.

Recommendation

232. I recommend, pursuant to sections 104 and 104B, and subject to Part 2 of the RMA, that the application made by Protranz International Limited for resource consent to continue operation of and expand an existing hard rock quarry and to establish, maintain and operate a landfill at 150, 154 ,174 and 176 Quarry Road Quarry Road, Loburn be **REFUSED.**

233. The reasons for this recommendation are related to:

a) The adverse effects on indigenous fauna and habitat.
b) The significant effects on Tangata Whenua values.
c) The proposal being inconsistent with the NPS-IB.
d) The tension the proposal has with the objectives and policies of the Operative District plan and the Proposed District Plan relating to Māori values, terrestrial ecology, water and land, and water margins.
e) The proposal not meeting the purpose of Part 2 of the RMA, in particular sections 6(e) and (f).
f) Uncertainty around the site selection process and alternative assessment.
g) The proposal being contrary to the Iwi Management Plan.
h) The absence of a sufficient site selection process as defined by the WasteMINZ guidelines.

Recommended by:

Tim Johnston

Date: 24th March 2025

Tim Johnston
Senior Planner

Appendix 1- Herpetology Section 42A report, prepared by Dr Mandy Tocher, LizardExpertNZ,

Before the Independent Hearing Panel appointed by the Canterbury Regional Council
IN THE MATTER OF The Resource Management Act 1991

AND

IN THE MATTER OF Application CRC243699 by Protranz International Limited for earthworks, quarrying and landfilling at Whiterock Quarry, 150 and 174 Quarry Road, Loburn, North Canterbury.

Supplemental Section 42A Officer's Report

Report of Dr Mandy D Tocher

Introduction

Background

1. This report forms part of the Environment Canterbury's (ECAN) audit of the assessment of environmental effects (AEE) provided by Protranz International Ltd (the applicant) in support of ECAN resource consent applications CRC243699-CRC243706, and RC245076 (Waimakariri District Council).
2. This report will provide the decision-maker with information and advice related to:
    a. The actual and potential effects of the proposed activities on indigenous lizards.
    b. The scale and significance of the anticipated environmental effects as they relate to lizard populations and habitats.
    c. The proposed management of lizard-related actual and potential adverse effects.

Qualifications

3. I have worked in the field of New Zealand herpetology (lizards and frogs) for over 30 years with almost all my career based in Canterbury and Otago.
4. I currently hold the position of Principle Herpetologist at LizardExpertNZ, my own business that I initiated April 2021.
5. I obtained a M.Sc. with first class honours in 1992 and a Ph. D in Zoology in 1997. These were both awarded by the University of Canterbury. I also hold a master's degree in planning (Distinction), awarded from the University of Otago in 2017.[1]

[1] Tocher, M. (2016). Biodiversity Maintenance and Protection under RMA Section 6(c) (Thesis, Master of Planning). University of Otago.
Tocher Mandy D., Theo Stephens, Claire Freeman, and Chris Garden (2017). Biodiversity Maintenance and Protection Under Both Clauses of s 6(c) of the RMA. Resource Management Theory & Practice 2017, pages 136-260.

6. I am a member of the New Zealand Amphibian Specialist Group for the IUCN, the New Zealand Reintroduction Specialist Group. I am a past member of the Department of Conservation (DOC*)* lizard Technical Advisory Group (TAG*),* the Native Frog Recovery group, grand and Otago skink Recovery group and the Resource Management Law Association. I am an Associate Editor for the New Zealand Journal of Zoology and an accredited RMA hearings commissioner.

7. From 2011-2016 I was employed as Senior Ecologist by Wildland Consultants Ltd, and then as Principal Ecologist/Herpetologist by Ryder Environmental until April 2021 when I initiated LizardExpertNZ. Before I took up my position with Wildland Consultants I was employed by the DOC as the South Island Herpetologist for 16 years, specialising in research and management of South Island lizards and frogs.

8. Under contract to DOC, I helped to develop the DOC lizard management plan template[2] and the key principles for lizard salvage in New Zealand.[3]

Scope of Report

9. This report is prepared under the provisions of Section 42A of the Resource Management Act 1991 (RMA). This section allows a council officer or consultant to provide a report to the decision-maker(s) on a resource consent application made to the council and allows the decision-maker(s) to consider the report at the hearing.

10. Section 41(4) of the RMA allows the decision-maker(s) to request and receive from any person who makes a report under Section 42A "any information or advice that is relevant and reasonably necessary to determine the application".

11. This report is supplementary to the Section 42A Report prepared by the Environment Canterbury/WDC for the above resource consent applications. Full details of the consent applications are provided in the respective Section 42A reports.

12. To carry out this audit of the consent applications, I have:

    a. Considered the relevant sections of the Applications and Assessment of effects on the environment (AEE) submitted by the applicant, dated 28th March 2024.

    b. Considered the technical Appendix G 'Ecological Impact Assessment' (EcIA) attached to the AEE/Application.

    c. Considered the proffered conditions dated 27/03/2024 attached to the AEE as Appendix Y. These conditions cover Region and District conditions in separate sections.

    d. Considered the revised set of conditions (Appendix Y Rev1) that formed part of the s92 response to ECAN, dated 27/08/2024. These conditions address lizard management in 'District Proposed Conditions' 'Biodiversity & Landscape Enhancement' and its accompanying Schedule 1.

    e. Considered the Site Management Plan (draft Rev B; Appendix L).

    f. Reviewed further information that was provided to WDC by the applicant on draft Management Plans, stock fencing & Terrestrial Ecology (Lizards) (dated 23/8/2024).

[2] https://www.doc.govt.nz/globalassets/documents/about-doc/concessions-and-permits/wildlife-research-permits/lizard-management-plan-template.pdf

[3] DOC TAG, 2019. Key principles for lizard salvage and transfer in New Zealand. Department of Conservation. 19 pages.

g. Reviewed further information that was provided to ECAN by the applicant on crown land (GEN-003) and draft MPs (GEN-002) (dated 16/8/24).

h. Considered Section 6(c) significance criteria in the Canterbury Regional Policy Statement and its supporting guidance document.[4]

i. Looked at Appendix H rev1 to determine footprint and locations of proposed activities.

j. Undertaken a site visit on 24th January 2025 to determine lizard habitats onsite.

k. Considered lizard specific issues raised by 22 submitters: namely concerns related to effects of the proposal on lizards and the management of actual and potential effects.

l. Reviewed the following report: Hutchison, M. August 2024. Botanical Survey of White Rock Limestone Site, Loburn, Waimakariri District. 57 pages.

13. Of note, I was not provided with a copy of a Lizard Management Plan (LMP) that I understand has been submitted to DOC for permitting.[5] As a result, I have had to assess the application 'as lodged' which deferred in many places to the LMP as the primary lizard management document.

14. This report also provides my assessment of the scale and significance of adverse and positive effects.

15. Finally, if the decision makers are of a mind to grant the application, this report provides recommendations on the scope of conditions of consent that are required to ensure adverse effects on lizards can be adequately avoided, remedied or mitigated, and/or compensated for.

Description of the Activity

16. I have relied on the description of the activity provided in Section 4 of the Applications & AEE. The proposed activities are located at 150, 154, 174 Quarry Road, Loburn as well as WDC road reserve and crown land (Karetu riverbed & margins). Mitigation is proposed for part of 176 Quarry Road (a WDC Significant Natural Area (SNA)[6]).

17. The proposed activities will affect a mix of disturbed land e.g., the quarry pit and associated disturbed surfaces, and lesser disturbed land such as:

a. recently felled pine plantations

b. wetlands

c. exotic grasslands

d. the riparian margins of the Karetu River and

e. the WDC road reserve area[7].

[4] UpdatedGuidelinesfortheApplicationofEcologicalSignificanceCriteriaforIndigenousVegetationandHabitats ofIndigenousFaunainCanterburyRegion%20(10).PDF

[5] DOC reference 107310-FAU.

[6] WDC SNA039 'Whiterock Limestone Vegetation'.

[7] The applicant's response to WDC issue 5 a) i. at page 23 does not unequivocally rule out works over the road reserve.

18. I define ‘lesser’ disturbed land as land that has been disturbed in the past, e.g., from farming, afforestation/logging and/or historic fires and no longer retains a predominately indigenous vegetation cover but nonetheless can and does provide lizard habitat.[8]

19. The extent and location of ‘lesser’ disturbed land affected by the proposed activities was not clearly set out in the AEE. Using Google earth imagery, observations during the site visit and a visual appraisal of Appendix H rev1[9] and Figure 43 of the EcIA[10], I have estimated these areas to cover a combined area of *ca*. 1.5-3 ha.

20. In making my estimate I note the applicant estimates the anticipated loss of lizard habitats to be *ca*. 0.5-1.0 ha[11] but does not provide a map/plan showing where loss will occur.

21. Activities most likely to affect lizard values, i.e., earthworks and concurrent vegetation removal (including exotic pasture) and spoil disposal (if required) over most of these lesser disturbed areas are well described in terms of consents required by both ECAN and WDC, and Appendix H (rev1) shows site plans where activities will generally take place.

22. Exceptions, where descriptions of activities over potential lizard habitats are not well set out by the applicant include:

    a. The width and method of installation of the proposed security fence. The installation of this fence may affect a variety of lizard habitats over exotic grasslands, wetlands and recently cleared plantation forestry.

    b. The width and method of installation of the proposed herbivore exclusion fencing around SNA. The installation of this fence may affect a variety of lizard habitats over exotic grasslands and recently cleared plantation forestry.

    c. The width and method of installation of the proposed stock exclusion fencing around watercourses. The installation of this fence may affect a variety of lizard habitats over exotic grasslands/shrublands of riparian areas.

    d. Proposed activities (if any) over the existing access road (WDC road reserve) from Quarry road and before the proposed new bridge.[12] Activities such as widening to accommodate entry onto the new bridge and/or introducing culverts/water tables could affect potential Canterbury grass skink (*Oligosoma* aff. *polychroma* clade 4) habitat along the roadsides, e.g., along the existing fence line that is not regularly mown.

    e. The location and description of offsite overburden storage[13]. I was unable to be assured by the information provided by the applicant that overburden will not be placed on top of offsite lizard habitats thus extending potential effects off site to a second location.

    f. The location and description of any wastewater disposal areas/trenching from weighbridge buildings.[14] I was unable to be assured by the information provided by the applicant that wastewater disposal onsite will avoid lizard habitats including wetlands.

[8] Figure 17, Page 35 of EcIA (Appendix G of application) and observations during the January 2025 site visit.
[9] Provided in the s92 response to ECAN.
[10] Page 51 of EcIA (Appendix G of AEE).
[11] Page 36 and 53 of the EcIA (Appendix G of AEE).
[12] The applicant’s response to WDC issue 5 a) i. does not unequivocally rule out works over the road reserve (page 23).
[13] Application Section 4.5.3 page 31.
[14] Application Section 2.2.22 page 5.

Description of the Receiving Environment

23. I consider the existing environment is represented by baseline lizard populations and habitats, and any factors that are currently influencing them e.g., predator loading of the site.

24. The application provides a general and mostly high-level description of the existing environment in Section 3. Section 3.10 addresses 'Ecology' and defers to Appendix G the Ecological Impact Assessment (EcIA) for existing lizard-environment.

25. The WDC SNA forms an important part of the application as it is a proposed release site for lizards salvaged from the development footprint. I expected, therefore, a description of lizard values of the site and details of any management being carried out there now that may affect existing lizard values. This information was not provided.

26. As I understand it the onsite pine plantations were cleared as a permitted activity under the WDC plan. Nonetheless, the activity of clearing the plantations from the site forms part of the proposal, i.e., there was a need to clear the plantations to enable the development of the site as per the applicant's proposal.

27. Given potential lizard habitat is present in and around the pine plantations and indeed, lizards may ultimately benefit from their removal; a commentary on the applicant's position on this activity as it pertains to lizards/lizard habitat was warranted and was provided in the EcIA.[15]

28. Bunding work has begun onsite and as I understand it forms part of the applicant's proposal. A description of onsite bunding work already carried out over potential lizard habitats was appropriately provided in the EcIA.[16]

Lizard Values – Assessment and Characteristics

29. To determine potential lizard values of the site, the results of a desktop appraisal of the DOC Herpetofauna database was provided.[17]

30. I agree with the applicant that the potential lizard values present are Canterbury grass skink and McCann's skink (*O. maccanni*) along with either Waitaha gecko (*Woodworthia brunnea*) or greywacke gecko (*Woodworthia "*Southern Alps northern*"*) and possibly jewelled gecko (*Naultinus gemmeus*), and their respective habitats.[18] All are nationally At Risk – Declining except McCann's skink (Not Threatened).[19] Jewelled geckos are very unlikely to be present.[20]

31. It would have been helpful to have more commentary on the herpetological context of Waitaha/greywacke gecko, and Canterbury grass skink complex and McCanns skink. For example, greywacke gecko is a recent split from Southern Alps gecko meaning its distribution is not well documented. Likewise, Canterbury grass skink cannot be easily physically differentiated from sister grass skinks, or from McCann's skink, which creates difficulties identifying the boundaries of their respective distributions and necessitates handling lizards to identify them from each other.

[15] Page 53 of the EcIA (Appendix G of the AEE).
[16] Based on oobservations made during January 2025 site visit, and reference to this is made in the EcIA page 53 (Appendix G of AEE).
[17] Table 33 of the EcIA (Appendix G of AEE).
[18] Page 30 of the EcIA (Appendix G of the AEE).
[19] Hitchmough *et al.* 2021.Conservation status of New Zealand reptiles, 2021. New Zealand Threat Classification Series 35. Department of Conservation, Wellington. 15 p.
[20] Based on observations of habitats present during January 2025 site visit.

Lizard Species Affected

32. To determine actual lizard values (populations and habitats), a 'passive' lizard survey was conducted over parts of the footprint whereby lizards were not handled. The survey was carried out without a Department of Conservation (DOC) handling permit which although appropriately acknowledged,[21] lessened the accuracy and thus usefulness of the lizard survey. A case in point, the two skinks photographed in the EcIA are grass skinks (probably Canterbury grass skinks)[22]; neither are McCann's skink as suggested by the applicant.[23]

33. It is standard & best practice to carry out a lizard survey under a DOC handling permit. This allows the surveyor to handle lizards and be sure of identification either by using their own experience or by taking high-quality photographs to enable others more experienced to assist with identification. As a result of the inability to handle lizards, the lizard species affected by the proposal are not entirely known.

34. What is known is that At Risk-Declining grass skinks (probably Canterbury grass skinks) are present in good numbers across the site including in areas recently cleared of pine plantation. Also, potential habitat for *Woodworthia* spp. geckos is present in the WDC SNA of 176 Quarry Road.[24] The presence of McCann's skink and *Woodworthia* sp. geckos is not certain.

35. To remedy this situation regarding lizard survey, the applicant has suggested the survey although not ideal, is sufficient and by erring on the side of caution and assuming At Risk declining lizards are present, the information collected from the survey is sufficient to assess effects and design appropriate mitigation.

36. Although I commend the applicant for being cautious and as it turns out At Risk Declining grass skinks are indeed present, I don't believe it is sufficient to simply guess at which of the likely species are present.

37. My view originates from the need to have a solid and robust foundational assessment of lizard values to then accurately determine effects and in turn, accurately determine appropriate mitigation to balance any adverse effects. A shaky foundation based on inadequate survey can, in my view, only lead to inaccuracies along the line, ultimately to the detriment of affected lizard values.

Lizard Habitats Affected

38. The EcIA states that an area of 11 ha will be affected across all proposed activities.[25] Of this, the applicant suggests that at least 0.5 ha of lizard habitat could be adversely affected by the landfill development and a further *ca*. 0.5 ha of habitat loss has already occurred relating to bunding work.[26]

39. The applicant's assessment of lizard habitat loss appropriately acknowledges that this estimate does not include all "other possible impacts"[27] such as improvement of the existing flood protection bund. I note that this estimate also does not include areas that were not surveyed (described in paragraph 46 of this statement).

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[21] This situation is acknowledged in the EcIA page 30 (Appendix G of AEE).
[22] The only way to be sure is to collect a genetic sample – tail tip – from a handful of skinks. Grass skinks cannot be identified by physical appearance alone, but location does point to the grass skinks onsite being Canterbury grass skinks.
[23] EcIA Figures 15 & 6 (Appendix G of AEE).
[24] Observations made during the site visit, January 2025.
[25] Appendix G, Section 1.2. page 10.
[26] Page 36 and 53 of the EcIA (Appendix G of AEE).
[27] Page 33 of the EcIA (Appendix G of AEE).

40. My own estimate of lizard habitats affected is provided in paragraph 19. My estimate is approximately double the estimates provided by the applicant, i.e., *ca*. 1.5-3.0 ha versus *ca.* 0.5-1.0 ha, my estimates and the applicants estimate respectively.

41. If my estimates are correct, the lizard habitat (and lizard populations within) affected by the proposal has been underestimated by the applicant and so too has the effects assessment and 'mitigation package' offered.

42. My view is supported by statements in the EcIA such as: "suitable habitat for indigenous lizards exists across much of the site, in the form of rank grass and where limestone rocks/boulder are present"[28] and "skinks were confirmed to be present across much of the site".[29] To me, these statements imply large areas of lizard habitat are present. Lizard populations also seem high over the site[30].

43. Despite the problems I have raised regarding the lizard survey, the applicant states that lizard values are 'high' when considered at the Ecological District (ED) level.[31] I generally agree with this assertion as areas of the site that provide habitat for Canterbury grass skinks represent Section 6c RMA 'significant fauna habitat' under the Canterbury Regional Policy Statement i.e., having an At Risk Declining threat status is enough to trigger significance.

44. Finally, in terms of the receiving environment and factors influencing lizard populations and habitats, the application along with Appendix G of the AEE addresses relevant issues except for existing pest control. I was unable to ascertain based on information provided by the applicant and an ecological report of the SNA[32] if any predator control was underway over the site or the SNA; I have assumed not.

Supplementary Lizard Survey

45. The areas that were subjected to lizard survey were confirmed in the s92 response[33] and as I understand it, survey was not carried out over all areas affected by the proposed activities.

46. Areas to be affected by the proposed activities that were not surveyed include:

    a. Areas recently cleared of pine plantation.

    b. Wetlands.

    c. The riparian margins/riverbed of the Karetu River and footprint of proposed stock exclusion fencing.

    d. The road reserve.

    e. An area of grassland over 154 Quarry Road.

    f. The WDC SNA and footprint of proposed stock exclusion fence.

    g. The footprint of the security fence that will encompass the site[34].

47. To illustrate by an example the potential consequence of this survey deficit I note that grass skinks (probably Canterbury grass skinks) were easily found over an area recently cleared of pine plantation during the January 2025 site visit. The area in question was

[28] Section 4.3 of the EcIA, page 30 (Appendix G of AEE).
[29] Section 4.3.2. of the EcIA page 33 (Appendix G of AEE).
[30] EcIA Figure 17, page 35 (Appendix G).
[31] Section 3.10 of application page 26 & Section 4.3.1. page 36 of the EcIA (Appendix G of AEE).
[32] Hutchison, M. August 2024. Botanical Survey of White Rock Limestone Site, Loburn, Waimakariri District. 57 pages.
[33] s92 response to WDC issues 5 a) i. or 5 a) ii. and shown in Figures 13 & 17 of the EcIA (Appendix G).
[34] Appendix H rev1 'Location Plan'.

directly adjacent to the WDC SNA on 176 Quarry Road. As far as I can tell, this area was not surveyed by the applicant which means effects on this area and other similar non-surveyed habitats are likely to have been underestimated.

48. Moreover, some or all these habitats maybe 'significant fauna habitat' under the Canterbury Regional Policy Statement (CRPS) necessitating 'protection' through application of the effects management hierarchy. For this reason, the location and extent of these habitats should have been documented in the EcIA to enable an assessment of proposed 'protection' of these areas.

49. In my opinion, an additional supplementary lizard survey is justified ahead of consenting (or otherwise) this application for the following reasons:

    a. It is best practice to carry out a lizard survey robust enough to determine which lizard species are present and the extent and quality of their habitats, and numbers of each species affected. This is the purpose of a lizard survey. Unfortunately, for reasons relating to DOC permitting, the current survey was unable to ascertain which species are present, i.e., there may be 1 species of lizard affected or more and up to three. The numbers affected has not been provided.

    b. The effects assessment described over the next section will be inherently flawed if the number of lizard species affected and the extent of each of their habitats is unknown. Moreover, the scale and significance of effects cannot be ascertained unless the survey informing the assessment is adequate.

    c. A flawed effects assessment cannot be used to design an appropriate mitigation package; for example, avoidance actions cannot be considered unless there is an understanding of where lizard values lie, and which places are priority for avoidance. I note that no definitive lizard avoidance actions have been suggested, nor indeed any remediation measures; these issues are covered over paragraphs 70-75 below. This information deficit that is presumably addressed in the LMP for that was not provided, needs addressing given grass skinks occupy significant fauna habitat across the site (significant under Section 6c, RMA 1991).

    d. The sufficiency (adequacy) of the proffered mitigation described below, itself lacking in substantive detail, cannot be determined based on a flawed effects assessment.

50. I note that even if the LMP provides some additional information that is lacking from the application as lodged, additional survey will still be required to properly inform the effects assessment required under the RMA (1991), and in particular, Section 6c. Proper and appropriate 'protection' of significant fauna habitat can only be achieved if we know where such habitat lies.

Actual and Potential Effects on Lizard Values

Description of Effects

51. I have raised concerns over paragraphs 45-49 relating to inadequate survey that has likely resulted in an underestimate of effects on lizard values. Moreover although I assume effects are clearly described in the LMP submitted to DOC, I cannot be sure.

52. Notwithstanding my concerns on the application as lodged, a high-level list of actual and potential project impacts (effects) of the proposed activities on lizard values was

supplied in the EcIA.[35] Some listed effects were nonspecific in terms of affected values, mechanism and location so I have assumed these related to all biodiversity over all habitats of the proposal and in adjacent areas. e.g., temporary to short term increase in dust, noise and vibration.

53. A further commentary on effects specific to lizards is provided in Section 4.3.2 of the EcIA.[36] This commentary appropriately acknowledges that effects maybe more severe during the colder months, and as noted in paragraph 39, the applicant acknowledges that there may be other potential effects too.

54. The Zone of Inference (ZOI) is defined in the EcIA as follows: "*lizard habitats immediately adjacent (within 5 m) to activities onsite*" but as noted above, lizard habitats have not been mapped and extent quantified over all areas of the site, so it is not possible to deduce where the ZOI is to then determine scale and magnitude of effects. Also, the 5 m buffer into adjacent habitats is inconsistent with the 1 m described in the 'pre-mitigated level of effects assessment' for lizard habitats.[37]

55. Overall, however, most relevant actual and potential unmitigated effects were documented in Section 4.3.2. of the EcIA.[38] The exceptions are injury to lizards, potential permanent fragmentation of lizard habitats & populations both onsite and over surrounding areas including the WDC SNA, and the potential positive effects to lizards of removing pine plantations that were shading their habitats.

Magnitude & Significance of Effects

56. I note that the RMA (1991) gives no guidance on how practitioners are to assess the magnitude or significance of effects.

57. *In lieu* of guidance under the RMA, the applicant has used EIANZ guidelines to assess level, magnitude and significance of lizard-related effects.[39] I do not generally support the application of the EIANZ guidelines as resulting effects assessments can be formulaic and rigid rather than bespoke for the site. As a result, there is a risk that effects can be downplayed. Moreover, the RMA (1991) and as far as I am aware ECAN too, do not formally support the EIANZ approach.

58. Using the EIANZ tables, the applicant has assessed:

    a. The pre-mitigated level of effect of the proposal on lizards as "very low".[40]

    b. The pre-mitigated magnitude of effect of the proposal on lizards as "negligible".[41]

59. For level and magnitude of effect 'lizards' have been clumped into a single entity, i.e., the applicant has assumed there is only 1 lizard species affected by the proposal despite inferring otherwise.[42] As a result, the level and magnitude of effect is only provided for 'lizards' rather than for each lizard species affected, the latter being more appropriate in my view.

60. For reasons detailed in paragraph 49 I have formed the view that effects have likely been underestimated and underestimates will have affected the applicants' assessments of both level and magnitude of effect, i.e., it follows that both level and

[35] Section 2.2.3 of EcIA (Appendix G of AEE).
[36] Page 36 (Appendix G of AEE).
[37] Section 4.3.2. page 36 of EcIA (Appendix G of AEE).
[38] Dust, noise and vibration, permanent habitat loss, disturbance & death of protected wildlife.
[39] https://www.eianz.org/document/item/4447
[40] Table 6, page 38 of the EcIA.
[41] EcIA page 36.
[42] Page 30 of the EcIA (Appendix G of the AEE).

magnitude of effect are also underestimated. For these reasons, I advocate for a fulsome reassessment of level and magnitude of effect following additional survey.

61. The pre-mitigated significance of effect is not provided by the applicant. In my opinion, inadequate survey has meant that an assessment of 'significance of effects' is also not possible now, ahead of supplementary survey.

62. However, Table 6 of the EcIA[43] assesses the 'post-mitigation magnitude of effect' as 'positive'. In my opinion, the level of detail provided by the applicant is insufficient to enable this assessment to be made and I recommend this assessment is disregarded.

RMA 1991 v Wildlife Act 1953

63. I firstly note that permitted activities under the RMA (1991) are not permitted activities under the Wildlife Act 1953 (WLA) i.e., there is no permitted baseline equivalent under the WLA. Moreover, the presence of a single lizard (including a Not Threatened species such as McCann's skink) triggers the Wildlife Act (1953), which in my view is a very blunt tool that is administered inconsistently by DOC.

64. The applicant suggests that managing effects under the Wildlife Act (1953) process is preferable to reduce "*a potential duplicated and or inconsistent approach with the Waimakariri District Council*."[44]

65. Managing effects over indigenous lizard habitats are very clearly within the mandate of the RMA (1991) and its planning tools. This is especially so for significant fauna habitats occupied by grass skinks that are addressed in the RMA as a Part II matter (Section 6c), and feature prominently in the NPS-IB. I strongly disagree, therefore, that the RMA (1991) devolves responsibility for 'effects management' to the Wildlife Act (1953) permitting process as the applicant proposes.[45]

66. A Lizard Management Plan is proposed in Section 5.6.2 of the application. This LMP is to be developed to "avoid, minimise, and remediate project effects to indigenous lizards and their habitat and minimise the risk of disturbing or killing lizards pursuant to the Wildlife Act 1953".[46]

67. I agree with the stated purpose of the LMP but fail to see why the applicant has not provided the LMP that has been submitted to DOC. This would have allowed for submitters, stakeholders and technical experts to review and comment on the LMP with the collective view to improve outcomes for lizards.

68. In my opinion, providing the LMP as part of the applicant's resource consent application would better serve to reduce any administrative duplication by allowing complete transparency to all stakeholders on how effects are proposed to be managed under both the Wildlife Act (1953) and the RMA (1991). This view is supported by one submitter who agreed with the need to have them upfront as part of the consenting process.[47]

69. What is more appropriate and commonplace in practice is the formulation of a site-specific LMP that serves the dual purpose of satisfying the requirements of the RMA (1991) whilst providing information in sufficient detail to support a WLA to DOC. The DOC LMP template provides for dual purpose LMPs.[48]

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[43] Page 38 of the EcIA (Appendix G of AEE).

[44] s92 response to WDC, page 6.

[45] Page 6 Section 2.4 'Wildlife Act 1953' of the application, and Section 5.6.2 of the application (page 47).

[46] Section 5.6 of the Application, page 47.

[47] SUB034870.

[48] https://www.doc.govt.nz/globalassets/documents/about-doc/concessions-and-permits/wildlife-research-permits/lizard-management-plan-template.pdf

Effects Management: Application of Mitigation Hierarchy

70. I note that one submitter referred to the need to protect significant biodiversity including lizards now and for future generations.[49] Section 6c of the RMA (1991) highlights the duty of practitioners to "…*recognise and provide for the …. protection of significant habitats of indigenous fauna*". As I understand it, implicit in this provision is the need to exhaustively avoid, remedy and mitigate adverse effects on 'significant fauna habitat', regardless of magnitude or significance of effects on such habitats. This is generally acknowledged by the applicant.[50]

71. I could find no legitimate actions described in the EcIA and/or application that relate to avoiding lizard habitat.[51] The exceptions to this is reference to avoiding the SNA[52] and avoiding the winter months when developing areas of the site that have an exotic grass cover that could harbour grass skinks (May-August inclusive)[53].

72. In my view, avoiding the SNA is not a legitimate avoidance action as the SNA is already protected by policies/rules in the WDC plan and NPS-IB. Also, I have doubts that the applicant will be able to, in a business sense, cease work over the winter months to avoid rank exotic grassland habitat of grass skinks.[54]

73. As well, there are aspirational references to avoiding areas of exotic rank grass "if practicable" and "should occur if possible" and then statements inferring that all this will be managed under the LMP that has not been provided[55]. I would have found it very helpful to see on a map, at the very least, where lizard habitats will be avoided or alternatively a clear statement that no lizard habitats can be avoided due to the nature of the development/business.

74. As it stands, I can give no weight to stated avoidance actions and cannot determine if all avoidance options have been exhausted.

75. For remediation of lizard habitats, again, no detail is provided of what the applicant proposes over the longer term at landfill closure. Instead, reference is made to managing lizard habitat remediation in the LMP or the LCP (assumed to be Landfill Closure & Aftercare Plan),[56] the latter also not provided. The VMP is also referenced as a plan that may manage lizard habitats of the riparian areas.[57]

76. I note that a single lizard-related submission referred to a desire to see remediation of the quarry for biodiversity purposes.[58]

77. The applicant states that the LMP will outline habitat creation that supersedes habitat lost,[59] which I support. The applicant does not, however, take the next logical step to provide the necessary information to back this claim.

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[49] SUB034380.

[50] Supported by the applicant in Section 3.3.3.3. 'Management of Effects' at page 20 of the EcIA (Appendix G of AEE).

[51] As noted elsewhere, I suspect this is because lizard habitat areas have not been mapped, but I note that wetland areas are mapped and included in project maps in Appendix H rev1; I expected a similar level of detail for lizard habitats, but this was absent.

[52] EcIA Section 4.3.3. Effects management hierarchy, page 37 (Appendix G of AEE).

[53] EcIA Section 4.3.3. page 37 (Appendix G of AEE).

[54] See Figure 43 of the EcIA, page 51 (Appendix G of AEE).

[55] s92 response to WDC issue 5 a) i.

[56] EcIA Section 4.3.3. page 37 (Appendix G of AEE). I note that Section 15 Landfill Closure and Aftercare in the SMP (draft Rev B, page 64) makes to "*light grazing or natural state vegetation*".

[57] Section 14.1 of SMP draft Rev B (Appendix L).

[58] SUB034380.

[59] s92 response to WDC on issue 5 a) vii.

78. As it stands, therefore, I can give no weight to stated remediation actions and cannot determine if all remediation options have been or will be exhausted.

79. For mitigation, the applicant proposes to move lizards to an area adjacent to the SNA[60] or to within the SNA itself.[61] I note that the release site is not confirmed to be the SNA, but I assume the release site is identified and confirmed in the LMP.

80. In terms of release into the SNA, it is very much a case of the 'devil is in the detail' so to speak. For example, removing stock from the SNA although touted as a positive effect of the proposal[62] may instead cause seasonal rodent eruptions in response to exotic grasses seeding that could in turn result in perverse outcomes (in terms of elevated predation) for both the existing lizards of the SNA, and the newcomers released via salvage. Rodent monitoring will be key at managing this effect and the LMP will need to provide a rodent control/suppression response action if rodent tracking goes above *ca*. 5 % tracking.[63]

81. Also, science has shown that releasing lizards into existing lizard populations does not result in good outcomes for released/salvaged lizards especially where mice are present.[64]

82. Potential rodent eruptions and relatively high mortality in salvaged lizards are just two of multiple problems I can see with the proposal and for these reasons, I am unable to assess whether salvage is the best option for lizards of the site but accept that it maybe.

83. As it stands, therefore, and without the detail contained within the submitted LMP, I can give no weight to stated mitigation actions and cannot determine if all mitigation options have been exhausted.

84. Lastly, although I accept that the applicant believes lizard values will be appropriately managed in the LMP, I cannot agree to this without sighting the LMP.

Compensation for Residual Adverse Effects

85. Based on information supplied I have formed the opinion that significant residual effects will likely ensue with the avoidance, remediation and mitigation actions proposed by the applicant. There really is no way to say for sure without sighting the LMP.

86. I note that the applicant forms a different view on level of residual effect and assesses the level as 'net gain'[65] whilst providing no supporting evidence for how this assessment was made. I am not convinced that a net gain will eventuate.

87. I hold the view that compensation is the most suitable path to address any residual effects on lizard values and that compensation actions are required to adhere as far as technically feasible to principles in Appendix 4 of the NPS-IB.[66]

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[60] Tables 1 & 2 'Assessment' of the s92 response to WDC (Page 6) & Biodiversity and Landscape Enhancement Plan (Appendix Y rev1).
[61] Page 44 of the EcIA (Appendix G of the AEE).
[62] EcIA page 17 (Appendix G of the AEE).
[63] A recommended tracking rate to generate a positive effect on lizards. See Norbury, G., Wilson, D.J., Clarke, D. et al. Density-impact functions for invasive house mouse (*Mus musculus*) effects on indigenous lizards and invertebrates. Biol Invasions 25, 801–815 (2023). https://doi.org/10.1007/s10530-022-02946-9
[64] Norbury, G., van den Munckhof, M., Neitzel, S., Hutcheon, A., Reardon, J., & Ludwig, K. (2014). Impacts of invasive house mice on post-release survival of translocated lizards. *New Zealand Journal of Ecology*, 322-327.
[65] Table 6, page 38 of the EcIA.
[66] [2023] NZEnvC 103 Friends of Conical Hill Incorporated v Hurunui District Council and Hanmer Springs Thermal Pools and Spa [PDF, 223 KB]

88. Also, compensation actions need to be lizard-centric and additional to actions proposed to balance other effects on biodiversity, i.e., 'double-dipping' is not appropriate where a single action is proposed to offset multiple effects across a range of ecological values.

Consideration of Submissions

89. Twenty-two submissions referred directly to indigenous lizards, skinks or geckos. [67]

90. I have divided these submissions into two topic areas:

    a. Effects of the proposal on lizard values, and

    b. Proposed effects management: Lizard translocation.

91. Each will now be addressed in turn.

Effects of the proposal on Lizard values

92. Of the twenty-two lizard-related submissions, twenty specifically raised concerns regarding potential effects and all of these 'oppose' the application. No lizard-related submissions supported the applicant's approach to assessing effects nor the proposed effects management.

93. Effects identified by submitters were general and referred to 'disruption', 'impact', 'contamination', 'potential threat', 'health', 'short and long-term effects' of and to indigenous lizards. One submitter[68] shared my concern that effects may have been underestimated by the applicant and others seem to infer this. A single submitter[69] questioned the quality of technical reports which I take to include the lizard effects assessment.

94. As noted over paragraphs 56-62 above, I too have concerns about lizard effects and the inability of the applicant to robustly ascertain the scale and magnitude of effects from the lizard survey carried out. That said, I assume a comprehensive effects assessment has been provided to DOC within the submitted LMP as the DOC LMP template requires this.

95. Four submitters[70] while not expressly referring to lizards, had concerns regarding the impact of the proposal on wetland habitats and their biodiversity (fauna and flora). As noted in paragraph 46, wetland habitats were not surveyed for lizards, despite their potential as significant fauna habitat. For this reason, I share submitters concerns and note again my recommendation that further surveys are required to ascertain the degree with which onsite wetlands support indigenous lizards (see paragraphs 45-50).

96. Seven submitters[71] had concerns relating to the potential impact of the proposal on the WDC SNA (176 Quarry Road). These submissions are highly relevant to lizards because the SNA forms part of the applicant's proposal, and the SNA was not surveyed for lizards. I too have concerns regarding the impact on the SNA but my concerns are very specific to the applicant's proposal to relocate lizards there (or to an adjacent area; see paragraphs 97-100 below).

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[67] SUB034326,SUB034361,SUB034380,SUB034383,SUB034384,SUB034396,SUB034413, SUB034415,SUB034497,SUB034518,SUB034529,SUB034566,SUB034571,SUB034623, SUB034627,SUB034631,SUB034668,SUB034767,SUB034806,SUB034807,SUB034848, SUB034837.

[68] SUB034741.

[69] SUB034741.

[70] SUB034741, SUB034405, SUB034529, SUB034380.

[71] SUB034383, SUB034384, SUB034413, SUB034627, SUB034668, SUB034806, SUB034807.

Proposed Effects Management: Lizard Translocation

97. Four submitters[72] questioned the likely success and/or the appropriateness of the proposed lizard relocation from the works footprint to the nearby SNA (or adjacent area). A related issue was raised by a single submitter regarding the fate, in terms of adverse effects of a landfill, to lizards that evade capture and are not relocated, i.e., those that are left behind.[73]

98. Without having the opportunity to view the LMP submitted to DOC, it is hard to form a view on the likely outcome of a salvage but I note that key information is missing from the application that DOC consider necessary for a successful salvage.[74] I refer to information such as (but not limited to):

    a. The lizard species to be relocated and some idea of numbers likely to be involved.

    b. Lizard species and numbers at the proposed release site (the WDC SNA/adjacent area).

    c. The likely carrying capacity of lizards at the proposed release site.

99. Based solely on information provided by the applicant, I have formed the view that the planned relocation of skinks from the footprint to the nearby WDC SNA (or adjacent area) has only casually been considered by the applicant and submitters concerns have merit. In support of the submitters, I note that scientific research has shown that lizard relocation is often unsuccessful.[75]

100. Lastly, I am far from convinced that relevant DOC salvage principles have been adhered to in the design of the salvage/translocation proposal, which could also compromise the success of any planned relocation.

Conclusions and Recommendations

101. Lizard survey did not cover the entire project area and has failed to generate key information necessary to understand the scale and magnitude of effects of the applicant's proposal on lizard values. For example, the number of lizard species onsite, the extent of their habitat uses, and the population levels affected remains largely unknown. A flawed effects assessment is a concern also raised by multiple submitters.

102. Without an effects assessment based on appropriate survey, the quantum of mitigation required to balance effects is unable to be determined. This is particularly concerning given much of the lizard habitat onsite is 'significant fauna habitat'.

103. Moreover, I believe withholding the LMP that has been submitted to DOC is inappropriate as it may contain a level of detail of effects and mitigation that is absent from the application. Also, stakeholders have been unable to effectively engage in the consent process as it pertains to lizards as key and essential information has been unreasonably withheld.

104. For the reasons stated above, I recommend processing of the WDC consents are stalled until a lizard survey is completed that addresses information gaps, and a DOC-approved

[72] SUB034396, SUB034571, SUB034415, SUB034518.
[73] SUB034767.
[74] DOC TAG, 2019. Key principles for lizard salvage and transfer in New Zealand. Department of Conservation. 19 pages.
[75] Griffith B, Scott JM, Carpenter JW, Reed C 1989.Translocation as a species conservation tool:status and strategy. Science 245: 477-480

LMP is supplied that at the very least assists with aligning consent conditions with any conditions imposed by DOC.

105. If, however, the decision makers are of a mind to grant the application ahead of new survey, I recommend that conditions of consent are imposed that cover the following matters.

    a. A requirement to carry out an additional lizard survey. This survey must include all areas affected by proposed activities (including the SNA & wetlands) and must:

        i. Identify lizard species affected.

        ii. Provide an estimate of population/individuals affected for each lizard species and

        iii. Quantify the extent of lizard habitats affected for each lizard species.

    b. A requirement to provide a Lizard Management Plan upfront and ahead of consenting that:

        i. Disregards the EIANZ guidelines and opts instead for clear & precise expert commentary of values, magnitude, level and significance of effects.

        ii. Conforms to the DOC LMP template[76] that caters for dual-purpose RMA/Wildlife Act LMPs.

        iii. Applies the mitigation hierarchy to actual and potential adverse effects and compensates for any residual effects that are deemed significant.

        iv. Adheres as far as technically feasible to principles in Appendix 4 of the NPS-IB, if compensation is required.[77]

        v. Describes a best practice lizard salvage regime that conforms to relevant principles in the DOC salvage principles guidance document.[78]

106. Should conditions be imposed that cover these matters, I will be confident any adverse effects of the proposal on lizard values will be appropriately avoided, remedied or mitigated, and/or compensated for.

[76] https://www.doc.govt.nz/globalassets/documents/about-doc/concessions-and-permits/wildlife-research-permits/lizard-management-plan-template.pdf

[77] [2023] NZEnvC 103 Friends of Conical Hill Incorporated v Hurunui District Council and Hanmer Springs Thermal Pools and Spa [PDF, 223 KB]

[78] DOC TAG, 2019. Key principles for lizard salvage and transfer in New Zealand. Department of Conservation. 19 pages.

Appendix 2- Avifauna- Section 42A report prepared by Hamish Dean, SLR Consulting.

Before the Independent Hearing Panel appointed by the Canterbury Regional Council

IN THE MATTER OF The Resource Management Act 1991

AND

IN THE MATTER OF Application CRC243699 by Protranz International Limited application for earthworks, quarrying and landfilling at Whiterock Quarry, 150 and 174 Quarry Road, Loburn, North Canterbury.

Section 42A Officer's Report

Report of Hamish Dean

26 January 2025

Introduction

Background

1. This report forms part of the Environment Canterbury's audit of the assessment of environmental effects (AEE) provided by Protranz International Limited (the applicant) in support of resource consent applications CRC243699.
2. This report will provide the decision-maker with information and advice related to:
    a. The actual and potential effects of the proposed activities on avifauna and;
    b. The management of pest animals.

Qualifications

3. My full name is Hamish Alston Dean.
4. I hold the qualifications of Bachelor of Science (Ecology and Zoology) from Victoria University of Wellington, and Master of Science in Biological Sciences (Ecology) from the University of Waikato.
5. I have worked in the fields of ecology and natural resource management for 21 years, working in consultancy, not for profit organisations and at Bay of Plenty Regional Council (**BOPRC**). I am currently a Principal Ecologist at SLR Consulting (**SLR**). I have held this position since June 2021. Prior to joining SLR (then 4Sight Consulting) I was a Consents Team Leader at BOPRC.
6. I am a generalist terrestrial ecologist with a broad range of experience in vegetation ecology, wetlands, avifauna, pest animal control, and ecological restoration. This experience includes survey, monitoring, assessment and management of a range of ecosystem types. Some examples of my recent experience are summarised below.
7. I have designed and undertaken bird monitoring programmes, including at Aongatete Forest (2022) and Ohope Scenic Reserve (2023). These projects involved avifauna monitoring in Aongatete Forest in the Kaimai Range, and at Ohope Scenic Reserve, and Matata Scenic Reserve in the Eastern Bay of Plenty. Over 100 5-minute bird count

stations were measured and data was used to assess the effectiveness of pest animal control by measuring change in bird populations over time and against control sites.

8. I was field lead for a team that undertook comprehensive surveys of vegetation, wetlands, fauna, and fish passage for the reconsenting of an existing mineral extraction operation at Taharoa in the North Island. This survey across a 940 ha site included cryptic bird survey, shorebird survey and point counts. I wrote the terrestrial vegetation and wetlands technical report and prepared and presented expert evidence for the resource consent hearing.

9. I have undertaken or managed numerous Ecological Impact Assessments which have generally included site assessments of vegetation, wetlands, fauna, pests and aquatic values and subsequent reporting and impact assessment. Recent examples have included solar farms at Opunake, Carterton, Marton and in the Tasman District.

10. I managed the expansion of the pest animal control operation at the Aongatete Forest Restoration project. This involved design and implementation of a new multi-species control network across more than 100 ha, along with monitoring. I have also been involved with pest animal control operations for other community groups, including the Otanewainuku Kiwi Trust and was part of the kiwi management and kokako translocation teams.

11. I have read and am familiar with the Environment Court's Code of Conduct for Expert Witnesses, contained in the Environment Court Practice Note 2023, and agree to comply with it. My qualifications as an expert are set out above. Other than where I state that I am relying on the advice of another person, I confirm that the issues addressed in this report are within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

Scope of Report

12. This report is prepared under the provisions of Section 42A of the Resource Management Act 1991 (RMA). This section allows a council officer or consultant to provide a report to the decision-maker(s) on a resource consent application made to the council and allows the decision-maker(s) to consider the report at the hearing. Section 41(4) of the RMA allows the decision-maker(s) to request and receive from any person who makes a report under Section 42A "*any information or advice that is relevant and reasonably necessary to determine the application*".

13. This report is supplementary to the Section 42A Report prepared by the Environment Canterbury for the above resource consent applications. Full details of the consent applications are provided in that report.

14. To carry out this audit of the consent applications, I have:

    a. Considered the relevant sections of the assessment of effects on the environment (AEE) submitted by the applicant, including its technical appendices.

    b. Reviewed Revision 1 of the proposed consent conditions dated 23 August 2024 supplied by the applicant.

    c. Taken into account relevant issues raised by submitters in relation to the effects I have considered in this report.

    d. Visited the site on January 24th 2025.

15. Finally, this report provides conclusions on the scale and significance of adverse and positive effects.

16. If the decision makers are of a mind to grant the application, this report provides recommendations on conditions of consent, and management plan that are required to ensure adverse effects can be adequately avoided, remedied or mitigated.

Description of the Affected Environment

17. The application provides a comprehensive description of the existing environment, including the history of the site, cultural, ecological, geological and landscape context.

18. The site lies within the Oxford Ecological District and is described as 28 ha in size and on a west facing slope with the Karetu River to the west, farmland to the north and east and exotic forestry to the south. The northern part of the site (176 Quarry Road) comprises a 14 ha parcel of land containing a Waimakariri District Significant Natural Area, while the southern part of the site has been quarried for limestone since the early 1950s.

19. The Karetu River catchment in which the site is located comprises 3,119 ha on the southern slopes of the Okuku Range and Mount Karetu flowing south to the Grey and then Okuku Rivers. The catchment is entirely rural with landcover of predominantly high producing exotic grassland (45%) and exotic forest (24.3%), with only 13.5% remaining in indigenous habitats which is mostly in the upper catchment[1].

Avifauna methodology and values

20. The EcIA included a desktop assessment to ascertain the likely avifauna of the area using the eBird database[2]. This is a typical first step in a fauna assessment and is appropriate. In addition to the desktop assessment, avifauna was surveyed on nine occasions between September 2022 and June 2023, with three surveys in spring, three in summer (January), two in autumn and the final one in winter. The number of surveys and the spread across the year was commensurate with the likely level of effect and could be expected to provide adequate detail on the bird species using the site.

21. However, no detail on how surveys were undertaken or whether the whole site was covered on each occasion were supplied. It is assumed that walk-through surveys were undertaken but it would have been good to have the route taken and the method used explicitly stated. Although more detail on the methodology should have been provided, I do not consider that this would have fundamentally affected the outcomes of the ecological values assessment or the assessment of effects.

22. The approach taken to assess ecological value and effects is consistent with the EIANZ guidelines (Roper-Lindsay *et. al.* 2018). These guidelines have been criticised for potentially downplaying values and effects and being used to justify loss. However, they provide a solid framework for assessing ecological impact provided they are used with care and ecologists sense check the results using expert judgment. The author of the EcIA mentions the need to apply judgment and in the case of avifauna has done so.

23. Through desktop and field surveys the Ecological Impact Assessment (EcIA) identified 36 bird species known or likely to occur on the site or in the Zone of Influence (ZOI), including two Threatened and two At Risk species[3]. Fifteen species were directly observed on the site. A pair of kārearea (New Zealand falcon, Threatened – Nationally Vulnerable) were recorded travelling through the site, and little shag (At-Risk – Relict)

[1] Analysis derived from the New Zealand Landcover Database v5. Landcare Research.
[2] Sullivan, B.L., C.L. Wood, M.J. Iliff, R.E. Bonney, D. Fink, and S. Kelling. 2009. eBird: a citizen-based bird observation network in the biological sciences. Biological Conservation 142: 2282-2292.
[3] Robertson HA, Baird KA, Elliott GP, Hitchmough RA, McArthur NJ, Makan TD, Miskelly CM, O'Donnell CFJ, Sagar PM, Scofield RP, Taylor GA, Michel P. 2021: Conservation status of birds in Aotearoa New Zealand, 2021 . New Zealand Threat Classification Series 36. Department of Conservation, Wellington. 43 p.

was detected through eDNA sampling in the Karetu River. The other two threatened or At-Risk species (black-fronted tern and South Island pied oystercatcher) were thought unlikely to occur on the site. Other birds observed on the site were common native species or exotics typical of open and partially forested rural areas. For birds not observed through field survey an indication of the likelihood of them occurring on the site was included in the EcIA.

24. The survey methodology used, including the desktop assessment, is generally appropriate for the site and the project and it is unlikely that any rare, threatened or unusual species would have been missed. After email correspondence with Grant Davey of the Ashley Rakahuri Rivercare Group I consider it very unlikely that threatened braided river birds such as black-fronted tern or banded dotterel regularly utilise the Karetu River or the site.

25. When I visited the site in January 2025, I observed three kārearea which were actively hunting within the quarry. These may have been a pair and a juvenile, but I cannot confirm this. They were utilising tall pine trees around the site and the bluffs at the southern end of the SNA as perches from which to hunt prey. I observed them hunting across the quarry site for the two hours I was there. Although the applicant's ecologists recorded falcon traversing and resting in the site the value of the site to these birds is not well covered.

26. The ecological value of the avifauna on the site was assessed using the EIANZ criteria and the criteria in the Canterbury Regional Policy Statement (**CRPS**) to give an overall Moderate value, which I agree with. The presence of kārearea traversing the site and little shag detected through eDNA may not be enough to warrant a Very High score for rarity and distinctiveness but under the EIANZ system the overall score would still be Moderate even if the rarity and distinctiveness criterion was High or Moderate. The wider site was rightly classified as significant under the CRPS because of the presence of kārearea.

27. However, after considering the Moderate score assigned to avifauna, the author of the EcIA applied professional judgment to lower the score to Low. This was based on the fact that the surveys covered the whole property owned by the applicant (including the SNA area), but the impact area covered a much smaller area at the southern end of the site. This is a slightly confusing way to undertake the assessment because in this case a large part of the area surveyed and included in 'the site' is outside of the ZOI, which was defined as within 50 m of works or disturbance areas. All the species found in the wider site (that includes the SNA) could also utilise parts of the ZOI, although I acknowledge that the habitat is less suitable, so lowering the score from Moderate to Low is difficult to justify.

28. Given my own observations of kārearea at the site, including the way they were utilising the site, I think it is difficult to justify the observation that these birds were only 'traversing the site' and more information would be needed on their site use to support the drop from Moderate to Low value.

29. In my opinion, a more appropriate way to undertake the assessment is to retain the Moderate value and reduce the magnitude of effect of the works on avifauna (if appropriate to do so) because any effect would be only on a small number of individuals or on low quality avifauna habitat.

Pest animal methodology and prevalence

30. A pest animal survey was undertaken as part of the EcIA. This included site walkovers and incidental observations of pest sign such as tracks, scat and browse, as well as a dedicated survey of small mammals using tracking tunnels.

31. Surveys targeted only hedgehogs, rodents and mustelids and no specific survey was carried out for possums, rabbits or hares. Nevertheless, nine pest species were confirmed to be using the site.

32. The survey effort was appropriate and although detailed methods were only provided for the tracking tunnel survey, the approach was adequate, and most of the pest species likely to be on the site were identified. The exceptions are mustelids, and particularly ferrets and stoats which are highly likely to utilise this site as part of a wider hunting territory.

Assessment of Effects on the Environment

Actual and Potential Effects on Avifauna

33. Relevant works and activities under the proposal include extraction and processing of lime and overburden during the operation of the quarry, construction of roads, ponds, and sediment controls during the construction phase, regular heavy vehicle movements, and vegetation clearance.

34. It is important to note that the Significant Natural Area to the north of the site will be completely avoided, except for the construction of a stock proof fence around the perimeter which will have no impact on avifauna.

35. The potential adverse effects of the proposal on avifauna are discussed in the EcIA and include noise, dust, and vibration disturbance as well as destruction of bird habitat. A more quantitative assessment of the amount of habitat being lost and which species are likely to be affected would have been beneficial, especially as it relates to absolutely protected indigenous species.

36. The magnitude of unmitigated effect on avifauna was assessed as negligible which I think is understated given that habitat for indigenous bird species is being destroyed and there is potential for nests to be destroyed. Overall, the level of unmitigated effect on avifauna was assessed in the EcIA as Very Low.

37. The assessment of effects on kārearea may also be slightly understated because there is at least potential for a greater level of effect than has been assessed. Although there is plentiful habitat for kārearea to the north in the SNA area, falcon are known to breed in cutover exotic pine plantation[4] and on bluffs and they could utilise part of the impact area for nesting. Given the existing level of disturbance this seems unlikely, but they appear to be breeding in close proximity to the quarry, and the proposed activities could result in destroyed nests or breeding failure. As kārearea are a Threatened species the National Policy Statement for Indigenous Biodiversity (**NPS-IB**) policy of applying the effects management hierarchy applies.

38. On that basis, the overall level of unmitigated effect of the works on avifauna, assigned as Very Low in the EcIA, may better be assigned as Moderate. The implications of this are that avoidance measures, specifically relating to kārearea, are recommended to be included in consent conditions. These are discussed in paragraph 42 below.

39. In my opinion impacts from the proposal on all avifauna apart from kārearea will be minimal and limited to short-duration disturbance events not dissimilar to the status quo, and minor loss of low-quality habitat for indigenous species. There is potential for disturbance or destruction of nests of indigenous avifauna which are absolutely protected by the Wildlife Act 1953, but I do not consider that this constitutes any more

[4] Seaton, R.; Hyde, N. 2013 [updated 2022]. New Zealand falcon | kārearea. In Miskelly, C.M. (ed.) New Zealand Birds Online. www.nzbirdsonline.org.nz

than a Low level of effect in the RMA sense and remains a Wildlife Act compliance matter.

40. To comply with the objectives and policies of the NPS-IB, the EcIA has adopted a precautionary approach and recommends several measures to manage what effects there are on avifauna. These include:

    a. Development and implementation of a Bird Management Plan (BMP), to include:

        i. Restrictions on work during bird nesting and fledging periods.

        ii. Details on management of effects.

        iii. Procedures for discovery of active nests.

        iv. Development of an Accidental Discovery Protocol for threatened and At-Risk species.

    b. Development of a Vegetation Management Plan which will detail plantings to enhance habitat for birds.

    c. Mammalian pest control as part of a Site Management Plan.

41. The development of a BMP has not been carried through to the applicant's proposed condition set.

42. In the absence of kārearea I would not recommend a BMP or specific conditions relating to birds. However, as there is a risk that kārearea could be using the ZOI and could be impacted by the proposal, a condition requiring a suitably qualified and experienced ecologist to undertake a search for kārearea nests prior to any expansion of earthworks or vegetation clearance during their peak breeding season (September to March) is recommended. If nests are found, the area should be avoided, and an appropriate buffer set up until the chicks have fledged. The applicant's ecologist should be required to provide a brief report to the consenting authority on the findings of any such nest search and the management measures to be undertaken. An advice note on compliance with the Wildlife Act 1953 should also be included.

Pest animal management

43. Although not required to manage the effects of the proposal, the applicant is proposing to fence the SNA to the north of the site to exclude livestock. This will protect the high-value indigenous flora and fauna in the SNA from browsing ungulates and represents a positive effect.

44. Pest animal control is also recommended in the EcIA to protect the proposed indigenous plantings within the site and to protect lizard populations. This level of pest animal management is appropriate, although I defer to Dr Tocher on the efficacy of the proposed control for lizard protection.

45. A condition requiring pest animal control has been included in the proposed District and Regional land use consents. This condition should include a purpose of the pest animal control to reduce the risk that non-targeted, ineffective pest control will be done. It should also include a timeframe and should include control of mustelids.

Off-setting of, or Compensation for, Actual and Potential Adverse Effects to Ensure Positive Effects on the Environment

46. Although not required to offset any residual adverse effects on avifauna, two proposed consent conditions may contribute to a net gain in avifauna values at the site:

a. The Development of a Vegetation Management Plan which will detail plantings to enhance habitat for birds; and

b. The establishment of pest control as part of a Site Management Plan.

47. Provided conditions requiring avoidance of kārearea nests are also included, these two conditions will result in a positive effect on avifauna.

Consideration of Submissions

48. At least five hundred submissions were made on the application from individuals, community organisations, and companies. All submissions were summarised and key word searches were done to find submissions relevant to avifauna and pest animals. These were then read in full.

49. In paragraphs 50 to 60 below, I discuss the main topics raised by submitters.

Avifauna

50. A large number of submissions mentioned effects on birds or wildlife in general. These varied in the level of specificity but were generally relating to the following potential or perceived effects on birds:

a. Adverse effects on birds resulting from contaminants entering the environment via dust or discharge of leachate. This included concern about impacts on the bird habitats of the Ashley River downstream of the site;

b. Disturbance of birds by increased levels of noise from traffic and other activity associated with the site;

c. Non-specific effects on flora and fauna from the activity as a whole; and

d. An increase in scavenger birds.

Contaminants

51. Several submissions mention the potential for contaminants to enter the Karetu River, particularly from leachate, and the effect this could have on water quality, the aquatic ecosystem and on threatened and significant river birds which utilise the braided river system. Although this potential issue has not been addressed by the applicant in relation to avifauna, the potential effects on aquatic ecosystems and water quality, on which some birds rely, have been addressed.

52. The applicant has detailed a series of controls to prevent leachate entering the river or the groundwater, along with monitoring of water and the aquatic ecosystem, and assessed the level of effect from potential pollution on aquatic fauna as Low prior to management, and as a net gain with the proposed management.

53. The likelihood of the proposed activity polluting the Karetu River and the vectors through which that might happen are outside my area of expertise and I leave others to comment on these issues and the adequacy of the proposed controls. However, it is my understanding from the evidence of Ms Tiernan[5] that there is the possibility that leachate could enter the river and groundwater under several scenarios. Should this happen, there may be adverse effects on avifauna along with other components of the ecosystem.

54. A range of potentially toxic substances have been identified as possibly occurring in the landfill leachate, including ammonium, arsenic, chromium and boron. I understand from

[5] s42a report of Fleur Tiernan.

the evidence of Dr Silver[6] that per- and poly-fluoroalkyl substances (**PFAS**) are also likely to be present in leachate despite known sources of these substances being banned from the landfill. Some PFAS (e.g. PFOS) are known to adversely affect breeding success of avifauna[7,8]. These chemicals also bioaccumulate, meaning levels in animals higher up the food chain become much higher than in those lower down, and they pass readily from mother to offspring[9]. In aquatic ecosystems PFAS can be ingested by invertebrates which are prey for river birds as well as for fish, which is turn may be preyed upon by birds.

55. The Ashley Rakahuri River is a braided river system which provides regionally or nationally significant breeding habitat for river birds including the Nationally Endangered[10] black-fronted tern (*Chlidonias albostriatus*), Threatened wrybill (*Anarhynchus frontalis*), and At Risk – Declining, black-billed gull (*Chroicocephalus bulleri*). Any potential threat to these species and the habitat they rely on needs to be carefully considered and properly characterised and quantified. In the application material this has been done for aquatic ecosystems but not for the avifauna that rely on them for food.

56. A draft guideline value (DGV) for PFOS in freshwaters was published in May 2023[11] and guideline values for avifauna food and eggs derived from Canadian data were published in 2019 by MfE[12]. The freshwater DGV does not account for bioaccumulation and it is recommended that the 99% species protection value is used for slightly-to-moderately disturbed ecosystems.

57. I support the monitoring recommendations made by Ms Tiernan in paragraphs 107 to 110 of her reporting evidence as a means by which to gauge risk on downstream avifauna, but I note that once PFAS are in the waterway, removing them would be extremely expensive, if it is even possible. While monitoring water quality closer to the high value avifauna habitat in the Ashley Rakahuri River and monitoring concentrations of PFAS in aquatic invertebrates or in eggs may give better information on the effects on avifauna, preventing contaminants from entering the waterway in the first place is the only way to guarantee their protection.

Disturbance of birds

58. Several submissions raised concerns over disturbance of birds by increased levels of machinery movement and activity at the site, and some submissions, including that of Mr Mackintosh[13], talk about kārearea regularly nesting along the limestone ridge on which the quarry is situated and express concern for their wellbeing.

59. I have discussed potential disturbance of kārearea in paragraphs 36 to 42 above and I do not have any major concerns for other bird species, given the activities will be of a similar nature as the status quo, albeit more regular. In my opinion the only concern is

[6] s42a report of Dr Matthew Silver.
[7] Odegard, A., E. Pavlovic, A. Pesano, AND M. Etterson. Exposure and Effects of PFAS on Birds. Twin Ports Freshwater Folk Meeting, Duluth, MN, February 01, 2023. https://doi.org/10.23645/epacomptox.22587274
[8] Custer CM, Custer TW, Dummer PM, Etterson MA, Thogmartin WE, Wu Q, et al. 2014. Exposure and effects of perfluoroalkyl substances in tree swallows nesting in Minnesota and Wisconsin, USA. Arch Environ Contam Toxicol 66:120-138
[9] Ricolfi L, Taylor MD, Yang Y, Lagisz M, Nakagawa S. Maternal transfer of per- and polyfluoroalkyl substances (PFAS) in wild birds: A systematic review and meta-analysis. Chemosphere. 2024 Aug;361:142346. doi: 10.1016/j.chemosphere.2024.142346. Epub 2024 May 15. PMID: 38759804.
[10] Robertson HA, Baird KA, Elliott GP, Hitchmough RA, McArthur NJ, Makan TD, Miskelly CM, O'Donnell CFJ, Sagar PM, Scofield RP, Taylor GA, Michel P. 2021: Conservation status of birds in Aotearoa New Zealand, 2021. New Zealand Threat Classification Series 36. Department of Conservation, Wellington. 43 p.
[11] ANZG 2023, Toxicant default guideline values for aquatic ecosystem protection: Perfluorooctane sulfonate (PFOS) in freshwater. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. CC BY 4.0. Australian and New Zealand Governments and Australian state and territory governments, Canberra, ACT, Australia.
[12] Ministry for the Environment. 2019. PFAS investigation, response and funding guidance. Wellington: Ministry for the Environment.
[13] Submission of Duncan Stuart Mackintosh dated 9 October 2024.

disturbance of nesting kārearea and I have recommended in paragraph 42 that a condition be included to manage this risk.

Scavenger Bird Issues

60. At least one submission[14] raises concern that scavenger birds and rodents will be an issue. In my opinion, given that no household or food waste is to be allowed at the landfill, this concern is not justified.

Conclusions and Recommendations

61. Overall, I consider that the proposal is likely to have only a Low level of effect on avifauna with two exceptions:

    a. Potential adverse effects on kārearea could be of a Moderate level and need to be managed;

    b. Potential downstream adverse effects on threatened avifauna in the Okuku and Ashley/Rakahuri rivers resulting from contaminants entering the Karetu river need to be carefully considered.

62. To manage potential effects on kārearea, I recommend including a condition requiring a suitably qualified and experienced ecologist to undertake a search for kārearea nests prior to any expansion of earthworks or vegetation clearance during their peak breeding season (September to March). If nests are found, the area should be avoided, and an appropriate buffer set up until the chicks have fledged. The applicant's ecologist should be required to provide a brief report to the consenting authority on the findings of any such nest search and the management measures to be undertaken. In addition, an advice note on compliance with the Wildlife Act 1953 should also be included.

63. The likelihood of river contamination occurring and the pathways by which this may occur are outside my area of expertise, but I support the monitoring recommendations made by Ms Tiernan, including the addition of PFAS/PFOS monitoring as a means of assessing potential risk on downstream avifauna.

[14] Submission of Dave Sewell. Dated 25 September 2024.

Appendix 3- Vegetation and Wetland Section 42A report, prepared by Dr Stephen Rate, SLR Consulting.

Before the Independent Hearing Panel appointed by the Canterbury Regional Council

IN THE MATTER OF The Resource Management Act 1991

AND

IN THE MATTER OF Application CRC243699 by Protranz International Ltd for operation of a quarry and landfill at 150 and 174 Quarry Road, Whiterock (Loburn)

Section 42A Officer's Report

Report of Stephen Ronald Rate

Introduction

Background

1. This report forms part of the Environment Canterbury's audit of the assessment of environmental effects (AEE) provided by ProTranz (the applicant) in support of resource consent application CRC243699.
2. This report will provide the decision-maker with information and advice related to:
    a. the actual and potential effects of the proposed activities on terrestrial vegetation and wetlands.

Qualifications

3. My full name is Stephen Ronald Rate. I hold a PhD in Ecology, obtained from the University of Otago in 2005. I have worked as an ecological consultant for the last 19 years, focusing on terrestrial and wetland systems throughout New Zealand. I have been based in Dunedin since 2007, joining SLR Consulting in 2022, where I am currently a Senior Ecologist.
4. My relevant experience includes undertaking assessments of ecological effects and significance assessments for a range of activities including airports, residential subdivisions, irrigation schemes, wind and hydroelectric energy schemes, afforestation, ski field expansions, and industrial and quarry developments.
5. I regularly undertake natural wetland assessments as required under the National Policy Statement for Freshwater Management (NPS-FM) (Ministry for the Environment 2024).
6. I have read and am familiar with the Environment Court's Code of Conduct for Expert Witnesses, contained in the Environment Court Practice Note 2023, and agree to comply with it. My qualifications as an expert are set out above. Other than where I state that I am relying on the advice of another person, I confirm that the issues addressed in this report are within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

Scope of Report

7. This report is prepared under the provisions of Section 42A of the Resource Management Act 1991 (RMA). This section allows a council officer or consultant to provide a report to the decision-maker(s) on a resource consent application made to the council and allows the decision-maker(s) to consider the report at the hearing. Section 41(4) of the RMA allows the decision-maker(s) to request and receive from any person who makes a report under Section 42A "*any information or advice that is relevant and reasonably necessary to determine the application*".

8. This report is supplementary to the Section 42A Report prepared by the Environment Canterbury for the above resource consent applications. Full details of the consent applications are provided in that report.

9. To carry out this audit of the consent applications, I have:

    a. Considered the relevant sections of the assessment of effects on the environment (AEE) submitted by the applicant, including its technical appendices.

    b. Reviewed further information that was provided by the applicant: 1-E0087.00 Whiterock Landfill Post Lodgement Response to ECan RFI Section 4 – WET dated August 2024, wetland aspects of the Groundwater and Surface Water Effects Assessment dated15 May 2024, Revision 1 of the proposed consent conditions dated 23 August 2024 supplied by the applicant, revision B of the Monitoring Programme and Triggers and Action Response Plan (TARP), and the responses to s92 information requests (Wetland Ecology).

    c. Taken into account relevant issues raised by submitters in relation to the effects I have considered in this report.

10. This report provides conclusions on the scale and significance of adverse and positive effects.

11. In addition, a site visit was undertaken on 27 May 2024 which entailed a site walkover and discussion with the applicant's ecologist.

Description of the Affected Environment

12. The application and accompanying Ecological Impact Assessment (EcIA) provides a very broad overview of the site, describing the site's location within the Oxford Ecological District, adjacent to the Karetu River, the Waimakariri District Significant Natural Area (SNA 039), the limestone escarpment, and the site's setting within largely agricultural land[1].

13. The application outlines the proposed works, zones of influence, and duration, and provides a summary list of actual and potential impacts on ecological values. In relation to terrestrial vegetation and wetlands the proposed works will include vegetation removal within the proposed quarry footprint and modification to groundwater and surface water hydrology near wetlands within the site.

Vegetation Assessments

14. The EcIA included a desktop assessment to review former vegetation cover of the site and surrounding area, and GIS layers of current vegetation mapping before onsite surveys of vegetation types were undertaken.

1.

[1] Appendix G Ecological Impact Assessment, Section 1.2 Site location, Description, and Ecological Context

15. The walk-through assessments that were undertaken to describe and map the vegetation and habitats present are an appropriate survey technique[2]. The assessment methodology was generally adequate although somewhat lacking in detail. For example, during the site visit, several plant species not listed in the species lists were observed. Due to the omission of many plant species, it is unclear whether any important species may have been overlooked. Nevertheless, due to high levels of modification at the site, the probability of important plant species being present outside the SNA is likely to be low.

Wetland Delineation and Description

16. The wetland delineation assessment[3] was undertaken in line with the requirements under the National Policy Statement for Freshwater Management (Ministry for the Environment 2024) and the wetland delineation protocols (Ministry for the Environment 2022). The findings generally concur with observations undertaken in the wetlands during the site visit.

17. Wetland extent is accurately demarcated at these sites. Mapping of wetland boundaries based on the vegetation community, hydrological features, topography and professional judgement[4] is considered appropriate.

18. The descriptions of the wetlands are generally sufficient, and include hydrology, plant species composition, and levels of modification.

19. I concur with the Ecological Impact Assessment (Appendix G) that both the upper and lower wetlands meet the definition of a natural inland wetland under the National Policy Statement for Freshwater Management.

Significance assessments

20. The significance assessments undertaken for wetlands are problematic.

21. In Tables 21 and 23 of the EcIA, the outcome of the significance assessments for wetlands is greatly influenced by the determination that no indigenous vegetation is present and therefore criteria 1-8 and 10 from the CRPS (Environment Canterbury Regional Council 2021) do not apply[5].

22. The determination of whether indigenous vegetation is present is mostly based on the cover of indigenous species in two wetland delineation plots in each wetland which are then averaged for each wetland, with a mean of <50% indicating the presence of exotic vegetation[6].

23. However, what constitutes indigenous vegetation is not defined in the CRPS. Second, two of the plots (one in each wetland) have greater than 50% cover of indigenous species indicating the presence of indigenous vegetation. Third, mosaics of indigenous and exotic vegetation are typically observed in wetlands and the entire wetland does not need to contain indigenous vegetation for indigenous vegetation to be present.

24. Based on the wetland delineation plot data and my own observations on site, it is my opinion that indigenous vegetation is present in both of the wetlands identified at the site, along with areas of exotic vegetation.

25. If indigenous vegetation is present in both wetlands, then the criteria in the CRPS have not been assessed correctly. The EIANZ guidelines (Roper-Lindsay *et al*. 2018) used in the assessment state that attributes to be considered for the Rarity/Distinctiveness

1.

[2] Appendix G Ecological Impact Assessment, Section 4.5 Flora and Vegetation
[3] Appendix G Ecological Impact Assessment: Appendix C – Wetland Delineation data
[4] s92 response, WET-001 (WSP 2024e)
[5] s92 response Section 004 Wetland Ecology, responses WET-002 and WET-005 (WSP 2024e)
[6] s92 response, Section 004 Wetland Ecology, response WET-002 (WSP 2024e)

criterion include whether the habitat type is naturally uncommon or has induced scarcity. Freshwater wetlands are much reduced at a national scale with <10% of their original extent remaining (Cromarty and Scott 1995). Freshwater wetlands are also rare in Oxford Ecological District (where the quarry is located) where it is estimated that they originally covered and still cover <1% of the district (Harding 2009).

26. It is my opinion that the wetlands at the site meet Rarity/Distinctiveness criterion 3 of the CRPS as they contain indigenous vegetation in a habitat type which has been reduced to less than 20% of its former extent in the region, or relevant land environment, ecological district, or freshwater environment. This assessment concurs with the examples of habitat types (including lowland wetlands) which meet criterion 3 in the guidelines for application of the CRPS ecological significance criteria (Wildland Consultants 2013).

27. In addition, Table 10 of the EcIA appears to show that SNA 039 also does not meet the significance criteria. This is clearly incorrect, as the Rarity criterion alone would be easily met due to the presence of a range of Threatened and At Risk plant species (Hutcheson & Reinders 2024). At least two of these species are located near the southern boundary of the SNA where it abuts the quarry area (personal observation).

28. It may have been more appropriate to assess the significance of areas within the quarry and the SNA separately, for clarity.

29. Nevertheless, the conclusions reached in the EcIA are considered accurate – that the highest values lie in the SNA (not adversely affected by the proposal) and the wetlands and watercourses.

Assessment of Effects on the Environment

Actual and Potential Effects on the Environment

30. The assessment of effects on terrestrial vegetation and wetlands provided in the EcIA is considered to be generally accurate.

31. The EcIA identifies that the highest value vegetation and habitats are present in the SNA and these will be avoided by the proposed activity. Effects of the landfill on terrestrial vegetation are largely limited to exotic vegetation.

32. The extent of works will avoid directly encroaching into the site wetlands and the associated eastern boundary watercourse, with the intent that surface flows to the wetlands remain unaffected. A minimum 10m setback from the upper wetland is proposed.

33. Works are expected to result in changes to groundwater discharge that will have some effect on the lower wetland through a reduction in groundwater recharge. Such changes could ultimately impact vegetation composition and the extent of the wetland[7]. The hydrology report indicates that mitigation in the form of redirecting intercepted groundwater to the wetland is proposed.

34. The pre-mitigation potential reduction in the area of a wetland may be relevant to rules regarding wetlands in the Canterbury Land and Water Regional Plan 2023.

35. The proposed Water Permit conditions (Condition 5) specifies that the ground water take must not cause a permanent reduction of extent of the lower wetland. There appears to be a disconnect between the anticipated effects outlined in both the ecology and hydrology reports and this requirement. The hydrology report indicates that mitigation in

1.

1. [7] Potential effects on wetland extent are mentioned, for example, in Appendix G Ecological Impact Assessment, Section 4.9.7.

the form of redirecting intercepted groundwater to the wetland is proposed. That report also notes the removal of the plantation pine trees is likely to have increased baseflows that would previously have been intercepted by these trees. The ecology report notes that selective plant choice for the lower wetland could be undertaken to help retain surface water.

36. There is no disagreement that without mitigation there will be an adverse effect on the wetland hydrology, and it is appropriate to manage this effect through consent conditions to provide surety that impacts on the wetland are avoided or minimised.

37. The level of adverse effects on the lower wetland are considered by the applicant to be low[8], based on low wetland values and a moderate magnitude of effect of long-term groundwater drawdown of up to 0.2 m at the wetland and up to 0.4 m up gradient of the wetland[9]).

38. However, if the lower wetland is considered to be ecologically significant due to the Rarity criterion being met, and assigned a Moderate ecological value on that basis (see paragraphs 20-25 above), while the magnitude of effect remains Moderate, then the level of adverse effects would be Moderate (based on Tables 6, 8, and 10 of the EIANZ guidelines for Ecological impact assessments (Roper-Lindsay *et al*. 2018)), which has implications for the level of mitigation required.

39. However, the EIANZ process does not fully account for the requirements of the NES-F, including working through the effects management hierarchy.

Off-setting of, or Compensation for, Actual and Potential Adverse Effects to Ensure Positive Effects on the Environment

40. The proposed mitigation for potential effects on terrestrial vegetation is considered appropriate. The mitigation measures proposed by the applicant include remediation of the landfill site following closure, hydroseeding, stock exclusion fencing on both sides of the eastern watercourse, and planting of eco-sourced indigenous species alongside the watercourse[10]. Monitoring of planting success and weed control is also proposed (e.g. CRC243700 proposed condition 46).

41. However, there is uncertainty with what is considered required as mitigation and what is being offered up by the applicant. For example, in Table 11 the Ecological Impact Assessment includes a proposed mitigation approach to “remediate the loss of any indigenous vegetation by replacing with indigenous eco-sourced vegetation”. It is unclear what area of vegetation loss this refers to or at what ratio vegetation loss should be replaced at. It would be useful to specify which areas of indigenous vegetation will be affected and mitigated.

42. Adverse effects on the lower wetland are proposed to be mitigated by enhancing seepage flows, providing additional surface water flows, and planting of indigenous species to retain surface water. These actions would better be considered remediation, not minimisation (as stated in the EcIA[11]), as they will be implemented after the effect on wetland hydrology has occurred.

43. The National Environmental Standards for Freshwater (NES-F) require that any effect on natural inland wetlands must be managed using the effects management hierarchy. I disagree with the s92 response that effects on wetlands are avoided, and therefore that the NES-F is not relevant, given that the justification provided includes examples of

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[8] Appendix G Ecological Impact Assessment, Section 4.9.6
[9] Groundwater and surface water effects assessment. Rev 0, Figure 5-3
[10] Appendix G Ecological Impact Assessment, Section 4.9
[11] Appendix G Sections 4.9.7 and 6.6

remediation (enhancing seepage flows, planting indigenous species to retain surface water) to address adverse effects.

44. From my understanding of the application, I have assessed adverse effects on wetlands using the effects management hierarchy in Table 1.

Table 1. Effects management hierarchy for effects on wetlands (National Environmental Standards for Freshwater)

Effects management hierarchy	Assessment
effects management hierarchy means an approach to managing the adverse effects of an activity on indigenous biodiversity that requires that:	
(a) adverse effects are avoided where practicable; then	Some effects on wetlands are avoided, such as direct damage to wetlands through earthworks, by the use of a protective buffer Groundwater modelling predicts adverse effects on the lower wetland (lowered groundwater discharge) which may result in changes to wetland extent and vegetation composition
(b) where adverse effects cannot be avoided, they are minimised where practicable; then	Minimisation is not proposed [presumably because it would require significant changes to the application]
(c) where adverse effects cannot be minimised, they are remedied where practicable; then	Proposed remediation includes enhancing seepage flows and planting of indigenous species to retain surface water
(d) where more than minor residual adverse effects cannot be avoided, minimised, or remedied, biodiversity offsetting is provided where possible; then	Biodiversity offsetting is not proposed as it is considered that adverse effects will be remedied
(e) where biodiversity offsetting of more than minor residual adverse effects is not possible, biodiversity compensation is provided; then	Biodiversity compensation is not proposed [although fencing and planting of riparian areas is planned to enhance wetlands above the baseline level]
(f) if biodiversity compensation is not appropriate, the activity itself is avoided	Not applicable

45. The updated monitoring programme for wetlands (Appendix M Monitoring Programme and TARP RevB), is proposed to include additional baseline monitoring before work commences, twice yearly monitoring, monitoring of groundwater levels at proposed shallow monitoring wells GW4-1, GW5-1 and GW6-1, monitoring of wetland extent, and inclusion of a Triggers and Action Response Plan (TARP). These measures are supported and will help ensure that any adverse effects are identified and addressed through review and adjustment of mitigation actions.

46. However, there is much uncertainty in the likelihood of the proposed mitigation method for the lower wetland being successful and that as a result, effects cannot be properly assessed. For example, mitigation options will be governed by space constraints and land stability[12] and therefore the most effective solution may not be available when required. In addition, it is not known whether taking water upgradient of the wetland to supplement flows to the wetland will itself have a negative effect on the wetland by reducing residual groundwater flows, or indeed whether baseflow supplementation will be successful at all. Planting of wetland margins with indigenous species could also reduce water flow to the wetland[14] increasing the level of required mitigation. While planting to retain surface water/formation of an artificial wetland is proposed as mitigation for adverse effects on the lower wetland in the Ecological Impact Assessment[13], it is not mentioned in the Monitoring Programme and TARP[14], and it is therefore uncertain when this action may be undertaken or modified as a result of monitoring. No options are provided should the proposed mitigation actions prove unsuccessful.

Management Plans

47. It is proposed that a Vegetation Management Plan (VMP) is prepared within 6 months of commencement of the consent[15].

48. There are brief descriptions of the requirements of a VMP[16]. It will be important that he VMP includes all works required to meet the proposed mitigation goals, including details on planting, fencing, and weed control.

49. A Wetland Management Plan (WMP) is also proposed, which intends to ensure no loss of value is caused to the lower wetland, although no detail on the content of the WMP is presented.

Appendix Y Proposed Conditions Rev1

50. CRC243699 Proposed condition 2. A 10 m setback from wetlands meets the requirements for earthworks under the Resource Management (National Environmental Standards for Freshwater) Regulations 2020. This condition could be improved by requiring the 10 m buffer to be clearly delineated and/or temporarily fenced prior to works commencing to avoid accidental encroachment of machinery or spoil into the wetland.

51. CRC243700 Proposed condition 47, Pg 18. In my opinion, the timescale specified is inappropriate and requirements for infill planting following original planting should be based on monitoring. This condition would be improved by deleting ‘years two to three’ and adding that infill planting should be undertaken yearly to satisfy the requirements of condition 48.

52. The requirement for development and implementation of a WMP has not been included in the proposed conditions of consent. The s92 response for further information stated that this was not required as it is not part of mitigation and wetland monitoring (and actions and responses) are covered by the Monitoring Programme and TARP. It is unclear whether the proposed supplementation of water flows to the lower wetland is also covered by the WMP. Planting of indigenous species to retain surface water within the lower wetland is covered by VMP. Nevertheless, I believe any proposed plan should be included in the conditions of consent.

1.
2. [12] Whiterock Limestone Quarry and Managed Fill Landfill Resource Consent Applications and Assessment of Effects on the Environment 28 March 2024 (page 47)
3. [13] e.g. in Section 4.9.7 and Section 6.6.
4. [14] Appendix M Monitoring Programme and TARP (Draft Rev B) Table G. Lower Wetland Extent.
   [15] Appendix Y Proposed Conditions Rev1, RC245076 Land Use consent, condition 31
   [16] Appendix G Ecological Impact Assessment, Section 6.4

53. CRC243700 Proposed condition 48, Pg 18. The 75% survival rate is low, with best practice typically being 80-90%. Justification for this low figure is warranted.

54. Proposed Conditions (Rev1), Schedule 1, Wetland Margin Enhancement. It is recommended that the objectives for each proposed activity regarding wetlands be included in this schedule, e.g. planting for hydrological retention, to help retain surface water in the lower wetland.

55. Proposed Conditions (Rev1), Schedule 1. It is recommended that the proposed conditions or goals included in Schedule 1 should include requirements for woody weed control over the entire part of the SNA within the property. This control would align with the priorities outlined in Hutcheson & Reinders (2024) for enhancement of the SNA. This is important because the proposed fencing of the SNA will reduce grazing pressure, and therefore weeds may increase in abundance.

Consideration of Submissions

56. A key word search (supplied by CRC) was used to determine relevant submissions, which were read along with a search of a further selection of submissions (299 submissions).

57. It was noted that the predominant concerns relating to ecological matters were regarding contamination of water, particularly in the Karetu River. Relatively few submissions mentioned terrestrial vegetation or wetlands.

58. Many submitters used general terms to express concern for potential effects on terrestrial values, including “flora”, “local ecosystem”, “biodiversity”, and “environmental” (e.g. submission of R. van der Bos). These submissions could not be assessed in detail.

59. The key word search identified three submissions relating to “vegetation”. C. Onellion is “concerned about the proposed vegetation clearance and earthworks near waterways”. D. Gibbs is concerned about “Excavations & vegetation clearance outside of river bed”. B. De Goldi is concerned about spread of contaminated soil to vegetation and waterways. These concerns are addressed by the applicant (e.g. dampening down dust, earthworks set-backs from wetlands, undertaking indigenous plantings on riparian margins).

60. The key word search identified nine submissions referencing ‘wetland’. One additional submission mentioning wetlands was also identified. Several of these submissions were generalist in nature. For example, the submission of S. Fitzjohn is in opposition to the consent “because is carries environmental risks in the forms of…the alteration of wetlands…” and J. McCaleb states in his submission that he is “concerned that the applicant has little consideration for … the wetlands within its own property”. While noted, these submissions could not be assessed in detail.

61. Some submissions are more detailed in their concerns regarding wetlands. For example the submission from White Rock Community Incorporated raises several points including:

    - vegetation types in each wetland are not adequately described.
    - loss of wetland vegetation and extent due to earthworks and reduction in groundwater recharge/dewatering.
    - the ecological value of the wetland is not “low”.
    - the WMP should be submitted as part of the application.
    - works will require consent under the NES-F.

    These issues have been addressed by the applicant and in this evidence.

62. The submission of R. Conelly raised further issues regarding wetlands including contamination of wetlands, rarity of wetlands, and water take within 100m of wetlands. These issues have been addressed by the applicant or in this evidence.

63. The submission of Rangiora Ashley Community Board asked “How can they guarantee the effects on water quality would be less than minor when it is not known whether the groundwater monitor sites are useable in the lower wetlands?”. This question was answered by the applicant following the s92 request for information regarding the use of monitoring stations GW4-1, GW5-1 and GW6-1 to monitor water levels affecting wetlands.

64. The submission summary identifies nine submissions with concerns relating to the nearby Significant Natural Area (e.g. submissions of Z. Brock, L. Munroe, and M. Stanton). The application proposes to avoid the SNA, and concerns relating to proposed enhancement of the SNA have been outlined in this evidence.

Conclusions and Recommendations

65. The description of the environment is generally accurate, and the wetland delineation assessment appears to have been undertaken correctly.

66. In my opinion the ecological significance assessment for wetlands does not consider the rarity of wetlands, both at a natural scale and within Oxford Ecological District. On that basis, it is considered that the site wetlands are likely to meet the rarity criterion and would be significant under the Canterbury Regional Policy Statement criteria. Nevertheless, the conclusions reached in the EcIA are considered accurate – that the highest values lie in the SNA (not adversely affected by the proposal) and the wetlands and watercourses.

67. The assessment of effects for terrestrial vegetation is generally accurate, and the proposed mitigation is considered appropriate.

68. The assessment of effects for wetlands is affected by the outcome of the significance assessment. It is considered that effects on the lower wetland are Moderate, not Low as assessed in the EcIA. However, both wetlands should be protected, as the proposed consent conditions[17] specify that no reduction in the extent of the lower wetland is permitted, and no earthworks are permitted within 10 m of wetlands. In addition, the proposed monitoring and Triggers and Action Response Plan (TARP) will help ensure that any adverse effects are identified and addressed through review and adjustment of mitigation actions.

69. There is much uncertainty in the likelihood of the proposed mitigation method for the lower wetland being successful. As a result, effects cannot be properly assessed.

70. An independent assessment (Hutcheson & Reinders 2024) identified weed control as the priority action to be undertaken in and adjacent to SNA 039 to protect the habitats of threatened plant species. The proposed fencing of the SNA, while supported, is likely to reduce browsing pressure, which may lead to an increase in weed abundance. Targeted weed control within the SNA for the duration of the consent would therefore be a good way to compensate for any adverse effects on ecological values that could result from the proposed landfill, and should be part of the consent conditions.

71. Several other relatively minor adjustments to the proposed consent conditions (paragraphs 48-53) would also provide more certainty that the proposed mitigation actions are successful.

1.

[17] Appendix Y Proposed Conditions Rev1, CRC243703 Condition 5, page 35

72. The concerns of submitters regarding potential adverse effects on terrestrial vegetation and wetlands have been addressed by the applicant or in this evidence.

References

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86. WSP 2024d. Whiterock Lime Quarry and Landfill. Groundwater and surface water effects assessment. Rev 0. 15 May 2024.
87. WSP 2024e. 1-E0087.00 Whiterock Landfill Post Lodgement Response to ECan RFI Section 4 – WET. August 2024

Appendix 4- Geotechnical Section 42A report, prepared by Clive Anderson, Tonkin + Taylor.

Before the Independent Hearing Panel appointed by the Canterbury Regional Council

IN THE MATTER OF The Resource Management Act 1991

AND

IN THE MATTER OF Application CRC 243699 to 243706

Section 42A Officer's report

Report of: Clive Kenneth Anderson (Tonkin & Taylor Ltd)

1 Introduction

1.1 Background

1 Protranz International Limited (Protranz) proposes to operate a limestone quarry and processing plant, and to establish a Class 3 Managed Fill (landfill), that will also accept contaminated soils that will meet the Class 1 landfill leaching criteria, at the existing Whiterock Quarry in Loburn, North Canterbury. Protranz has applied to both Waimakariri District Council (WDC) and Canterbury Regional Council (known colloquially as ECan) for a range of resource consents required for the establishment and operation of the proposed hybrid Class 1/Class 3 Managed Fill (landfill).

2 Tonkin & Taylor Ltd (T+T) has been engaged by WDC to undertake a technical review of the geotechnical and slope stability assessments lodged by Protranz in support of its resource consent applications.

3 The purpose of this Report is to set out the findings of our Technical Review of Protranz's geotechnical and slope stability assessments to support a Section 42A report and inform a decision by WDC and ECan on the resource consent applications.

4 The following documents have been considered as part of this technical review:

- **Appendix E – Geotechnical Assessment:** Prepared by WSP, Revision 3, dated 19 March 2024 (referred to as the Geotechnical Assessment).
- **Appendix F – Groundwater and Surface Water Effects Assessment:** Prepared by WSP, Revision 0, dated 26 March 2024.
- **Appendix H – Design Drawing Set (Rev1):** Prepared by WSP, Revision 0, dated 18 March 2024. Updated to Revision 1, dated 6 August 2024 (referred to as the Drawings).
- **Appendix J – Landfill Design Report, Section 6: Geotechnical:** Prepared by WSP, Revision 0, dated 25 March 2024 (referred to as the Landfill Design Report).

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- **Appendix Q – Slope Stability Assessment:** Prepared by WSP, Revision 1, dated 20 February 2024 (referred to as the Slope Stability Assessment).
- **Section 2 – Geotechnical Engineering: Response to ECan RFI:** Letter prepared by WSP, dated 16 August 2024.
- **RC245076 – 150 Quarry Road Section 92 Response, Section 3 – Geotechnical Engineering:** Letter prepared by WSP, dated 23 August 2024.
- **Those submissions received by CRC and WDC** that mention concerns about geotechnical aspects of the project.

5 This technical review has been undertaken by me, a Senior Principal Geotechnical Engineer at T+T. I have reviewed the aspects of the application relating to the geotechnical and slope stability assessments. This report has been prepared in accordance with T+T's letter of engagement with WDC, dated 22 May 2024.

6 The geotechnical assessment (Appendix E) focusses on identifying the key geological features external to the landfill body in the surrounding rocks and soil. Other than the landfill capping it does not discuss specifics of the landfill body design. That is reported elsewhere in the applicant's proposal.

7 The content of this report focuses on the key geotechnical issues, pertaining to the project consenting process arising from the applicant's geotechnical assessment. Where specific aspects of the geotechnical assessment have not been discussed it can be taken that I did not have any particular concern or disagreement with the applicant's geotechnical assessment and/or design.

8 I have considered the submissions that raise concerns about the geological conditions at the White Rock Quarry site. Several common concerns about the geological conditions have been raised by submitters. These are dealt with by responding to the specific issue raised rather than addressing each submission.

9 I visited the site and carried out a walkover of the quarry and its immediate surroundings on 25th June 2024.

1.2 Qualifications

10 I am a Principal Geotechnical Engineer with Tonkin & Taylor Ltd with 41 years of post-graduate experience working as a geotechnical engineer. My specific qualifications are:

1) NZ Certificate of Engineering (Civil);
2) Batchelor of Engineering (Civil) (Honours) from the University of Canterbury;
3) Master of Science in Soil Mechanics and Engineering Seismology (with Distinction) from the Imperial College, London University;
4) Diploma of Imperial College;
5) Diploma of Technology Management from Deakin University;
6) Chartered Professional Engineer (NZ);
7) Fellow of Engineering NZ.

11 My relevant experience encompasses a wide range of geotechnical projects within NZ, Australia, Singapore and Indonesia. Specific experience that is relevant to this project includes:

1) Assessment of a new museum that Whale Watch proposed for the Kaikoura Peninsula which required the assessment of the karstic limestone that is part of the local geology.

2) Assessment of the risk posed by karstic limestone to a sub-sea tunnelling project in Singapore. This assessment included engagement of a subject matter expert on karstic limestone from the University of Malaysia. I commissioned a sea based geophysical survey

of the seabed limestone searching for evidence of karstic features that may have developed prior to submergence following the most recent ice age and the subsequent sea level rise.

3) Provision of expert geotechnical evidence to changes to the Christchurch District Plan.

4) Review of Resource and Building consent applications for both Christchurch City and Whangarei District Councils. In Christchurch many of the building consent applications required review of future earthquake effects on land. In Whangarei District my consenting work has included providing advice on the risk of underground coal mine collapse to existing and new houses built above the disused mines.

5) Following the Kaikoura Earthquake in 2016 I was peer reviewer of the designs of the rockfall mitigation works above the railway and highway north and south of Kaikoura. NZTA was reliant on my design and report sign-off for the assurance that the works on the steep rock slopes had been designed to the required standard and defined risk criteria.

6) Design of the proposed 100 m high Cypress Coal mine highwall at Stockton, West Coast of New Zealand. This highwall design was impacted by high groundwater levels that required drainage and the regional scale Mt William Fault that intersected the highwall. Mining of coal was to take place at the base of the steep highwall.

7) Provision of expert geotechnical evidence in numerous legal disputes which has included mediation hearings and trials in the High Court.

8) I have carried out or supervised the investigations and analysis of the stability of numerous slopes in rock and soils. Notable projects include the investigation and stabilisation of the very large landslides adjacent to Lake Dunstan behind the Clyde Dam, analysis of a large-scale slope failure in rock on the Paiton Power Project in Indonesia plus numerous smaller slopes ranging residential sites impacted by storms to rock slopes routinely encountered along NZ's highways. My role on the Paiton Power project included service as an expert geotechnical witness in the International Court of Arbitration in London.

9) Assessment and design of the light industrial development sited on top of the landfill at Musgrove Close, Christchurch. The landfill comprised 5 – 6 m depth of uncontrolled building demolition waste from buildings demolished in Christchurch in the 1960's then dumped into a disused gravel pit. Groundwater rose and fell within the debris seasonally. A low permeability soil cap was placed on top of the debris to minimise surface water entry. Testing of the contaminants within the landfill material was carried out as part of the Council requirements for approval of the new industrial estate. Surcharging was placed on the cap to accelerate settlement of the landfill material. Dynamic compaction was used to consolidate the landfill below the access road. Settlement of the soil cap was monitored and the results served as inputs to the design of the sewage and stormwater systems and the access road. Lightweight industrial buildings capable of dealing with settlement were then built over the landfill. One heavy building, with a landfill gas control system, was piled through the landfill to the underlying gravels. All buildings and the services have performed satisfactorily to date.

10) I am currently both an author and reviewer of the Slope Stability Geotechnical Guidance Series being developed for use on NZ projects by the New Zealand Geotechnical Society.

1.3 Code of Conduct and Conflict of Interest declaration

12 I have read the Environment Court's Code of Conduct for Expert Witnesses contained in the Court's Practice Note of 2023. I have complied with that code in preparing this report and agree to comply with it in providing information or opinion to the Hearing Panel in relation to this matter. The aspects of the application addressed in my report are within my area of expertise and I have considered and stated all material facts known to me which might alter or qualify the opinions I express.

13 I have no commercial relationship with the applicant.

1.4 Scope of the Report

14 This report is prepared under the provisions of Section 42A of the Resource Management Act 1991 (RMA). This section allows a council officer or consultant to provide a report to the decision-maker(s) on a resource consent application made to the council and allows the decision-maker(s) to consider the report at the hearing. Section 41(4) of the RMA allows the decision-maker(s) to request and receive from any person who makes a report under Section 42A "*any information or advice that is relevant and reasonably necessary to determine the application*".

15 This report is supplementary to the Section 42A Report prepared by Environment Canterbury (ECan) for the above resource consent applications. Full details of the consent applications are provided in that report.

16 To carry out this audit of the consent applications, I have:

- Considered the relevant sections of the assessment of effects on the environment (AEE) submitted by the applicant, including its technical appendices.
- Reviewed further information that was provided by the applicant on 16 August 2024 in response to Section 92 questions.
- Taken into account relevant issues raised by submitters in relation to the effects I have considered in this report.
- Read the Section 42A reports prepared by Ms Sally Lochhead (Hydrogeology) and Mr Tony Kortegast (Landfill Engineering and Waste Containment).
- Read the Section 42A report of Matthew Silver of Canterbury Regional Council focused on groundwater and leachate issues.

2 Description of the Proposal

17 The proposed Whiterock Landfill will be formed within the void left by extraction of limestone for lime production which has been occurring since the 1950's. Limestone extraction is set to continue. The quarry has produced significant quantities of soil overburden which is proposed to be reused within the proposed landfill operation.

18 The application is for a Class 3 Landfill (Technical Guidelines for Disposal to Land, WasteMINZ 2023) to receive construction and demolition (C&D) waste, contaminated soils, controlled fill and clean fill. The fill material will include asbestos containing materials (ACM). It is understood that degradable organic materials will be prohibited. The applicant proposes contaminated soils with TCLP[1] limits for Class 1 Landfills (WasteMINZ 2023) be accepted at the landfill.

[1] Toxicity Characteristic Leaching Procedure: a standard test developed by the US Environment protection Agency to determine the levels of leachable organic and inorganic chemical species in leachates at landfills.

19 I understand from Mr Kortegast's Section 42A report (Section 2.1) that given the proposed mix of materials to be disposed at White Rock Quarry that the landfill (if consent is granted) is better termed a hybrid Class 1/Class 3 Managed Landfill.

20 The total landfill footprint is about 4 ha. The completed landfill volumes is about 500,000 m^3.

21 The design drawings (Appendix H) and report (Appendix J) show the landfill will have a Class 1 landfill engineered liner based on the proposed acceptance of contaminated soils with TCLP limits for Class 1. The purpose of the Class 1 liner is to minimise the risk of leachate leakage through the liner. The design requires the collection of leachates above the Class 1 liner which then flows into a leachate collection pond prior to removal off-site to a waste water treatment plant most of the time. Recirculation of the collected leachate within the waste is proposed if climatic conditions allow.

22 The landfill will be constructed in two stages, each stage with similar phases comprising earthworks, installation of the underdrainage system, landfill bottom liner, and a leachate collection system. The construction of the leachate pond forms part of Stage 1.

23 Before the landfill body is constructed the WSP Preliminary design drawings show that prior to building the engineered lining system the quarry void will be shaped so that the drainage of leachates at the base of the future landfill flows along the top of the liner towards a leachate pond to be built immediately beyond the southern end of the landfill body. The intended gradient of the liner is 1 V to 50 H or 2 % toward the leachate sump.

24 The landfill lining system itself comprises, amongst other elements, a 600 mm thick low permeability cohesive soil (i.e. clay) layer plus a 1.5 mm thick HDPE liner immediately on top of the soil layer. These two elements form the long-term primary containment system to prevent the loss of leachate out through the fill base into the wider environment. Leachate that reaches the landfill base will flow along the top of the HDPE liner through a 300 mm thick aggregate layer or one of the perforated leachate collection pipes placed at up to 25 m centres within the aggregate. From there it will flow into the leachate storage pond for collection.

25 An underdrainage system will be installed below the lining which is designed to intercept groundwater in natural ground below the landfill body and divert it away to either the Karetu River or into the leachate storage pond (if the water is contaminated). One of the design criteria for this system is to maintain natural groundwater levels to no higher than 1 m below the lining base.

26 The applicant has undertaken a field investigation program which has included a site walkover by experienced engineering geologists and a program of subsurface exploration by two test pits and nine boreholes. The investigation locations were the overburden spoil piles, the groundwater system(s), the quarry itself and the river crossing. Rock and soil samples gathered from the test pits and boreholes were tested in the laboratory.

27 The scope of geotechnical investigations is considered appropriate for the consenting phase of the project to define the potential long-term environmental effects of the landfill.

28 The geotechnical report contains recommendations at Appendix E Section 6.1 for the end of quarrying final "pit slopes". I endorse the proposed bench heights of 15 m maximum coupled with benches of 8 m minimum width from both stability and safety perspectives.

3 Key Aspects of the Geotechnical Environment

29 The quarry geology comprises a sequence of Tertiary age sandstones/limestone/siltstone rocks. This sequence forms a south plunging syncline with mining of the exposed limestone taking place on the western limb of the syncline. Bedding within the limestone dips down from west to east. No active faults have been mapped within the site and the nearest known major regional scale faults are 2 to 4 km away.

30 Subvertical joints perpendicular to the quarry highwall are spaced at about 30 to 40 m intervals along the highwall and may be a series of small, localised, normal and reverse faults with up to 5 m movement on them. Joints in the quarry face that run sub-parallel with the face have led to wedge failure mechanisms where they intersect with other joints and the small faults.

31 The local faults within the quarry have uplifted the limestone 30 to 50 m but the lack of any faulting through the surface loess soil layer indicates an absence of fault movement since the loess was deposited by westerly winds 10,000 to 20,000 years ago.

32 Signs of highwall/quarry face movement, in response to the quarrying process, have been recorded. These include tension cracks subparallel to benches in the highwall and batter instability where unfavourably oriented faults or joints occur. Water erosion of the fine sandstone of the Tokama Siltstone as runnels down the face has occurred.

33 Excavated overburden soils above the limestone resource have been stockpiled in a loose condition nearby with side batter slopes of about 30°. Some areas of instability of these slopes have occurred possibly triggered by local seepage.

34 Site groundwater observations are not presented in detail within the applicant's geotechnical report (Appendix E). This is presented in Appendix F (Groundwater and Surface Water Effects Assessment) and has been addressed in ECan's Section 42A report, and in T+T's Hydrogeology Technical review report[2] by Sally Lochhead. Consequently, I do not present any detailed assessment of the groundwater system in this report.

35 My examination of Figure 4-4 and Table 4-2 in the Appendix F report indicates that a simple model of the groundwater flow could be as follows:

- 1) Groundwater heads in the Whiterock limestone and underlying Berrydale Greensand are at about 225 m (NZVD).
- 2) The topographical RL of the Karetu River alongside and below the existing quarry void is about 210 m (NZVD).
- 3) Therefore the shortest flowpath (about 200 m long based on Figure 4-4) for fugitive leachate would be directly through the limestone and greensand rocks directly into the Karetu River if a suitable flow path through the rock mass is available. This would be the most conservative assumption for assessing the impact of any leachate discharge into the wider environment beyond the landfill.

36 There are existing shallow landslides external to the quarry, one of which is about 30 m wide and 100 m east of the quarry. This may have moved toward the quarry in the period 2010-13 based on the applicant's assessment of Google Earth images.

4 Environmental Effects arising from the Geotechnical Assessment

37 Movement on the observed small-scale faults within the quarry is unlikely during the life of the landfill. There is no evidence of movement on these faults since the overlying loess soils were deposited following the end of the last ice- age about 12,000 years ago (Ref Appendix E Section 5.1.2). Therefore, a loss of contaminants caused by short fault rupture of any containment structure is unlikely during the life of the landfill.

38 I consider now the concerns expressed by submitters about faults in the area:

- Some submitters expressed concern about the potential for nearby large fault movement to damage the landfill. If local movement did occur on a fault that passed through the landfill, then damage could occur to the containment liner but as I state

[2] Tonkin & Taylor Ltd (2025). *Section 42A Officer's Report of Sally Elizabeth Lochhead*, March 2025, T+T Ref. 1094013.0001.

above I agree with the applicant that the available evidence indicates that this is very unlikely.

- The normal response to the potential for large scale fault movement within the quarry walls is to ensure that the likelihood (or probability) of movement on these faults is acceptably low.
- However, in Section 5.1.2 (Discontinuities) of the WSP Geotechnical Report March 2024 it states that the expected return period of movement on the known active faults in the region is believed to be "*in the order of hundreds of thousands of years*". This statement appears to be in error as the Mt Lawry Fault 2km from the quarry is mapped as a fault offset and monocline fold offsetting the Q2 glacial outwash surface which is bracketed at 10,000 to 25,000 years old. The Mt Lawry Fault is defined as a definite fault awareness zone on Canterbury Maps and described as offsetting an estimated 18,000-year-old landform in GNS Science report 2012/236 (General distribution and characteristics of active faults and folds in the Waimakariri District North Canterbury).
- These long-estimated time periods since fault movement on nearby active faults and small-scale faulting in the quarry indicate an acceptably low probability of direct fault rupture during the expected life of the landfill which I acknowledge will be in perpetuity.

Therefore, based on the above long time periods between fault movements, I conclude that the likelihood of any nearby fault damaging the proposed landfill is acceptably low.

39 The impact of the wedge failure mechanisms on the landfill design was queried during my initial review of the application. The applicant's response states that the wedge failures are "*relatively uncommon*", of "*small volume and do not significantly affect the overall stability of the slopes. The wall liner detail can accommodate any small-scale wedge failures that occur following slope cutting*". I observed these potential failure mechanisms during my site visit on 25 June 2024 and ***based on my geotechnical experience and engineering judgement I concur with the applicant***.

- Some submitters are concerned that "unstable" limestone rock could damage the containment liner. The unstable areas of the limestone rock mass noted in the geotechnical assessment by WSP, if not removed by trimming and excavation of the rock batter, can be stabilised directly by using rock bolts and shotcrete, or similar stabilising technique designed to prevent post construction movement of the rock and damage to the containment liner.

40 The applicant proposes to cap the landfill using currently stockpiled overburden soils. The WSP Landfill Design Report states that subsoil drainage may be included within the cap soil lining. The long-term capped landfill slope angles were queried under Section 92 and the applicant has responded stating that the final, long-term landfill slopes will be *"up to 3H:1V (approximately 18°)*". Despite a request for stability analysis results for the landfill cap, in terms of the factor of safety a response to this part of the question was not provided. However, using an infinite slope failure mechanism for the landfill cap, sloping at no more than 18°, I assess that the factor of safety for a dry slope (i.e. landfill cap) should be about 1.8 and for a fully saturated slope I assess the factor of safety could drop to about 0.7. ***Consequently, it will be important for the design of the final landfill cap to ensure that seepage water pressures are kept to a low level to prevent cap failures that could expose the underlying landfill materials***. ***This will require consideration of the ability of the low permeability spoil proposed as the landfill cap to retain and hold water within it along with the consequent implications for instability. This will necessitate incorporating specific drainage into the cap lining design. I note that this is proposed on the design drawings (Drawing C301) but with a cap thickness 1.5 m thick careful design of the drainage system will be required to preserve long term cap stability. I also note that Section 12.3.2 Cap***

subsoil drainage in the Appendix J Landfill Design Report may not be provided in final design. If that is the case, then the applicant will need to provide adequate geotechnical assessment to confirm that this drainage element is not required given my simple stability assessment results provided above.

41 Review of Appendix Q – Slope Stability Assessment sets out the stability analyses for the landfill body along with the chosen seismic ground motions. The landfill is assigned a nominal life of 100 years for the stability analyses and an Importance level 3 is assigned. This level requires the use of ground motion parameters of equivalent to a return period of 1000 years to be used in assessing stability. The stability analyses indicate that acceptable factors of safety are present for moderate shaking levels but that movement of the landfill body of up to 180 mm may occur along leachate containment system for the 1000-year design earthquake ground motions. If that movement occurred cracking of the containment system may occur. Subsequent observations of the leachate and under lining drainage system for any changes in leachate flows would be required to check for evidence of containment damage.

42 A Section 92 query was raised about the potential for existing landslides to move further and enter the quarry area (Appendix E Section 5.5). The applicant's response states that they believe the likelihood of that occurring to be low on the basis that the slope between the landslide and quarry is "*considerably flatter*" than the slope that the landslide has previously moved on. The applicant further states that the quality of the Google Earth images is sufficient to identify other landslide features such as tension cracks and hummocky ground. No evidence was found in those images of large-scale deep-seated landslides affecting the site***. I have examined the same Google images, visited the site and I concur with the applicant's assessment of local landslide risk to the proposed landfill area.***

43 The applicant proposes to reuse the site won materials during landfill operations and for landfill capping. Laboratory testing of two samples of the stockpiled soils indicate a low recompacted permeability of less than 10^{-9} m/s. A trial fill of these material is proposed. I note that the Appendix I (Vehicle Movement Calculations and Materials Balance Summary) indicates that of the 174,000 m^3 of site won materials about 164,000 m^3 will be reused on site with 6,200 m^3 of topsoil either reused from onsite or imported for a total soil requirement of 170,000 m^3. Consequently, there will only be a margin of 4000 m^3 (or 2 %) of surplus soils currently available. Therefore, should the available volume of soil for reuse within the quarry limits not eventuate then additional vehicle movements associated with importing the shortfall will be required. ***This is an issue that warrants further discussions regarding the applicant's proposal for refining what the impacts of that situation might be and how likely it is to occur. A contingency source for capping materials may need to be identified in case there is a shortage.***

5 Other Geological Issues Raised by Submitters

44 This section sets out my response to other geological issues raised by submitters but not explicitly dealt with in previous sections.

45 ***Earthquake Shaking Risk*** The landfill will have a design life of 100 years with an importance level of 3 which means it needs to resist the effects of earthquake ground motions with an average return period of 1000 years. The probability of the design ground motions occurring during the 100-year life of the landfill is about 10 %, or 1 in 10. Consequently, steep interfaces around the old quarry rock walls and over lying landfill could experience downward movement i.e. settlement or lateral movement of the landfill materials which may damage the containment liner. ***Therefore, the design of the liner will need to ensure that damage from downward movement on the steep quarry walls cannot occur and that any movement of the landfill body along the core.***

46 ***Karstic Limestone*** is formed when slightly acidic freshwater dissolves limestone over long time periods (1000's of years), to develop surface and subsurface features that form by the exploitation of existing rock defects such as bedding, joints and faults to provide open, locally high permeability pathways for fluid flow. Cave systems are the ultimate expression of this process. This is a concern to some submitters.

47 Geological study of the limestone rock (Appendix E Sections 5) and indicates that weathering led to development of minor (i.e. surface erosion features and not passages and caverns) forms of paleo karst topography on the upper limestone surface before deposition of the overlying Tokama Siltstone about 23 Million years ago. There is no indication of further karstic features developing in the limestone rock around the current White Rock Quarry since it was tectonically uplifted from a shallow sea floor over the past approximately 2 Million years. Observations by professional geotechnical engineers and engineering geologists have not found any such features. I did not see any such features on my site visit. Neither is there any evidence of collapse features on the ground surface around the quarry. Collapse features, often termed tomos, are commonly associated with the collapse of passages and caverns within karstic limestone.

48 However, I acknowledge that some submitters (O Meijer and Duncan Mackintosh) have pointed out that they are aware of evidence of karst features that have been found during the quarry life. It appears that these features were small in scale. ***It is my opinion, based on my reading of their submissions, that the features they observed were more likely than not to be small in scale and able to be rectified, if they are found, with good engineering design to preserve the integrity of the lining system. Therefore, the applicant's design should contain a contingency detail to fill/seal/drain any small karst features that are discovered. The landfill design report (Appendix J) acknowledges the potential for karst features to be found. If unexpectedly large karstic features were found on subsequent quarrying, then a reassessment of the containment design would be required.***

49 ***Porous Limestone*** Some submitters expressed concern about the limestone being porous and/or able to be eroded by acidic leachate that escapes from the landfill containment system.

Limestone can indeed be a porous rock due to its nature as a sedimentary rock formed from the deposition and cementation of the remains of marine organisms like coral and shells.

50 The porosity of limestone is determined by both primary and secondary porosity. Primary porosity is related to the depositional characteristics of the rock itself, such as the spaces between grains in a sedimentary rock. Secondary porosity is related to the post-depositional changes to the rock, typically connected with dissolution processes, fracturing or weathering over time, resulting in features like vugs (small cavities), joints, or fissures.

51 The limestone observed in the White Rock Quarry walls is a relatively massive muddy (micritic) limestone with poorly developed bedding and widely spaced persistent defects (20 to 30 m spaced small scale faults). The paleo karst features in the top of the limestone may result in higher secondary porosity than the main mass of the limestone. As such the overall porosity is relatively low compared to the range for the overlying Kowai Conglomerates and the underlying Karetu Silica Sands. I understand that this is reflected in the groundwater modelling that has been undertaken and reviewed in the evidence of S. Lochhead.

52 As noted in T+T's Landfill Technical review report[3], the landfill assessment indicates that large volumes of leachate are considered unlikely, and that leachate is unlikely to be acidic. Refer to the Section 42A report of A.P. Kortegast for more information.

53 For the proposed landfill there are two features which will counteract the natural porosity of the limestone and any concerns of submitters of an attack by acidic leachate.

[3] Tonkin & Taylor Ltd (2025). *Section 42A Officer's Report of Anthony Paul Kortegast*, March 2025, T+T Ref. 1094013.0001.

54 The first is the containment system which I understand will be robustly designed to reduce the risk of leakage of any leachate from the landfill encountering the underlying limestone. I summarised the water barrier features of this system in Section 2 above. If that system were to fail in a catastrophic manner and, if large, ongoing quantities of acidic leachate were able to encounter the limestone, then it would be possible for the limestone rock to chemically weather by a process known as dissolution. In this process the acid leachate would react and dissolve the alkaline calcium carbonate limestone increasing both the rocks porosity and permeability.

55 The second feature is that the leachate is unlikely to be acidic as set out by my colleague in Mr Kortegast's Section 42 A report.

56 ***Large Scale Landsliding*** One submitter expressed concern that landsliding on the scale seen along the Kaikoura Coast following the Kaikoura Earthquake in November 2016 might occur at White Rock Quarry. Strong locally centred earthquake shaking is likely to cause instability of some slopes in the White Rock Quarry area and possibly of the Quarry highwalls themselves.

57 However, the scale of catastrophic instability leading to large rockfalls on the Kaikoura Coast cannot be repeated at White Rock for the following reasons:

- The rock mass around the Quarry is not as intensely fractured nor standing as high as the slopes along the Kaikoura Coast so similar volumes of failure material into the quarry following strong shaking cannot develop. The rock slopes along the Kaikoura Coast are up to 300 m high whereas the highwalls around the White Rock Quarry are in the order of 40 to 50 m high.
- Failures around White Rock Quarry are more likely to be discrete rock blocks from the highwall. Small scale instability features are noted in the geotechnical assessment such as wedge and bench failures. In Section 4 on Environmental effects, I have noted the need for the landfill designer to consider stabilising these features to prevent damage to the containment system. If that is done properly then that process should reduce the likelihood of earthquake induced failure of the remnant quarry highwalls.
- As the landfill develops, its mass, resting against the supporting slopes, should increasingly create a stabilising effect against highwall failures. As a consequence the likelihood of a large-scale highwall failure, triggered by strong earthquake shaking, should progressively decrease with time as the landfill volume increases.
- Seismically generated movement of the landfill itself will be limited by its containment within the quarry void at the end of quarrying. I commented on the landfill body assessment above.

58 ***Leakage of Leachate into the wider Environment***

Many submitters have expressed concern about the potential for leachate to flow through the base of the landfill if the containment lining leaked for any reason. Some of the potential causes of leaks that concerned submitters included earthquake faulting (addressed above), the limestone being potentially karstic (addressed above) and aging of the HDPE lining.

The HDPE lining reaching the end of its life and starting to leak concerns many people. I've examined the design of the landfill base lining system and concluded that even if the HDPE lining eventually deteriorated and started to leak the leakage rate through the underlying clay soil lining 600 mm thick would be extremely slow. Properly constructed, this lining is required to have a maximum permeability of less than 1×10^{-9} m/s. What this would mean is that if leachate was ponded on top of the clay liner to the maximum design depth of 300 mm it would take 38 years for leachate to flow from the top to the base of the lining and into the wider environment.

The clay soil of the 600 mm thick liner is not subject to the same time related deterioration processes as the HDPE. The critical issue with the clay liner is to ensure that the correct

material type is selected and that the liner is properly constructed so that cracks cannot form in it due to post-construction shrinkage due to loss of moisture. Any such cracks would totally compromise the permeability of the lining system and leave only the HDPE lining to prevent loss of leachate into the environment. If the HDPE lining became degraded for any reason, then leachate is likely to escape from the landfill with the potential to flow down gradient through the limestone toward and into the Karetu River.

Therefore, it is essential to the long-term functioning of the leachate containment system that the 600 mm thick clay lining is built to stringent quality control requirements which includes sign-off by the landfill designer at the end of construction to verify that the clay lining system has achieved the required permeability without cracks forming.

6 Conclusion

I conclude that if the proposed landfill design is properly executed in the detailed design and then construction, then there is no geotechnical impediment to developing the proposed landfill.

However, this conclusion is totally dependent on the proposed containment system being properly constructed. This is because the local geology and topography would not provide effective long-term containment of fugitive leachate.

The critical element of the proposed containment system in my opinion is the 600 mm thick clay lining as that should have an unlimited effective life over which it continues to perform its function. If due to poor construction cracks formed through the clay and if the HDPE layer is damaged during construction and not repaired, then any leachate that escaped the underlying drainage system is likely to reach the adjacent Karetu River. This serves as the ultimate discharge point into the wider environment. The short distance from the quarry void to the river (about 200 m) and the nature of limestone would not prevent this occurring in the long run. This opinion is consistent with Sally Lochead's Section 42A report.

Consequently, in my opinion, constructing a high-quality containment system is the key to the ability to use the quarry void for the proposed hybrid Class1/Class 3 landfill.

Report prepared by:

Clive Anderson

Principal Geotechnical Engineer

Tonkin & Taylor Ltd

March 2025

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Appendix 5- Transportation Section 42A report prepared by Alan Gregory, Tonkin + Taylor.

Before the Independent Hearing Panel appointed by the Canterbury Regional Council

IN THE MATTER OF The Resource Management Act 1991

AND

IN THE MATTER OF Application CRC 243699 to 243706

Section 42A Officer's report

Report of: Alan Gregory (Tonkin & Taylor Ltd)

1 Introduction

1.1 Background

1 Protranz International Limited (Protranz, the Applicant) proposes to operate a limestone quarry and processing plant, and to establish a Class 3 Managed Fill (landfill) at the existing Whiterock Quarry in Loburn, North Canterbury (the site). Protranz has applied to Waimakariri District Council (WDC) for a range of resource consents required for the establishment and operation of the proposed landfill.

2 Tonkin & Taylor Ltd (T+T) has been engaged by WDC to undertake a technical review of the transport assessment and vehicle calculations lodged by Protranz in support of its resource consent applications.

3 The purpose of this Technical Report is to set out the findings of my update of the Technical Review, conducted by T+T Senior Principal Transport Planner Sam Wilkie, of the Protranz transport assessment and vehicle movement calculations to support a Section 42A report and inform a decision by WDC on the resource consent applications.

4 The following documents have been considered as part of this technical review:

- **Appendix H – Design Drawing Set (Rev1):** Prepared by WSP, Revision 0, dated 18 March 2024. Updated to Revision 1, dated 6 August 2024 (referred to as the Drawings).
- **Appendix I – Vehicle Movement Calculations and Materials Balance Summary:** Prepared by WSP, no date (referred to as Vehicle Calculations).
- **Appendix U – High Level Transport Assessment:** Prepared by WSP, Revision 0, dated 9 August 2023 (referred to as Transport Assessment).
- **RC245076 – 150 Quarry Road Section 92 Response, Section 4 – Transport:** Letter prepared by WSP, dated 23 August 2024.

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5 I have been involved in Mr Wilkie's earlier assessment as technical reviewer and agree with the conclusions drawn.

6 I visited the site on 19 March 2025 and reviewed the road corridor between Rangiora and the end of Quarry Road to assess the road environment and observe road user behaviours.

1.2 Code of Conduct and Conflict of Interest declaration

7 While not required for a Council hearing for a resource consent application, I have read the Environment Court's Code of Conduct for Expert Witnesses contained in the Court's Practice Note of 2023. I agree to comply with that code when giving evidence to the Hearing Panel in this matter. All my evidence is within my expertise, and I have considered and stated all material facts known to me which might alter or qualify the opinions I express.

8 I confirm that the issues addressed in this brief of evidence are within my area of expertise, except where I state I am relying on what I have been told by another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

9 I have no commercial relationship with the Applicant, save in my role as an expert in relation to this application or other concurrent work for the Applicant as an independent expert.

1.3 Qualifications

10 I hold the qualification of MSc in traffic and transportation. I am a Chartered Professional Engineer (CPEng), a Chartered Member of Engineering NZ (CMEngNZ) and a Member of the Institution of Civil Engineers (MICE).

11 I am Principal Transport Planner with Tonkin & Taylor Ltd (T+T) in Hamilton and have been for five years. Prior to that I was Transport Team Leader with MWH for 3 years and Principal Transportation Engineer with Opus International Consultants for 8 years. I was National Chair of the Engineering NZ Transportation Group between 2016 and 2019. Before 2006 I worked in the UK in the civil engineering and transport industry.

12 I have 30 years of experience in traffic transportation and roading engineering in New Zealand, the Pacific Islands, and the UK. I have extensive knowledge and experience of the New Zealand transportation network. I have 18 years' experience in the evaluation and assessment of transportation effects of development throughout the country including landfills at Tirohia, Redvale and Whitford, and have acted as an independent expert witness for NZTA, local authorities, and the private sector over that time.

1.4 Scope of this report

13 This report is prepared under the provisions of Section 42A of the Resource Management Act 1991 (RMA). This section allows a council officer or consultant to provide a report to the decision-maker(s) on a resource consent application made to the council and allows the decision-maker(s) to consider the report at the hearing. Section 41(4) of the RMA allows the decision-maker(s) to request and receive from any person who makes a report under Section 42A "*any information or advice that is relevant and reasonably necessary to determine the application*".

14 This report is supplementary to the Section 42A Report prepared by Waimakariri District Council (WDC) for the above resource consent applications. Full details of the consent applications are provided in that report.

15 To complete this report of the consent applications, I have:

- Considered the relevant sections of the Assessment of Effects on the Environment (AEE) submitted by the Applicant, including its technical appendices.
- Reviewed further information that was provided by the Applicant on 16 August 2024 in response to Section 92 questions.
- Taken into account relevant issues raised by submitters in relation to the effects I have considered in this report.

2 Description of the Proposal

16 The proposed Whiterock Landfill is at the location of an existing lime quarry at 150 Quarry Road, Loburn in the Waimakariri District. The Site is approximately 1.5km North of the intersection with Loburn Whiterock Road and Taaffes Glen Road.

17 The Applicant has identified a low increase in traffic movements associated with the proposal and has undertaken a transport assessment identifying the effects of this increase in traffic movements. The estimate of traffic movements was identified based on the expected landfill waste arriving to site, the landfill construction, as well as the movements associated with transporting lime and excess overburden off site. The calculation of the estimate is included in Appendix I of the AEE.

18 I consider that the scope of the transport assessment is appropriate for the consenting phase of the project to define the potential effects, and I generally agree with the Applicant's statements of the transport effects of the proposal.

3 Key Aspects of the Transport Environment

19 Quarry Road is administered by the Waimakariri District Council. The Applicant notes that Quarry Road is classified as a Rural Road according to the One Network Framework (ONF), the surrounding network area has an unposted speed limit of 100 km/h and has an estimated traffic volume of 149 vehicles per day, of which around 40 are estimated to be heavy vehicles (27% heavy vehicles). The Applicant has indicated that the current quarry activities generate between four and six truck, and on average six light vehicle movements per day. I have reviewed these matters and agree with the Applicant's assessment.

20 Quarry Road provides access to approximately 15 properties which are zoned as Rural General in the District Plan and connects to a network of other roads that provide access to forestry blocks which appear to be at different stages of harvest. While the Applicant estimates that the traffic volume on Quarry Road could grow by around 2% per year based on general historical trends, I anticipate that the traffic volumes will also fluctuate with harvesting operations within the forestry blocks further north along Quarry Road.

21 I am not aware of any other land use changes proposed around the site that may influence the traffic volume. However, as also noted by the Applicant, activities beyond what is anticipated for the zone by the Operative and Proposed Waimakariri District Plans would likely be subject to a resource consent process where considerations of traffic effects can be made.

22 The Applicant notes the presence of recreational cyclists and walkers on Quarry Road, but suggests there will be relatively few, given the low number of properties accessed by the road, and that the sealed width of 5.9m is wide enough for a vehicle to safely pass the occasional cyclist or pedestrian, given the infrequent nature of vehicular traffic on this section of road. The Applicant further notes that typical truck speeds on this section of road will be on average 60km/h due to the road alignment and relatively short distance from a low-speed corner and the quarry entrance. There are existing mountain bike trails nearby around Ashley Forest that may lead to cyclists riding along Quarry Road. However, I agree with the Applicant and note

that as traffic volumes are low the actual risk of conflict is low, although, due to operating speeds, any crash could result in a high severity.

23 I note that Quarry Road is not on a school bus or other bus route, the closest school being North Loburn School, about 8 km from the site located on Loburn Whiterock Road.

24 The site is accessed through an access with Quarry Road. The accessway is sealed and there are unsealed areas of the road either side of the access near Quarry Road and there is evidence of heavy vehicles tracking over this surface, causing ruts and the potential for loose material to track over the sealed surface potentially leading to vehicles losing grip, and running off the road (see Figure 1 and Figure 2 below).

25 There is adequate sight distance to the site access as demonstrated by the Applicant's assessment based on industry standard guidelines (Austroads Safe Intersection Sight Distance). The posted speed limit is 100 km/h which requires a minimum sight distance of 250 m, the Applicant has estimated the available sight distance to be greater than 250 m, which meets the minimum requirement. Based on observations by the Applicant and by Mr Wilkie in his site visit, the actual operating speed is somewhere between 60km/h and 80km/h, requiring SISD of between 115m and 200m. I agree with the estimate of available sight distance based on site investigations by Mr Wilke.

26 Based on the Applicant's report, there were no recorded crashes near the site access over the past 10 years. The crash history for the 20km route from the Ashley River to the quarry entrance over the same period included no crashes involving heavy vehicles. However, there were five reported serious injury crashes involving light vehicles. The predominant crash type is single vehicle loss of control during the hours of darkness. In noting this trend, the Applicant has recommended that the site operator include the consideration of the risk of driving on rural roads in their Health and Safety Plan and implements mitigation and monitoring measures if deemed appropriate, this would likely include site induction training to highlight risks on the road network, a level of expectation on driving behaviour, and a method of feedback to reinforce these principles. I recommend that this initiative is explored further by the Applicant. I note that the quarry operating hours (7am to 7pm) will largely be in daylight and therefore unlikely to contribute to the trend of crashes during hours of darkness, a Health and Safety Plan with measures such as these contributes to a safe working site.

27 The Applicant has noted that the site layout should be reviewed by a suitably qualified person. Having visited the site, Mr Wilkie confirms that improvements can be made, and I agree with this conclusion.

4 Assessment of Transport Effects

28 The Applicant indicates that the total traffic generated by the site is 36 vehicle movements per day, 24 heavy vehicle movements and 12 light vehicle movements, relating to the various operations on site as summarised in Table 1 below:

Table 1: Summary of traffic generation.

Operation	Peak daily vehicle movements (2 way)
Haulage of processed lime*	2
Removal of overburden*	2
Leachate removal	6

Landfill	14
Light vehicles (typical)	12
Total daily truck movements	**24**
Total daily light vehicle movements	**12**

** Average trip rate is less than 1 vehicle per day.*

Based on the calculation provided by the Applicant, I consider this to be an appropriate evaluation of traffic generation for the proposed activities including: quarry operation, landfill construction and operation.

29 I estimate there are currently 38 heavy vehicle movements per day on Quarry Road, obtained from published WDC data retrieved from the 'Mobileroad' website[1]. This is the equivalent of 19 trucks per day in each direction. The Applicant estimates that between four and six of these are associated with the existing quarry. Therefore, the proposal has the effect of increasing the existing heavy vehicle movements on Quarry Road to 24, a net increase of 18 to 20 truck movements, or 10 trucks in each direction. This represents a 50% increase in average daily heavy vehicle movements on Quarry Road, or an overall increase in average daily traffic (ADT) of approximately 12%. As the total traffic is likely to remain between 150 and 200 vehicles per day, I do not consider this to be a significant change.

30 As a sensitivity test, if the landfill waste to site were to double to 1,000,000 m^3 per year, based on WSP's calculations, the average daily truck movements associated with the site would increase to 40, resulting in a total truck volume on Quarry Road of 72, or an increase of 80%. However, this volume spread over a typical 10-to-12-hour operational period would represent at most 7 movements per hour which I do not consider excessive in this low traffic environment.

31 The Applicant has highlighted that the traffic generated through the landfill operation on the site is below the District Plan thresholds for restricted activities. The District Plan thresholds are 250 motorised vehicle movements per day, either entering or exiting the site, and the District Plan defines high traffic generation thresholds in a rural zone of 200 vehicle movements per day (average), or 50 heavy vehicle movements per day (average). I have reviewed the assessment against the requirements of the Operative Waimakariri District Plan and agree that the traffic generation of the proposed activity does not meet the significance threshold.

32 A Section 92 query was raised about the potential impact the proposed activity has on the existing high crash rate on the route to the site. The Applicant's response stated most of the crashes occurred at night and none involved heavy vehicles and concluded that as the proposed activity would generally result in traffic generated in day light that there was no reason to consider that there would be an identifiable increase in crashes resulting from the proposed activity. I agree with the Applicant's assessment of risk.

33 The Applicant has noted that the existing site access should be reviewed for deficiencies to improve safety for users of the site. As noted in paragraph 24, there is potential for loose material to track over the sealed surface of the access potentially leading to vehicles losing grip and running off the road. The Applicant notes that trucks are unlikely to track over the unsealed areas particularly the northern area as trucks are unlikely to arrive or depart to or from the north. On his 25 June 2024 site visit, Mr Wilkie noted substantial evidence to indicate that this tracking is occurring, as demonstrated by the photos below taken during that site

[1] www.mobileroad.org – this website is run by Auckland Motorway Alliance and carries the most recent data captured from road controlling authority maintenance databases (RAMM)

visit (see below). Whilst there are minor safety risks associated with this, there are likely to be ongoing maintenance liabilities for Council as continued overrunning will result in edge break on the seal of Quarry Road.

34 The current seal within the site access has insufficient width for vehicles travelling in opposing directions, which means that a vehicle will either need to wait on Quarry Road until an existing vehicle has left or as suggested by the vehicle track evidence, vehicles entering the site will turn wide to afford space to vehicles leaving site. I recommend that a width, sufficient to accommodate two vehicles, is sealed within the entrance to the site.



Figure 1: Quarry entrance looking south along Quarry Road, note evidence of wheel tracking from north.



Figure 2: Quarry access looking north along Quarry Road, note evidence of high frequency heavy vehicle movement into the site. (note: the rocks have been removed since this photograph was taken).

5 Consideration of submissions

35 549 submissions have been received of which 243 directly relate to traffic and transportation issues.

36 I have reviewed these submissions which primarily highlight the issue of an increase in truck traffic associated with the proposed activity, with specific concerns raised over:

- Increase in heavy traffic (243 submissions 100%).

- The routing of vehicles through the rural road network, particularly past the North Loburn school (100 submissions 41%).
- The increase in safety risk to vulnerable road users (182 submissions 75%).
- Increased maintenance liability for local road network (56 submissions 23%).

A smaller number of submissions were received relating to wider impact of traffic and intersection safety which are reviewed in section 5.5 below.

Which I have addressed in the following paragraphs.

5.1 Increase in heavy traffic

37 This is a generic submission which objects to any increase in traffic within the local area. There are some misconceptions stated in the submissions regarding the volume and frequency of vehicles, with the suggestion that the significance threshold in the district plan of 200 vpd is the actual increase in vehicles from the site.

38 The predicted increase in traffic to and from the site is anticipated to be on average 24 trips per day, consisting of 18 heavy vehicle and 6 light vehicle movements. The Resource Consent application (Appendix Y) has a proposed condition which limits truck movements to 18 per day as a rolling annual average. This is not a finite limit to vehicle movements, and it is possible that the peak truck movements could be up to double this on occasions.

39 The sensitivity test carried out referred to in paragraph 30 above, examines the scenario of doubling the landfill volume and I anticipate that an infrequent intensification of daily traffic to 40 truck movements is unlikely to have a significant detrimental effect. I recommend that the Consent Conditions reflect this volume as a maximum on any single day and included in my review of the proposed Consent conditions in section 6 below.

5.2 Routing of vehicles

40 One hundred of the submissions raise the issue of increase in heavy vehicles on Loburn Whiterock Road. The key issues raised are:

- The width of the road with single lane bridges and winding alignment.
- The increase in heavy traffic passing through the village.

41 Loburn Whiterock Road is approximately 14.5 km long and links Dixon Road (Arterial road) with Quarry Road (Collector road), passing through the villages of Loburn and North Loburn and is detailed in Table 2 below:

Table 2: Loburn Whiterock Road sections.

Length (km) from Dixon Rd	From	To	Road Hierarchy DP/ONF[2]	Seal Width (m)	Posted speed (km/h)	ADT[3] (vpd)	HCV (vpd)[4]
0 – 2.1	Barkers Road	Hodgsons Road	Local/Rural Connector	7.5	80	2,863	272

[2] Road hierarchy is a function of traffic volume and environment and guides the design and use of a road, DP relates to the District Plan and ONF is the NZTA One Network Framework which supersedes previous categorisations

[3] ADT is average daily traffic

[4] Vpd is vehicles per day

2.1 – 5.6	Hodgsons Road	Station Road	Local/Rural Connector	6.5	100	1009	142
5.6 – 8.5[5]	Station Road	Thompsons Road	Collector/Rural Connector	6.5	100	759	102
8.5 – 14.5[6]	Thompsons Road	Taafles Glen Road	Collector/Rural	6.1	100	320	40

42 The average daily increase in trucks in the section adjacent to the school is 18 trucks per day (based on proposed Consent Condition), or around 18% increase in truck movements over a 24-hour period. To determine the level of relative risk, I have considered the peak traffic movements. Peak traffic on the road will generally be for an hour in the morning and for an hour in the afternoon, equivalent to 10% of the ADT. In this section of road this would be approximately 76 trips of which 10 would be trucks. Peak times[7] will generally be consistent with commuter times, between 7 and 9am and between 4 and 6pm, although in this rural location this may alter by up to 20 minutes earlier in the mornings and 20 minutes later in the evenings.

43 School hours are generally between 8:30 am and 3pm.

44 The proposed site operating hours are 7am to 7pm. In my experience of landfill operations the peak arrivals tend to coincide with truck operators work hours[8], with a trip to the landfill either being the first trip or the last trip of the day, given the location, based on other clean fill operations, I estimate this to be between 9:30am and 10:30am and between 3:30pm and 5pm.

45 I consider it likely that trucks will be at their highest concentration between these times, which are likely to coincide with the trip to and from school, at least in part.

46 The current truck volume is 102 per day, this indicates that the peak will be approximately 10 return trips or 5 trips in each direction. Assuming a normal distribution, it is possible that during the "school run" (the 30-minute period prior to school start, or 30 minutes after school finishes) up to 5 trucks could pass the school gate, i.e. on average one every 6 minutes. The average increase in trucks is 2 movements per day, the peak would therefore be 2. This means that in the peak 30 minutes coincident with school travel periods the increase in truck volume would be 1, increasing the overall truck frequency to one every 5 minutes. I do not consider this to be a significant increase in truck movements.

5.3 Increased safety risk

47 This submission generally focuses on two elements of roads safety:

- The increase in trucks will pose a risk to general traffic through likelihood of head on crash at corners and single lane bridges or the likelihood of a crash at an intersection.
- The increase in trucks will pose a risk to vulnerable road users (pedestrian, cyclist, equestrian) who are regular users of the road.

48 The recorded crash history detailed in paragraph 26 above, does not indicate that truck movements pose a specific risk to other road users. Based on the crash history and site

[5] *This section is where North Loburn School is located (8.2km)*
[6] *Single lane bridges – Karetu River (14.1 km), Grey River (10.8km)*
[7] Derived from SH71 telemetry data
[8] Derived from weighbridge data at Tirohia

observations, I consider the current risks along the corridor to be a narrow road width, with several low-speed corners and narrow single lane bridges.

49 The current carriageway width varies between 7.5m and 6.1m from south to north along Loburn Whiterock Road, on Quarry Road it is 5.9m. I note that the road width decreases proportionally to the traffic volume. Throughout the corridor there are generally wide berms which allow for a good field of vision and recoverable area for motorised road users, as well as a safe area for people to walk, cycle[9] or ride horses. Appropriate road markings and hazard warning signs are present along the corridor although adding a W18-4 "truck operating" warning sign in advance of the site entrance may enhance risk awareness for unfamiliar road users.

50 Given the relatively low traffic volumes in the vicinity of low radius curves and single lane bridges, the likelihood of meeting another vehicle is relatively low which is why the majority of loss of control crashes are single vehicle.

51 A high-level assessment of the corridor suggests that whilst nighttime hazard delineation meets minimum standards it may require additional maintenance where marker posts have been knocked over. However, considering the predominant traffic movements associated with the site will be during daylight hours, I do not consider any improvement or upgrade to be the responsibility of the Applicant.

52 I have conducted a review of the speed environment as recorded in the NZTA Mega Maps website[10] which indicates the mean speeds along the corridor; between Dixon Road and Thompsons Road is on average 84 km/h; between Station Road and Grey River bridge it is 78 km/h; between Grey River bridge and Fords Road it is 53 km/h; and from Fords Road to Quarry Road it is 64km/h. Quarry Road has a mean speed of 60 km/h which reinforces the Applicant's assessment of vehicle speeds.

53 The school has flashing warning signs on its approaches to warn drivers of the presence of activity at the school gate during key times together with a number of statutory and informal warning signs and markings. With a mean speed of 78 km/h it is unclear if these warnings have the desired calming effect on traffic.

54 I note that the 2023 Waimakariri Draft Speed Management Plan, North Loburn School has a proposed 60 km/h speed limit, and I consider this to be an important safety enhancement which should be progressed. Again this is not a responsibility of the Applicant.

55 I anticipate that there is likely to be a demand for pedestrians and cyclists along the corridor, although outside of school hours, this is likely to be predominantly recreational and outside of peak travel times.

56 Outside peak hours as described in paragraph 44 above, typical hourly truck demand would be spread across the working day which I estimate to be between one and two trucks per hour. The increase in truck traffic of less than two vehicles per hour in the off peak is unlikely to increase the level of risk to vulnerable road users.

57 The North Loburn School is predominantly rural and has facilities for school bus and evidence of high demand for private vehicle drop off and pick up, I understand that a number of students cycle to and from school here and to the Loburn School off Hodgsons Road. The length of Loburn Whiterock Road between Loburn and the school and approximately 6.5m in width and has a posted speed limit of 100km/h. Whilst traffic volumes are modest, there is potentially an increased risk to children cycling to and from school. However, the risk is existing with the 100 or so vehicles already on the road within the peak hour, and as described

[9] This would generally be restricted to cycles with an off-road capability, or as an escape route in an emergency situation
[10] https://spatial.nzta.govt.nz/apps/megamaps/

in paragraph 46 above, the peak hour increase in trucks associated with the proposal is less than 2% and unlikely to pose a significant increase in risk.

58 Extending the 80km/h speed limit from its current location at Hodgsons Road to Thompsons Road would reduce the risk to vulnerable road users, particularly since the mean speed in this section is already around 84 km/h. However this is not the responsibility of the Applicant as it is a pre-existing risk which will not be significantly increased through traffic generation associated with the stated activities in the AEE.

5.4 Increased maintenance liability

59 These submissions suggest that the increase in truck volume will have a detrimental effect on the road structure, leading to premature failure and increased maintenance liability.

60 A high-level assessment of the corridor indicates that Loburn Whiterock Road and Quarry Road are in a reasonable condition with only minor defects such as occasional potholes and limited surface flushing.

61 I consider it unlikely that the proposed truck volume increase would have a material impact on maintenance demands over the lifespan of the pavement. However, further analysis from an appropriately qualified and experienced pavement design engineer should be sought to determine the actual impact of pavement residual life.

5.5 Other issues

62 A small number of submitters have raised specific comments regarding the wider impact of truck volume increase within the main routes through Rangiora. As detailed in paragraph 38 above, the average increase in truck movements will be 18 per day. Considering the current truck volume is approximately 620 per day, I do not consider that an increase of 18 (or 3% of the total truck volume) is significant and will not result in a traffic efficiency or safety risk within Rangiora.

63 One submitter has highlighted concerns over an increase in truck volume and the risks faced by drivers waiting to turn right from Loburn Whiterock Road into Glenbrae Place within the village of Loburn. At this location the road is straight with good visibility, and 7.5m wide with approximately 0.5m sealed shoulder either side. According to Austroads[11], the hourly traffic volumes present at this location of 290 vph on Loburn Whiterock Road, and less than 10 vph on Glenbrae Place, do not warrant a right turn bay. Furthermore, the ADT on this section of Loburn Whiterock Road is currently 2,863 vehicles per day including 272 trucks. The additional truck traffic represents an increase in heavy vehicles of less than 1% which does not change the design threshold for a right turn treatment. I do not anticipate any safety or efficiency issues for vehicles turning into and out of the side road.

6 Applicant's proposed conditions

64 In the Appendix Y, the Applicant has offered the following consent conditions relating to traffic:

[11] Austroads Guide to Traffic Management Part 6 - Intersections, Interchanges and Crossings Management (April 2020)

Table 3: Proposed Consent conditions relevant to traffic.

Ref	Condition
18	The hours of operation for the quarry and managed fill must only be Monday to Saturday (excluding public holidays): 7am until 7pm.
57	On commencement of landfilling the heavy vehicle movements must not exceed as an average more than 18 movements per day, over any consecutive 12 month period. For the avoidance of doubt; a. This means 9 trucks entering the site each day and 9 trucks exiting each day; and b. A truck with a trailer is also only one heavy vehicle.
58	Records of heavy vehicles movement must be kept and a summary report provided annually after commencement of landfilling on the previous 12 month periods number of heavy vehicle movements must be submitted to the Waimakariri District Council, Attention Planning Manager: Plan Implementation Unit.

65 I consider that proposed conditions place an appropriate limitation on operating hours and traffic generation and include a check mechanism. However, I consider that the following improvements can be made to reduce traffic risks:

- Condition 57, a finite upper limit of daily trucks should be added so that it states:

  On commencement of landfilling the heavy vehicle movements must not exceed as an average more than 18 movements per day, over any consecutive 12 month period. ***With a maximum number of truck movements on any single day not to exceed 40.*** *For the avoidance of doubt;*

  a. This means 9 trucks entering the site each day and 9 trucks exiting each day,

  b. A truck with a trailer is also only one heavy vehicle,

  c. Truck movements not to exceed 40 on any one day.

- A condition should be included with the effect that the entrance to the site will be sealed to a sufficient width to allow for two-way traffic. This should include the turning radii into and out of the site to a distance of 20m into the site.
- Provide a W18-4 “trucks operating” sign in advance of the site entrance to enhance awareness of an increase in truck movements on Quarry Road.

66 To accurately address the risk of premature pavement failure highlighted by a number of submitters, I recommend that a baseline condition assessment is carried out for Loburn Whiterock Road and that a condition is placed on the Applicant to undertake or contribute to repairs, to the satisfaction of the road controlling authority (WDC), which are a direct result of the increase in heavy vehicle movements relating to the activity.

7 Conclusions

67 Protranz (the Applicant) has applied for Resource Consent to operate a quarry and landfill at Whiterock Quarry in Loburn, North Canterbury.

68 I have reviewed the AEE, S92 response and submissions and have addressed the issues highlighted.

69 I consider that the traffic generation through the proposed activity, being a lime quarry and landfill operation, will not present any significant detriment to the safety and efficiency of the

existing transport network if the aforementioned changes to the conditions and mitigating measures are enacted.

8 Recommendations

70 I recommend the following amendments to condition 57

On commencement of landfilling the heavy vehicle movements must not exceed as an average more than 18 movements per day, over any consecutive 12-month period. ***With a maximum number of truck movements on any single day not to exceed 40.*** *For the avoidance of doubt;*

a. This means 9 trucks entering the site each day and 9 trucks exiting each day,

b. A truck with a trailer is also only one heavy vehicle,

c. Truck movements not to exceed 40 on any one day.

71 I recommend the following additional conditions:

- A condition should be included with the effect that the entrance to the site will be sealed to a sufficient width for a length of 20m to allow for two-way traffic.
- Provide a W18-4 “trucks operating” sign in advance of the site entrance.
- Carry out a baseline assessment of Loburn Whiterock Road and include an appropriate review and repair clause to the satisfaction of the road controlling authority.

Report Prepared by:

Alan Gregory

Principal Transport Planner

Tonkin & Taylor Ltd

March 2025

21-Mar-25

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Before the Independent Hearing Panel
appointed by the Canterbury Regional Council
and Waimakariri District Council

Under	the Resource Management Act 1991
In the matter of	Resource consent Application by Protranz International Limited for Whiterock Limestone Quarry and Managed Fill Landfill (CRC243699, CRC243707, RC245079)

Statement of Evidence of Naomi Louise Crawford

24th March 2025

Appendix 6- Landscape and Natural Character Section 42A report prepared by Naomi Crawford, Glasson Huxtable.

Qualifications and Experience

1 My full name is Naomi Louise Crawford.

2 I hold the qualification of a Bachelor of Design in Landscape Architecture with Honours from Victoria University of Wellington. I am also a registered member of the Tuio Pito Ora, New Zealand Institute of Landscape Architects (**NZILA**) and a member of Te Kahui Ture Taiao, Resource Management Law Association (**RMLA**).

3 I am a Director at Glasson Huxtable Landscape Architects in Christchurch, having held this position since September 2023. Previously I was a Senior Landscape Architect within the same company.

4 I have practiced as a Landscape Architect for approximately 14 years. For the past eight years, I have also taught into the Landscape Architecture degree programmes at Lincoln University. Previously, I have worked within small landscape firms, a large multi-disciplinary consultancy and in the public sector.

5 My experience spans across the full spectrum of Landscape Architecture and Landscape Planning. I am regularly called upon as a Landscape and Visual expert for complex projects involving multi-disciplinary approaches across Aotearoa.

6 For extractive landuse and managed fill landfill activity, this has included Aylesbury and Frew's Quarries (Canterbury), Nine Mile and Brownlee Mineral Sands (Buller), Wakamarina Mine (Marlborough), Barrytown Mine(s) (Grey), Mananui Mineral Sands (Westland), and Kakaramea and Ngāruawāhia Sand Extraction Sites (Waikato).

My Role

7 I have been involved with the Protranz International Limited, Whiterock Limestone Quarry and Managed Fill Landfill Application at 150, 154, 174 and 176 Quarry Road, Loburn, **(Application and Application Site)** since May 2024. My role has been to provide advice in relation to landscape and visual effects to the Waimakariri District Council **(WDC)**.

8 This has included:

(a) Visiting the site and surrounding area along with the Applicant, and representatives from WDC and Environment Canterbury (30 May 2024).

(b) Undertaking a high-level review of the existing landscape character and visual amenity. In turn, understanding the potential landscape and visual effects arising from the Application.

(c) Preparing a Memo on Landscape Matters (10 June 2024) to outline my observations, highlight omissions with the Application (in particular, the absence of a Landscape and Visual Assessment (**LVA**)), and to make recommendations. This was guided by Te Tangi a te Manu: Aotearoa Landscape Assessment Guidelines (**TTatM**), NZILA (July 2022).

9 In preparing this statement of evidence I have considered the following documents:

(a) The Assessment of Environmental Effects (**AEE**) accompanying the Application (28 March 2024) including (but not limited to) the Design Drawings Set (Appendix H, Rev1), Site Management Plan (Appendix L, RevB) and Proposed Conditions (Appendix Y, Rev1).

(b) The response to the Request for More Information **(RFI)** provided by the Applicant (23 August 2024) which included amendments to the Application and the provision of a LVA plus Graphic Appendix.

(c) Planning provisions relevant to my area of expertise.

(d) Submissions relevant to my area of expertise.

(e) The concepts and principles outlined within TTatM.

10 As part of preparing this evidence, I revisited the Application area for a second time on the 20 March 2024. This subsequent visit assisted with understanding the surrounding context in further detail and informed this landscape evidence.

Code of Conduct for Expert Witnesses

11 While this is not a hearing before the Environment Court, I can confirm that I have read the Code of Conduct for expert witnesses contained in the Environment Court of New Zealand Practice Note 2023 and that I have complied with it when preparing my evidence. Other than when I state I am relying on the advice of another person, this evidence is within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

Executive Summary

12 My statement of evidence considers the potential landscape and visual effects that could arise from Protranz International Limited's Limestone Quarry and Managed Fill Landfill Application at 150, 154, 174 and 176 Quarry Road Loburn.

13 Overall, I consider the quarry expansion, and the addition of a managed fill landfill will result in:

(a) Further modification to a site which has already been heavily modified by quarry and processing activities.

(b) Adverse effects on the amenity of local residents because of increased traffic movement to and from the Site.

(c) Protection of the SNA by way of a fence.

(d) Enhancement through planting along the Karetu River, eastern watercourse and within two wetlands.

(e) In the future, the recontouring and landscaping of the site following closure to assist with merging the final landform character into the surrounding hillscape.

14 Generally, I believe my views and those of Ms. Back (Landscape Architect for the Applicant) are well aligned, with her assessment being fair and justified, minus a few areas which have been further discussed within my evidence.

Scope of Evidence

15 I have prepared evidence in relation to:

(a) The existing environment of the Application Site as it relates to landscape matters including landscape character, visual amenity, the Significant Natural Area (**SNA**), and natural character.

(b) The applicable statutory provisions relevant to my area of expertise.

(c) The Applicant's original AEE plus the LVA included with their s.92 Response.

(d) Matters raised by submitters to the Application.

(e) The proposed landscape mitigation measures.

(f) The proposed conditions of consent.

Proposed Activity

16 My evidence is based upon the description of the Application attached to the Applicant's AEE. Key aspects related to the managed landfill development include:

(a) Continuing existing limestone quarrying activities to assist with shaping the landfill floor and sides for approximately the next ten years.[1]

(b) Constructing a minimum 2.2-metre-high perimeter fence around the landfill footprint and the SNA area prior to commencement of the landfill activity.

(c) Constructing and operating a Class 3 Managed Fill Landfill by filling the existing quarry pit for a period of approximately twenty years.[2]

(d) Continuing to access the Site via the gravel access road off Quarry Road. The crossing over the Karetu River will be upgraded with a single span bridge (and the existing ford and footbridge will be disestablished).

(e) Providing riparian enhancement through planting near the Karetu River, eastern watercourse and gully wetland areas.

(f) Remediating the Application Site at the conclusion of the landfill activity by capping and grassing the filled landfill area.

(g) Removing infrastructure such as the site office, weigh bridge, lime processing plant, kiln, maintenance workshops and bulk storage sheds as well as infrastructure associated with the landfill that is no longer required.

The Site and Existing Environment

17 To ensure that modifications can be integrated with acceptable effects, one must first understand the existing environment of the Whiterock area. This includes interpreting the existing landscape character and values to understand the effects of the Application on those values. The key landscape character and values of the environment include:

[1] Quarrying activity will occur in the upper portion of the site, with processing infrastructure located on the lower terrace.
[2] Material received will include inert and sorted constructed and demolition waste including contaminated material.

Physical Values

18 The Application Site is situated at the junction of the Canterbury Plains and the foothills of the Southern Alps, where the plains transition into the ranges of Mt Oxford and Mt Thomas.

19 The local environment features a diverse patchwork of rural land uses and property types including large farms and equestrian facilities, lifestyle blocks and smaller residential lots, and even temporary dwellings. Some residences are located near roadside boundaries, whereas others are located well inside land parcels. A mixture of properties are positioned on the flat, closer to the Karetu River, or on raised escarpments. In the distance, large pine plantations follow the rolling topography of the surrounding hillsides towards the Mt Thomas Conservation Area.

20 The local environment has been extensively modified, with fences, powerlines, roads, signage, farm homesteads, outbuildings, and the existing Whiterock Quarry. Large amounts of pasture, shelterbelts, tree plantations, clusters of vegetation, willows, exotic weeds, and grass berms are all found in the local area.

21 Whiterock Quarry itself is accessed off Quarry Road. Access is via a ford (or a footbridge) crossing the Karetu River. This river (a tributary of the downstream Ōkūkū River), defines the western boundary of the Application Site, while an eastern waterway and two wetlands are situated within the Site itself.

22 Existing quarrying operations have focused on extracting limestone from a west-facing escarpment, which is part of a larger undulating hillside. Extraction has resulted in a large quarry pit with benched quarry faces of varying heights.

23 Processing occurs on a lower terrace not far from the river. Nearby there is an existing weighbridge, staff amenities building, site office, processing facility (featuring a furnace and rotary kiln), crusher, lime and urea silos, conveyor belt, storage sheds, and coal bunkers.

Associative Values

24 The rolling hills within the local area showcase limestone scarps and in certain locations visually reflect the geology of the landform. The Site has operated as a lime quarry since the 1950's, extracting material from the distinctive limestone cliffs.

Perceptual Values

25 Perceptual values include a sense of remoteness and containment due to the Site's location between the foothills of the ranges, surrounding shelterbelts, and the rolling hills of the Site. Longer views are afforded where there are breaks in vegetation or from elevated viewpoints, such as above the quarry itself or from raised escarpments.

Statutory Context

26 The statutory provisions are covered in Appendix X of the Applicant's AEE and Attachment 2 of their WDC Section 92 response. Matters relating to landscape are outlined below.

27 Under the Operative Waimakariri District Plan (**OWDP**) the Application Site is zoned **Rural**. The applicable objectives seek to maintain and enhance both rural production and rural character. The rural zone is described as being characterised by the dominant effect of paddocks, trees, natural features, and agricultural, pastoral or horticultural activities (Objective 14.11).

28 Under the Proposed Waimakariri District Plan (**PWDP**) the Application Site is zoned **General Rural** (GRUZ) and is classified as being within the Oxford Ecological District. The rural objectives and policies of the PWDP place importance on providing for primary production activities (including quarrying activities). However, industrial activity in rural zones is to be limited to circumstances where (among other things) amenity values and the character of the zone can be maintained (RURZ-01, RURZ-P2, RURZ-P6 and GRUZ–P1).

29 The existing quarry is located adjacent to a SNA, which is mapped as 'PWDP SNA039 – Whiterock Limestone Vegetation' and has immediate effect.[3] This area has highly valued shrub and grasslands located on cliffs and rocky outcrops. It is likely to be representative of the original vegetation cover and landform.

30 Also, of relevance to this assessment, are PWDP policies related to natural character (which have immediate effect) and require that wetlands, rivers and their margins are managed to preserve natural character. Figure 1 below illustrates the natural character provisions relevant to this Application. Natural Character is also assessed under paragraphs 61 to 78 of this evidence.

[3] Whiterock Limestone Vegetation contains indigenous grassland, shrubland, and indigenous limestone rock outcrop vegetation. Notable flora on site includes at risk-declining species such as speargrass, matagouri, and New Zealand linen flax. It also contains threatened-nationally endangered species such as Gingidia enysii var. enysii and sun hebe, kanuka, and Waipara gentian. (PWDP ECO-SCHED1)

Figure 1: PWDP Natural Character Objectives and Policies[4]

NATC-03 Natural character	*The use of wetlands, and lakes and rivers and their margins are managed to preserve their natural character.*
NATC-P1 Recognising natural character	*Recognise the following natural elements, patterns, processes and experiential qualities which contribute to the natural character values of freshwater bodies:* *1. Freshwater bodies and their margins in their natural state or close to their natural state.* *2. Freshwater landforms and landscapes, biophysical, geologic and morphological aspects.* *3. …* *4. Indigenous biodiversity, habitats and ecosystems.* *5. Water flow and levels, colour and clarity, and water quality.* *6. …* *7. The experience of the above elements, patterns and processes.*
NATC-P4 Preservation of natural character values	*Preserve the natural character values of wetlands, and lakes and rivers and their margins, and protect those values by:* *1. Ensuring that the location, intensity, scale and form of subdivision, use and development of land takes into account the natural character values of the surface freshwater bodies.* *2. Minimising indigenous vegetation clearance and modification, including where associated with ground disturbance and the location of structures, near wetlands, and lakes and rivers and their margins.* *3. Requiring setbacks of activities from wetlands, and lakes and rivers and their margins, including buildings, structures, impervious surfaces, plantation forestry, woodlots and shelterbelts.* *4. Promoting opportunities to restore and rehabilitate the natural character of surface freshwater bodies and their margins, such as the removal of plant and animal pests, and supporting initiatives for the regeneration of indigenous biodiversity values, and spiritual, cultural and heritage values.*
NATC-P5 Structures within freshwater…	*Enable activities that have a functional need or operational need to be located within the freshwater body setbacks, provided that adverse effects on natural character values are avoided, remedied or mitigated.*
NATC-P6 New and existing structures within and over freshwater bodies	*Provide for new structures, and upgrades to existing structures, on the surface of freshwater where:* *1. Public access to, and along, the freshwater body is maintained.* *2. The structure has a functional need or operational need to be located on the surface of freshwater.* *3. The structure does not compromise the use of the surface of the freshwater for existing users.* *4. …* *5. …* *6. Any adverse effects to the natural character and cultural values, associated with freshwater bodies are avoided, remedied or mitigated in order to preserve those values.*

[4] It should be noted that natural character objectives and policies which relate to hydrology, geology, ecology and/or cultural values of the river fall outside the author's landscape and visual expertise. The obvious objectives and policies which fall outside of the realm of landscape and visual matters have been excluded.

Comments on the Original AEE

31 At the request of WDC, I completed a landscape review to evaluate the AEE prepared by WSP for the Applicant. My work involved reviewing the AEE (and relevant appendices) and then visiting the site alongside the Applicant and their experts and Council representatives. I undertook a high-level review of the existing landscape character and amenity to understand the potential landscape and visual effects arising from the Application and whether these were able to be sufficiently managed.

32 In response, I produced a memo (10 June 2024) outlining my observations, highlighting omissions, and making recommendations in relation to landscape and visual matters. I recommended that the Applicant provide an LVA prepared by a suitably qualified Landscape Architect, following the methodology, concepts and principles outlined in TTatM. The request was processed as part of the WDC s92 RFI.

Landscape and Visual Assessment

33 The purpose of this section of my evidence is to comment on the LVA prepared by Ms. Back of WSP (22 August 2024). This is the first opportunity I have had to respond to the contents of the LVA.

34 Generally, the LVA follows the guidance outlined in TTatM. The Application is adequately described, key aspects of the statutory context are discussed, the landscape context and character are covered appropriately, potentially affected neighbours are correctly identified, and an assessment of effects is undertaken using the prescribed 7-point scale. The assessment is supported by helpful graphics including site location maps, plans, character images, a viewpoint location map and supporting panoramas.

35 However, it is unclear whether Ms. Back contributed to or reviewed the proposed **Conditions of Consent** as there is no reference to these within her evidence. Likewise, the proposed landscape mitigation measures, objectives to be achieved, and timeframes described in the **Biodiversity and Landscape Enhancement Plan and Accompanying Schedule** (20 August 2024) are not referred to either.[5] It would be helpful to understand how Ms. Back considers the proposed landscape conditions and enhancement measures will work to achieve the necessary mitigation.

[5] Schedule 1 of Appendix Y of the AEE.

36 This aside, I believe the conclusions reached by Ms. Back in her LVA are fair and justified, minus a few areas that would benefit from further discussion. These points are discussed under subject headings below.

Matters Raised by Submitters

37 Five hundred and seventy-three submissions were received. Landscape matters raised fall broadly into six main themes, which are summarised below:

Figure 2: Summary of Landscape Related Submissions

Rural Character and Amenity	Submitters believe the Application may affect: • Amenity generally. • The area's visual, peaceful, tranquil character. • The area's rural amenity and rural setting. • The beauty and attractiveness of the area. In addition, some submitters believe that the Application will: • Harm the peaceful communities of Whiterock, Okuku and Loburn. • Threaten tranquillity, peace, quiet and their quality of life. • Change the area from serene place to busier/industrial place. • Mean that this special place will 'lose its magic' – exploring nature, building dams etc.
Traffic Related Effects on Amenity	Submitters believe the Application may result in the following traffic related effects on amenity: • Increased trucks/traffic on roads with effects on amenity, quality of life and enjoyment of scenic views. • Increased heavy vehicles on roads disrupting/diminishing rural tranquillity, peacefulness and the communities' quiet character. • Effects of increased trucks/traffic with an effect on activities such as cycling, horse riding, walking and running.
Recreation	Submitters believe the Application may affect: • Recreational opportunities and the recreational value of the area. • Visitors who come to the area for sports. • The scarcity of water for recreation. • The ability to swim in the river and/or algae blooms. • The safety of recreational activities in and around river. • The Ashley River/Rakahuri which is used recreationally (and which the Application Site is upstream of). There is some support for the creation of a space for the public to enjoy long term.
Landuse	Many submitters are concerned that the Application: • Is inconsistent with the rural character of the community. • Will bring about a change from rural landuse to industrial. • Will detrimentally change the feel of the community. • Is in close proximity to residential zoned land. • Will have an effect on agricultural landuse. • Will have an industrial landuse that will significantly alter the communities' character, identity and values.
Landcover	Many submitters are concerned that the Application: • Will cause disruption to and/or effects on flora and fauna. • May impact plans for community native planting, bush regeneration/ protection and organic gardens/orchards. • Will have effects on wetlands.

	One submitter advocates for maintaining the quarry for mineral extraction and eventual reforestation to preserve biodiversity.
SNA	Some submitters believe that the Application: • Threatens the SNA.
Natural Character	Some submitters believe that the Application may affect natural character through: • Vegetation clearance and earthworks near the waterway. • Diminishing the mauri of Karetu River. • Modifications to the river. • Effects with contaminants (such as water clarity). In addition, it is requested that: • Natural geological features including limestone springs and underwater caves are protected. • The land is kept natural and not 'ruined' by landfill.
Associative Aspects	Some submitters believe the Application may bring: • A loss of local identity, history, fossils and archaeological finds. • Harm to the areas 'clean and green' reputation and vision. • Concerns for the maunga. • Effects on māhinga kai.

38 Each of the main landscape themes from the submissions have been addressed below.

Visual Amenity

39 The Application Site is screened by topography to the north and east. The area is also quite visually contained in places by the hills, as well as river and roadside vegetation. Some residences are located near the road, whereas others are located well inside land parcels. A mixture of properties are positioned on the flat, closer to the Karetu River, or on raised escarpments.

40 It was observed on the second visit to the local area, that the higher the quarrying moves up the hillside in future, the more obvious it will become, particularly from properties further afield. Currently when viewed from the northern end of Quarry Road and midway along Taaffe's Glen Road, the top of the quarry is aligned fairly close to the top of the trees in the midground. This may not be the case when the quarry is expanded.

41 Due to the varying size of private lots, as well as intervening vegetation and topography, it was sometimes difficult to assess the effect of the Application on individual residences when they could not easily be seen from the road.

42 Ms. Back assessed the effects of the Application when viewed from ten private properties. She determined that the visual effect on the residents of 144 and 179 Quarry Road will be **low** during the works and **very low** following disestablishment

of the landfill (presumably adverse). Visual effects at all other locations were determined to be **very low**.[6]

43 I agree with the above findings. However, I would also include numbers 62 and 12 Quarry Road within the above property cluster. Number 62 Quarry Road (which is a dwelling located close to the roadside, plus a secondary dwelling immediately next door) was not accessed by Ms. Black as part of her LVA. This property is located closer to the quarry than some of the properties previously assessed. Again, the visual effect on the residents of this address are likely to be **low** due to the approximate 835 metre distance from the quarry.

44 Number 12 Quarry Road is also located next to the road but at a distance of 1.3km. Adverse visual effects are likely to be **very low**.

Rural Amenity

45 The area is valued for its paddocks, trees, and agricultural, pastoral or horticultural activities as well as dispersed buildings and structures, which give it a rural character. Also appreciated is the rural outlook, spaciousness, privacy, limited traffic, clean air, and quietness.

46 When assessing effects, it should be noted that a change in a rural area or landscape does not, of itself, necessary generate an adverse effect. All landscapes are dynamic and constantly changing over time, in both subtle and transformational ways, and through both natural and human activity.

47 Many submitters raised concerns about changes to the area's peaceful, tranquil character, rural setting, beauty and attractiveness. There was also concern relating to increased traffic and trucks on the roads and the effect on recreationalists using the local area.

48 The proposal is anticipated to result in an average of 36 vehicle movements per day, 18 vehicles coming and going, some of which will be heavy vehicles.[7] Residents and road users will experience an increase in traffic over and above the existing level both visually and through increased disturbance.

49 As mentioned previously, some dwellings are located close to the road, and some are setback further within their property parcels. Those located closer to the road (and located prior to the Site entrance) are likely to experience a greater adverse

[6] 26, 33, 49 and 179 (cluster) Quarry Road, 1, 105, 125 and 260 Taaffe's Glen Road, Quarry Road corridor, Karetu River corridor, and surrounding recreational areas.
[7] I understand that the number of vehicle trips between what the Applicant has proposed and what WDC may propose may differ. As such, I have focused on the fact that the amenity of local residents will be affected and tried to explain how. The greater the amount of vehicle trips, the greater the resulting adverse effect will be.

effect on amenity as a result of an increase in traffic relating to the Application. This disturbance will be experienced briefly as vehicles (trucks and trailers, service vehicles and staff vehicles) transition past private properties on their way to and from the Application Site.

Recreation

50 Submitters raised concerns about the effects of the Application on recreation and the recreational value of the area. Visually, the landfill is likely to have little effect on the user experience from DoC tracks and reserve land, which are located at least 6 kilometres away. An increase in traffic may be noticed by transient recreationalists such as cyclists, horse riders and river users. The effects of traffic safety, dust, noise and effects on water quality have been addressed by other experts.

Landscape Character

Landuse

51 Rural areas consist of a diverse mix of activities, some of which may be incompatible with each other and/or need to be mitigated. Many submitters comment that the Application will result in a change in landuse from a rural to industrial activity. This comment is made irrespective of the fact that there has been an existing large scale quarry in operation on site since 1950.

52 This existing quarry activity has provided the opportunity for the landfill activity to take place, to practically fill the hole in the ground. As such, the Application proposes a gradual change in landuse from a limestone extraction and processing activity to a managed fill landfill. At the completion of the activity, the site will be rehabilitated into a pastoral landuse, much like the surrounding hillscape.

Landform

53 Observations from visiting the site and local area include that the site is screened by topography to the north and east. The landform of the Application Site has been highly modified by quarry activity cutting into the surrounding hillside.

54 As a result of the Application, further modification will occur associated with extraction activity and landfill formation. As the landfill is progressed the site will begin to merge with the surrounding topography. An example of what this final landform may look like has been helpfully illustrated by the visual simulation prepared by WSP.

55 Submitters concerns in relation to landform centre around the modification of the river and the possibly of earthworks within the waterway. The Applicant has confirmed that there will be no central pier used in the new bridge crossing the

Karetu River. However, further information (such as a plan and cross sections) are needed to understand the location of the existing bunds, their dimensions, and the location of the proposed fencing and how these elements will work in relation to the proposed planting near the Karetu River. It is also not clear whether the existing bunds beside the river are being modified and stabilised. Without this information, it is difficult to quantify the effect of the Application on landform.

Landcover

56 Many submitters are concerned that the Application could cause disruption to and/or effects on flora and fauna. In contrast, one submitter advocates for maintaining the quarry due to the opportunity it provides for eventual reforestation to preserve biodiversity.

57 It is my understanding that the Application will result in no vegetation removal but instead a number of areas where planting will be added. These areas include riparian planting around the Karetu River, eastern watercourse and wetlands (Refer to the discussion on Proposed Landscape Mitigation Measures under paragraphs 79 to 80). Again, more detail is needed on the location, width, planting arrangement and species proposed, to provide reassurance around the enhancement of these areas proposed by the Applicant. (Refer to comments made alongside Conditions 30 and 31 later in this evidence).

58 As mentioned previously, upon completion of the quarry and landfill activity, the site will be rehabilitated into a pastoral landuse, much like the surrounding hillscape. The addition of the aforementioned further planting areas and the rehabilitation of the disturbed areas of the site will likely result in long-term **positive effects on landcover**.

Significant Natural Area (SNA)

59 The Statutory Context (paragraphs 26 to 30) included a definition for the SNA which is mapped as PWDP SNA039 – Whiterock Limestone Vegetation. This area is located immediately north of the proposed quarry and landfill activity. The SNA is important as it has highly valued shrub and grasslands located on cliffs and rocky outcrops. The area is likely to be representative of the original vegetation cover as well as the landform of rolling hills with limestone scarps.

60 It is my understanding that the SNA will be avoided by the Application and will be protected by fencing it off from the rest of the Application Site. If appropriate, the Applicant may also like to consider further rehabilitation or enhancement of this area.

Natural Character

61 Ms. Back addressed the effects of the Application on natural character in her LVA. However, she did not outline the methodology used to carry out her assessment of natural character.[8] As concerns about natural character were raised by submitters, I have assessed the effect of the Application upon natural character by using the methodology outlined in TTatM.

62 The purpose of assessing natural character is to inform its management. That is, to preserve the natural character of the environment, and of wetlands, rivers and their margins, and protect the natural character of those places from inappropriate use and development. That purpose applies to all such areas and not just those with a high degree of naturalness. An area's remnant character may be important even though it is highly modified.

63 For proposal driven assessments like this one, TTatM provides an example of a step by step approach for assessing natural character, which is methodically worked through below under each of the underlined headings.

64 It should be noted that aspects of natural character which relate to hydrology, geology, ecology and/or cultural values of the river fall outside the author's landscape and visual expertise. Other experts will provide comment on the freshwater margins of the river and/or the values of the water itself.

Defining Natural Character

65 Section 6(a) of the RMA refers to the preservation and protection of natural character but does not provide a definition for what it is. This assessment defines natural character as: *'The naturalness or degree of modification of an area'*[9] and *'an area's distinct combination of natural characteristics and qualities'*.

66 The former is a quantitative attribute - a condition.[10] The latter is a character specific to each area and adopts the interpretation that natural character is an area's distinctive combination of natural characteristics and qualities, including degree of naturalness. It is this second definition that this evidence focuses on.

Identifying the Relevant Area

67 For this Application, natural character relates to the Karetu River and its local environment, the eastern boundary watercourse and its riparian margins, and the

8 There are different views within the profession (and in other disciplines and organisations) on what natural character is and how it should be assessed. Refer to TTatM, page 206.
9 The extent to which the natural elements, patterns and processes occur.
10 Generally, the degree of natural character is highest where there is least modification.

upper and lower wetlands within the site. This evidence also considers the broader context within which all these waterbodies sit.

Assessing Natural Characteristics and Qualities

68 The key natural characteristics and qualities of the rivers, riparian areas and wetlands include the physical and biotic natural elements and how they are perceived and experienced. These are summarised in below:

Figure 3: Natural Characteristics and Qualities of the Waterbodies

Physical	• The Karetu River and its local environment, the eastern boundary watercourse and its margins, and the upper and lower wetlands. • The influence of heavy rainfall in times of flood and low water levels in times of drought. • Ecological values in terms of flora and fauna, habitats, and connectivity (e.g. presence of eels, watercress growth etc.).[11] • Movement of water and sediment (patterns and processes). • The SNA located near the river and contributing to the catchment. • The degradation of natural character (e.g. increasing sedimentation and decreasing water quality).
Perceived and Experienced	• Recreational use and enjoyment of the river. • Ability to see and hear the water (when flowing). • Sound and movement of aquatic life and birds. • Clarity of the river when undisturbed by vehicles using the ford. • The feel of the water when crossing the river or swimming. • The darkness of the night sky. • In places, a high level of modification has occurred to the waterbodies due to the existing quarry activity, presence of informal earth bunds, proximity of quarry buildings, compacted laydown areas, roads and the ford across the Karetu River.

Effects of the Application on Natural Character

69 Having understood the above characteristics and qualities of the site, the focus is on how these aspects come together as a collective expression of natural character. Effects on natural character by an Application can be both positive and adverse. TTatM promotes improvement of natural character values rather than simply managing the status quo or mitigating adverse.

70 Regard should also be given to the relevant statutory provisions for natural character. The applicable Natural Character Objectives and Policies from the PWDP are included under paragraph 30 and figure 1 of this evidence.

11 Refer to Appendix G Ecological Impact Assessment of the AEE which attributes the following ecological values to the site: Negligible vegetation values within the Project boundary; Very High ecological value of freshwater fauna on site within the Karetu River, Low ecological value for freshwater fauna of the eastern watercourse; and, Low overall ecological value of the upper and lower connected wetlands.

Karetu River

71 A ford intersects the Karetu River providing vehicular access along with a single person footbridge. This access will be replaced with a new 23 metre long single span bridge. During the removal of the rock armoured weir there will be a **short-term adverse effect** on natural character because of elevated sediment affecting water clarity. However, following completion, there will be a **positive effect** with less disturbance to the riverbed due to traffic no longer moving through it.

72 Stormwater infrastructure will be located within and alongside the Karetu River. These elements do not require the removal of any vegetation and require only small changes to the landform, much of which has been highly modified already.

73 At this stage, it is unclear how the proposed security fencing intersects with the bunding along the Karetu River. It is advisable that the fencing is not installed close to the waterbody. As previously mentioned, more information is needed in terms of existing bunds and whether these are being strengthened or replaced and how the proposed riparian planting works with these.

The Eastern Boundary Watercourse and Wetlands

74 This ephemeral eastern boundary watercourse connects with the upper and lower wetlands. The proposed activity is located at least 20 metres away from these features. The general area has already been highly modified by pasture, vegetation removal, slash and informal stockpiles.

<u>Overall Effects on Natural Character</u>

75 Preserving and protecting natural character does not necessarily mean maintaining the status quo or avoiding activities or development. Restoration and rehabilitation can also occur as part of activities proposed.

76 From a landscape and visual perspective, the Application will result in **positive effects** on natural character due to:

(a) Less disturbance to the riverbed due to traffic no longer moving through it.

(b) Additional riparian planting of the Karetu River, eastern watercourse and onsite wetland areas.

(c) Longterm removal of buildings and infrastructure near the river.

77 It can be concluded that the natural character of the area is generally highly degraded due to the existing quarry activity and associated changes to the landform and landcover. Most of the proposed activity will be located within areas of the Site that have already been subject to a high degree of modification.

Recommending Measures to Manage Effects on Natural Character

78 Having completed the above process, I generally agree with Ms. Back's findings that the effect on natural character (at completion of the quarrying and landfill activity) will be positive. However, there is some uncertainty around the net effect because of the vagueness about what is proposed in terms of fencing and bunds along the Karetu River and the reliance on conditions to secure the landscape enhancements. I have made further recommendations under the Proposed Consent Conditions section of this evidence to assist with managing effects on natural character.

Proposed Landscape Mitigation

79 The proposed landscape mitigation measures, objectives to be achieved, and timeframes are described in Schedule 1 of Appendix Y of the AEE and shown on the accompanying plan RC245076C[12] and summarised as follows:

Figure 4: Proposed Mitigation Measures Provided by the Applicant

Vegetation Management Plan	a) The consent holder will prepare a Vegetation Management Plan (VMP) including, among other things, detailed planting plans and a work programme. This will be certified by a suitably qualified and experience Ecologist or Landscape Architect.
Karetu River Margin Enhancement	a) 'Upstream' (Identified as 'Area C' on plan RC245076C) - Planting of a 10m riparian margin on the true left bank with indigenous species including the gradual removal of pest willow tree species as indigenous species mature. b) 'Onsite - Interim' (Identified as 'Area D' on plan RC245076C) – Planting of a 2 -3m wide riparian margin (average width) along the true left bank with indigenous species where practicable. c) 'Onsite - Long-term' (Identified as 'Area E' on plan RC245076C) – Planting of a 10m wide riparian margin in indigenous species on the true left bank.
Eastern Watercourse Enhancement	a) Planting of a 10m riparian margin in indigenous species on both margins identified as 'Area F' on plan RC245076C.
Wetlands	a) Planting of a 10m wide riparian margin of indigenous species identified as 'Area G' on plan RC245076C.
SNA	a) Registration of the SNA within 176 Quarry Road identified as 'Area A' on plan RC245076C as a Conservation Covenant with the Department of Conservation. b) Installation of stock proof fencing around the perimeter of the SNA as indicated on plan RC245076C.
Rehabilitation	a) A Landfill Closure and Aftercare Plan will be required covering, among other things, site restoration including the final landform, landscaping and planting, ground cover and land use. b) The recontouring and landscaping of the site following closure to ensure that it is in keeping with the character of the surrounding landscape.

12 Biodiversity and Landscape Enhancement Plan, produced by Ecologist, Mike Hansen (20 August 2024).

80 The effectiveness of the proposed mitigation measure is discussed under the Proposed Conditions of Consent section that follows.

Proposed Conditions of Consent

81 The proposed Conditions of Consent relating to mitigation of landscape and visual effects are included in Appendix Y (Rev 1) of the AEE under RC245076, Conditions 29 to 39: Biodiversity and Landscape Enhancement and 75 to 79: Landfill Closure and Aftercare.

82 Figure 5 below lists the landscape conditions. Where appropriate, I have provided comment and made recommendations to ensure that they will achieve the desired outcomes.

Figure 5: Landscape and Visual Related Conditions of Consent

RC245076 Conditions 29 to 39 Biodiversity and Landscape Enhancement	**Landscape Peer Review Comment on Conditions**
Condition 29: *"The Consent Holder, for the purposes of achieving biodiversity and landscape enhancement across the site, must complete the requirements set out in Schedule 1 in the areas identified on Plan RC245076C which are both attached to and form part of this consent. The requirements must be completed within the stated timeframes, unless otherwise specified by a condition of this consent."*	i. Schedule 1 clearly outlines what is required, the objectives to be achieved and the timeframe. This is supported by a helpful plan (RC245076C). ii. The fence for the eastern watercourse, wetlands and stream should be added to a detailed plan.
Condition 30: *"Within 3 months of exercising the consent, the Consent Holder must register the area of land referred to in Column 1 of Schedule 1 with the Department of Conservation as a conservation covenant."*	i. The VMP must be produced in accordance with the Waimakariri District Council Engineering Code of Practice. ii. The detailed planting plans must include the following: - Proposed planting areas. - Width of planting beds. - Planting arrangement (staggered, double rows or otherwise). - Species type. - Dimensions and annotations. iii. A Landscape Schedule of Species must be produced including species name, grade, spacing and quantity. iv. Refer to comments under Condition 35.
Condition 31: *"Within 6 months of commencement of the consent and prior to landfill development works commencing a Vegetation Management Plan (VMP) must be prepared, that provides for the requirements in Schedule 1. At a minimum, the VMP must provide for:* *a) The consent holders approach to completing the requirements outlined within Column 1 of the Schedule.* *b) Detailed planting plan(s) of the Column 1 requirements that will achieve the Column 3 objectives within each corresponding Area (Column 2); and* *c) Provide a work program for achieving the requirements within the timeframe in Column 4 including any contingency for plant unavailability (as referred to in Condition 35)."*	
Condition 32: *"Within one month after the completion of the VMP the consent holder must submit to the Waimakariri District*	

Council, Attention: Planning Manager: Plan Implementation Unit: *a) The VMP to achieve compliance with Condition 31 of this consent.* *b) b. A certificate signed by the suitably qualified and experienced ecologist or landscape architect to certify that the VMP has been prepared to comply with Condition 31 of the consent. This suitably qualified and experienced ecologist or landscape architect must also sign a statement confirming that they are competent to certify the VMP work."*	
Condition 33: *"The planting plan required as part of the VMP referred to in Condition 31.b must:* *a) Utilise indigenous plant species appropriate for the ecological district for the site; and* *b) Achieve a minimum average planting density of two plants per square meter."*	i. Plant spacing of two plants per square metre will work well.
Condition 34: *"Alternative plant species and/or planting density to the requirements in Condition 33 must be informed by a Suitably Qualified and Experienced ecologist or landscape architect in the field of botany and be approved in writing by Waimakariri District Council."*	i. The requirement for the Landscape Architect to be in the field of botany should be removed as this is not necessary. ii. The Landscape Architect and Ecologist should work together as both bring different experience and expertise.
Condition 35: *"Should there be a delay to the planting timeframe required in Column 4 of Schedule 1 due to the unavailability of suitable seedlings, the Consent Holder shall provide the Waimakariri District Council with an amended timeframe within which the planting shall occur. The total timeframe shall not exceed four planting seasons, and the Consent Holder shall complete the planting as soon as is reasonably practical within the four year timeframe and shall inform the Waimakariri District Council when planting is complete."*	i. A timeframe of four planting seasons (four years) is too long. If plant species are unavailable alternative species should be considered and approved by WDC. ii. A condition should be added requiring that a supply of plants of an appropriate size needs to be secured prior to the exercising of the Resource Consent (minimum 1L grade or equivalent). Note that this condition also needs to work with the timeframes specified by Condition 31 and may require some rework of timeframes. iii. A condition should be added making sure that planting occurs during the planting season from April to September to ensure the best chance of success. iv. A condition should be added ensuring that each plant is of nursery stock and of good form that is true to species. Plants must be healthy, vigorous and free of disease, injury, parasites or insects and not pot bound.
Condition 36: *"To verify that the requirements of Condition 31 have been completed, to the required standard and achieve*	i. The requirement for the Landscape Architect to be in the field of botany should be

the objectives in Column 3 of Schedule 1, the following must occur: *a) Within one month after completing a Schedule 1 requirement, the Consent Holder must submit to the Waimakariri District Council, Attention: Planning Manager: Plan Implementation Unit a certificate signed by a Suitably Qualified and Experienced ecologist or landscape architect in the field of botany to verify the requirements have been completed.* *b) All planting required by Condition 31 and Schedule 1 must be supervised by a Suitably Qualified and Experienced ecologist or landscape architect in the field of botany or person nominated on their behalf."*	removed as this is not necessary. ii. The Landscape Architect and Ecologist should work together as both bring different experience and expertise.
Condition 37: *"All plantings required by Schedule 1 must be regularly inspected during the first five years from planting to identify any management that may be required. Including the following minimum regime:* *a) In the first 12 months following a planting requirement, plant condition and weed competition must be assessed every three months, undertaking hand weeding or spraying with selective herbicides as necessary.* *b) Year Two following a planting requirement, the assessment and maintenance must be a minimum of three times per year.* *c) Years Three to Five, the assessment and maintenance must be a minimum of twice per year."* *Advice Note: Application and use of herbicides should comply with relevant regulations of the Waimakariri District Council and Canterbury Regional Council and follow label prescriptions."*	i. Add a requirement that after the first five years the plants are to be inspected annually to identify any management or maintenance required and to infill any gaps. ii. Specify that 'maintenance' includes weeding, spraying, staking, watering, fertilising, trimming, pest removal and replacement of plants where necessary. The aim is to achieve vigorous and thriving plants.
Condition 38: *"Infill planting to replace plants that have died must be undertaken as necessary in Years Two and Three after the original planting."*	i. This must occur throughout the life of the consent. Refer to comment 'i' under Condition 37.
Condition 39: *"The Consent Holder must undertake ongoing maintenance of the planted areas once a year after the five years until a minimum plant survival rate of 75% across the entire planting areas has been achieved. A report from a suitably qualified ecologist or landscape architect in the field of botany detailing the 75% survival rate must be provided to Waimakariri District Council, Attention: Planning Manager: Plan Implementation Unit to satisfy that no further maintenance and works is required."*	i. A 75% survival rate is very low and means ¼ of the plants could fail. This should be changed to 90% ii. Refer also to comment 'i' under Condition 37. iii. The requirement for the Landscape Architect to be in the field of botany should be removed as this is not necessary.
RC245076 Conditions 75 to 79 Landfill Closure and Aftercare	**Landscape Peer Review Comment on Conditions**
Conditions 75- 79 cover (paraphrased): a) Post care aftercare period. b) Closure and Aftercare Plan. *c)* A peer review of the Landfill Closure and Aftercare Plan.	i. From a landscape and visual effects perspective, the adjacent conditions are sufficient to ensure that the site is appropriately landscaped and contoured after closure.

83 From a landscape perspective, I agree with conditions 60-61 on fencing and conditions 81-82 on early closure. Condition 95 provides some reassurance that the Application Site will be remediated, and conditions adhered to.

84 Provided that my comments on conditions are incorporated into the conditions, I am satisfied that the proposed conditions can satisfactorily avoid, remedy and mitigate the adverse landscape and visual effects of the Application.

Conclusion

85 Within this Statement of Evidence, I have considered the landscape and visual effects that could arise from Protranz International Limited's Limestone Quarry and Managed Fill Landfill Application at 150, 154, 175 and 176 Quarry Road Loburn.

86 Overall, I consider the quarry expansion, and the addition of a managed fill landfill will result in:

(a) Further modification to a site which has already been heavily modified by quarry and processing activities.

(b) Adverse effects on the amenity of local residents because of increased traffic movement to and from the Site.

(c) Protection of the SNA by way of a fence.

(d) Enhancement through planting along the Karetu River, eastern watercourse and within two wetlands.

(e) In the future, the recontouring and landscaping of the site following closure to assist with merging the final landform character into the surrounding hillscape.

87 Generally, I believe my views and those of Ms. Back (Landscape Architect for the Applicant) are well aligned, with her assessment being fair and justified, minus a few areas which have been further discussed within my evidence.

Naomi Louise Crawford

Dated this 24th day of March 2025

Hon Nicola Willis

Minister of Finance
Minister for Economic Growth
Minister for Social Investment

26 SEP 2025

Hon Chris Bishop
Minister for Infrastructure
Parliament Buildings
Wellington

REQ-0021407

Dear Chris

Thank you for the opportunity to comment on the following two applications for referral under the Fast-track Approvals Act (FTAA):

- Whiterock Quarry and Managed Fill, FTAA-2505-1062
- Out of Scope

I am providing comments in my capacity as Minister for Economic Growth, focusing on whether these applications are likely to have significant economic benefits under section 22(2)(a)(iv) of the FTAA, based on the information provided. I defer to you and other relevant Ministers to assess the remaining criteria.

Whiterock Quarry and Managed Fill, FTAA-2505-1062

This application is a proposal to build and operate a landfill at the Whiterock Lime Quarry in Loburn, Canterbury. The proposed Class 3 Managed Fill facility is expected to receive inert and sorted construction and demolition waste, and other wastes such as contaminated soil and asbestos. Quarrying operations and limestone extraction activities are expected to continue during the construction of the waste disposal facility.

Whiterock Lime Limited, the applicant, submitted an independent assessment of the project's economic benefits. The assessment focused on cost savings from reduced transport and waste disposal charges, as well as potential support for future construction development through providing additional waste disposal facilities in Canterbury. No information was provided on job creation or GDP impacts.

Based on the applicant's economic assessment, the overall economic benefit of the proposal remains unclear. Any employment or GDP impacts are likely confined to Canterbury region, with limited broader regional or national impact.

Out of Scope

Private Bag 18041, Parliament Buildings, Wellington 6160, New Zealand | +64 4 817 6801 | n.willis@ministers.govt.nz

Out of Scope

Yours sincerely



Hon Nicola Willis
Minister for Economic Growth

Hon Penny Simmonds

Minister for the Environment
Minister for Vocational Education
Associate Minister for Social Development and Employment

29 September 2025 PS-COR1562

Hon Chris Bishop
Minister for Infrastructure
c.bishop@parliament.govt.nz

Dear Chris,

Thank you for the invitation to provide comments on the application for referral of the Whiterock Quarry and Managed Fill project to an expert panel under section 17 of the Fast-track Approvals Act 2024 (FTAA).

Having reviewed the referral application, I have some comments about the level of information provided to determine the significance of potential adverse environmental effects of the project.

The applicant will be required to provide more detailed assessments at the substantive stage. However, it would be more efficient to identify as soon as possible if there are likely to be significant adverse effects from the project. This would enable appropriate strategies to avoid, remedy or mitigate them to be considered throughout the detailed design process of the proposal prior to lodging the substantive application.

You may wish to use your discretion to specify information that is required to be provided with the substantive application under section 27(3)(b)(ii) of the FTAA, including:

a. Complete reporting on the adverse effects identified in relation to terrestrial and aquatic ecology, stormwater discharges and flood risk, including the full expert technical reports referenced on pages one and two of *"Attachment 8 Anticipated and Known Adverse Effects*

b. A fire safety plan which assesses the health and safety risks of the proposal and how these will be managed.

This approach will reduce the risk of unanticipated significant matters being identified late in the process and will support the smooth and efficient conduct of the expert panel's deliberations.

Thank you again for the opportunity to provide comments on this referral application.

Yours sincerely,

Hon Penny Simmonds
Minister for the Environment

Private Bag 18041, Parliament Buildings, Wellington 6160, New Zealand | +64 4 817 6815 | p.simmonds@ministers.govt.nz

Hon Shane Jones

Minister for Oceans and Fisheries
Minister for Regional Development
Minister for Resources
Associate Minister of Finance
Associate Minister for Energy

4 November 2025

Hon Chris Bishop
Minister for Infrastructure
Parliament Buildings
Wellington

Fast-track Approvals Act referral application – Whiterock Quarry and Managed Fill (FTAA-2505-1062)

Dear Chris,

Thank you for the opportunity to comment on the Whiterock Quarry and Managed Fill application for referral under the Fast-track Approvals Act (FTAA 2024).

I have considered the application and its alignment with the priorities of my Regional Development portfolio. My comments are attached as Annex One.

Yours sincerely

Hon Shane Jones
Minister for Regional Development

Private Bag 18041, Parliament Buildings, Wellington 6160, New Zealand | +64 4 817 6826 | s.jones@ministers.govt.nz

Annex One – Regional Development comments

Project overview

1. The Whiterock Quarry and Managed Fill application proposes to establish and operate a landfill at the Whiterock Lime Quarry in Loburn, 50 kilometres from central Christchurch. The landfill would receive inert and sorted construction and demolition waste, and other wastes such as contaminated soil and asbestos.

2. The Whiterock Lime Quarry a fixture of the local economy sincethe1950s, offers a sensible and efficient opportunity to extend its productive life by hosting a managed fill operation within its existing pit. Continuing quarrying activity alongside landfill development over the next decade reflects a practical use of regional assets, supporting jobs and infrastructure while making good use of the land that has long served the community.

3. Benefits associated with this application are:

    a. reduced transport costs for businesses transporting waste from central Christchurch, as the proposed site is 15 kilometres closer than the region's existing landfill site – an estimated haulage cost saving of $360,000 for the 800,000 tonnes of waste that could be disposed of at the new proposed site

    b. minimising 'opportunity cost' by redirecting inert waste material to the proposed site – this would enable the region's existing municipal waste landfill site to meet its electricity generation potential (by focusing on processing organic waste to be used for power generation).

Regional Development comments

4. The local region may experience some benefit from increased inert waste disposal capacity at the new site as set out in the economic analysis. The scale of this benefit is not clearly identified in the application.

5. The economic analysis states that there will be no displacement of other potential land uses for the site (such as agriculture).

6. Comments on any adverse effects and associated costs should come from relevant portfolio Ministers, such as the Minister for the Environment.

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If you are a corporate entity making comments on this application, your full contact details will be publicly available.

For individuals, your name will be publicly available, but your contact details (phone number, address, and email) will not be publicly available.

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Your written comments on a project under the Fast Track Approvals Act 2024

Project name	FTAA–2505-1062 Whiterock Quarry and Managed Fill Project

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All sections of this form with an asterisk (*) must be completed.

1. Contact Details			
Please ensure that you have authority to comment on the application on behalf of those named on this form.			
Organisation name (if relevant)	Hurunui District Council		
***First name**	Judith		
***Last name**	Batchelor		
Postal address	PO Box 13 Amberley		
***Contact phone number**	s 9(2)(a)	**Alternative**	
***Email**	s 9(2)(a)		

2. Please provide your comments on this application
If you need more space, please attach additional pages. Please include your name, page numbers and the project name on the additional pages.

Note: All comments will be made available to the public and the applicant when the Ministry for the Environment proactively releases advice provided to the Minister for the Environment.

Comments on a fast-track consenting application
Fast-Track Approvals Act 2024

Fast Track Application FTAA–2505-1062 Whiterock Quarry and Managed Fill

Thank you for your Invitation to provide written comments for the application for the Whiterock Quarry and Managed Fill project in Loburn under the Fast Track Approvals Act 2024. Please see below Waimakariri District Council's (WDC) comments on this application.

Insert Fast-track logo

Hurunui District Council has reviewed the Whiterock Quarry and Managed Fill project proposal under the Fast-track Approvals Act 2024 and provides the following feedback on the proposal being placed on the fast-track process.

Key considerations:

- **Competing Application Already Lodged** – The same application has been lodged and being processed by Waimakariri District Council and Canterbury Regional Council. The application has been publicly notified, with 573 submissions, and is subject to hearing requests of 80 submitters. Allowing Whiterock to proceed via fast-track process would bypass the hearing process and undermine fairness and natural justice to the community who have submitted on the proposal.
- **Not a Priority Project** -The proposal is not identified in any central government or local government strategy, spatial plan, or infrastructure priority list, and therefore carries no recognised strategic weight.
- **Lack of Regional or National Benefit** – The project duplicates services already provided in North Canterbury and does not address any identified infrastructure gap. It would not deliver significant regional or national benefits.
- **Environmental and Ecological Risks** – The project, under the current resource consent process, was deemed to have adverse effects on the environment, particularly concerning biodiversity and freshwater.
- **Cultural Opposition and Values** – Based on advice received by the Waimakariri District Council as part of the resource consent process, mana whenua (Ngāi Tūāhuriri) strongly oppose the project due to effects to cultural landscapes, mahinga kai, and kaitiakitanga.
- **Alternative Facility Already Available** – Existing infrastructure already provides secure regional capacity for residual waste disposal, making the Whiterock proposal unnecessary.
    - Canterbury has a Class 1 regional landfill at Kate Valley in the Hurunui District. It was established as a regional facility and consented by Hurunui District Council and Environment Canterbury to 2039. It has airspace remaining within the current consented profile and footprint to the mid-2040s at least.
    - The Council understands the Transwaste Canterbury Limited will further seek to maximise the current landfill before looking at alternate suitable sites at Kate Valley utilising the existing facilities.
    - Kate Valley is a class 1 facility for levy purposes but is expecting to have approval from MFE for a class 2 designation for part of its site from mid-November.
    - This will not alter the consent conditions or environmental standards but will reduce the rate of levy charged and passed on to the customer for appropriate waste streams.
    - Burwood managed fill owned by CCC is currently having its consent extended annually, however CCC have advised it has 5 or more years capacity remaining and they are expecting to keep extending until filled.
    - Kate Valley is the region's established, consented, and operating landfill. It was set up through a regional planning process, with substantial investment, and has the capacity to meet the region's waste disposal needs into the future.

- Kate Valley was specifically set up as a public/ private partnership between Christchurch City Council, and the District Councils of Ashburton, Hurunui, Selwyn and Waimakariri, and the private sector to manage Canterbury's waste streams and provide assurance to the community that no further small-scale localised landfills will be developed across the region. This approach also had the support of Canterbury's Papatipu Runanga. Kate Valley is 15 km further from Christchurch CBD than the proposed location of the Whiterock landfill.
- Kate Valley already provides this service; there is no evidence provided demonstrating the need for a second landfill. Establishing a privately-owned landfill would duplicate existing infrastructure, fragment waste streams, and undermine the coordinated regional approach that led to Kate Valley being chosen and developed. This proposal is therefore unnecessary, inefficient, and inconsistent with good planning outcomes
- Accordingly, Hurunui District Council does not consider the project to be a priority, nor one that would deliver significant regional or national benefits. This is particularly so given the existing statutory waste management framework and the established role of Kate Valley Landfill in providing for the region's waste disposal needs

Judith Batchelor

Chief Strategy and Community Officer

30 September 2025

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Your written comments on a project under the Fast Track Approvals Act 2024

Project name	Whiterock Quarry and Managed Fill FTAA-2505-1062

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All sections of this form with an asterisk (*) must be completed.

1. Contact Details

Please ensure that you have authority to comment on the application on behalf of those named on this form.

Organisation name (if relevant)	Land Information New Zealand		
***First name**	Brett		
***Last name**	Parker		
Postal address	P O Box 5501, Wellington 6145, New Zealand		
***Contact phone number**	s 9(2)(a)	**Alternative**	
***Email**	s 9(2)(a)		

2. Please provide your comments on this application

Access to Whiterock quarry is through Crown land (parcel ID 3594099, refer Central Record of State Land). This access is therefore subject to the Land Act 1948. There is not an active easement granted to Whiterock Quarry Ltd at present.

In October 2024 Whiterock Quarry Ltd applied to LINZ for an easement for the quarry site.

LINZ (Crown Property) is considering the application under section 60 of the Land Act 1948.

Note: All comments will be made available to the public and the applicant when the Ministry for the Environment proactively releases advice provided to the Minister for the Environment.

Managers signoff

Keryn Lavery

Lead – Policy



Date 29/9/2025

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Your written comments on a project under the Fast Track Approvals Act 2024

Project name	Whiterock Quarry and Managed Fill project

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1. Contact Details

Please ensure that you have authority to comment on the application on behalf of those named on this form.

Organisation name (if relevant)	Christchurch City Council		
*First name	Alec		
*Last name	McNeil		
Postal address			
*Contact phone number	s9(2)(a)	Alternative	
*Email	s9(2)(a)		

2. Please provide your comments on this application

Comment from the Christchurch City Council (CCC) as "any other person", with comments sought in relation to the regional benefits of the proposed managed fill in accepting construction and demolition waste to the facility, including post-earthquake demolition waste.

Dr Alec McNeil, Manager Resource Recovery, and Grant Gillard, Landfill Aftercare Supervisor, have reviewed the information provided and noted with regard to regional benefits that an additional landfill in Canterbury:

- Is likely to increase the lifespan of Kate Valley Regional Landfill.
- Would also give developers more options for disposal, particularly for Waimakariri District developments.
- More disposal options could lead to more competitive pricing and thus economic benefit.

Overall, the economic impact could be positive dependent on accessibility for the wider market to use the site and the site gate fee pricing. In providing these comments, Dr McNeil and Mr Gillard have had regard to the information provided with the referral application setting out the anticipated regional benefits, including the economic assessment. For completeness, I note that the Christchurch City Council have not sought a peer review of the provided assessment or alternative economic assessment.

Note: All comments will be made available to the public and the applicant when the Ministry for the Environment proactively releases advice provided to the Minister for the Environment.

Insert Fast-track logo

Managers signoff



Brent Smith, General Manager City Infrastructure **8/9/2026**

Delegated authority



Paul Lowe, Resource Consents Manager **8/9/2026**

Your written comments on a project under the Fast Track Approvals Act 2024

Project name	REQ002015LOJ2 Whiterock Quarry and Managed Fill Project

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All sections of this form with an asterisk (*) must be completed.

1. Contact Details			
Please ensure that you have authority to comment on the application on behalf of those named on this form.			
Organisation name (if relevant)	Hurunui District Council		
***First name**	Judith		
***Last name**	Batchelor		
Postal address	PO Box 13 Amberley		
***Contact phone number**	s9(2)(a)	**Alternative**	
***Email**	s9(2)(a)		

2. Please provide your comments on this application
If you need more space, please attach additional pages. Please include your name, page numbers and the project name on the additional pages.

Note: All comments will be made available to the public and the applicant when the Ministry for the Environment proactively releases advice provided to the Minister for the Environment.

Comments on a fast-track consenting application
Fast-Track Approvals Act 2024

Fast Track Application REQ002015LOJ2 Whiterock Quarry and Managed Fill

Thank you for your Invitation to provide written comments for the application for the Whiterock Quarry and Managed Fill project in Loburn under the Fast Track Approvals Act 2024. Please see below Waimakariri District Council's (WDC) comments on this application.

Insert Fast-track logo

Hurunui District Council has reviewed the Whiterock Quarry and Managed Fill project proposal under the Fast-track Approvals Act 2024 and provides the following feedback on the proposal being placed on the fast-track process.

Key considerations:

- **Competing Application Already Lodged** – The same application has been lodged and being processed by Waimakariri District Council and Canterbury Regional Council. The application has been publicly notified, with 573 submissions, and is subject to hearing requests of 80 submitters. Allowing Whiterock to proceed via fast-track process would bypass the hearing process and undermine fairness and natural justice to the community who have submitted on the proposal.
- **Not a Priority Project** -The proposal is not identified in any central government or local government strategy, spatial plan, or infrastructure priority list, and therefore carries no recognised strategic weight.
- **Lack of Regional or National Benefit** – The project duplicates services already provided in North Canterbury and does not address any identified infrastructure gap. It would not deliver significant regional or national benefits.
- **Environmental and Ecological Risks** – The project, under the current resource consent process, was deemed to have adverse effects on the environment, particularly concerning biodiversity and freshwater.
- **Cultural Opposition and Values** – Based on advice received by the Waimakariri District Council as part of the resource consent process, mana whenua (Ngāi Tūāhuriri) strongly oppose the project due to effects to cultural landscapes, mahinga kai, and kaitiakitanga.
- **Alternative Facility Already Available** – Existing infrastructure already provides secure regional capacity for residual waste disposal, making the Whiterock proposal unnecessary.
    - Canterbury has a Class 1 regional landfill at Kate Valley in the Hurunui District. It was established as a regional facility and consented by Hurunui District Council and Environment Canterbury to 2039. It has airspace remaining within the current consented profile and footprint to the mid-2040s at least.
    - The Council understands the Transwaste Canterbury Limited will further seek to maximise the current landfill before looking at alternate suitable sites at Kate Valley utilising the existing facilities.
    - Kate Valley is a class 1 facility for levy purposes but is expecting to have approval from MFE for a class 2 designation for part of its site from mid-November.
    - This will not alter the consent conditions or environmental standards but will reduce the rate of levy charged and passed on to the customer for appropriate waste streams.
    - Burwood managed fill owned by CCC is currently having its consent extended annually, however CCC have advised it has 5 or more years capacity remaining and they are expecting to keep extending until filled.
    - Kate Valley is the region's established, consented, and operating landfill. It was set up through a regional planning process, with substantial investment, and has the capacity to meet the region's waste disposal needs into the future.

- Kate Valley was specifically set up as a public/ private partnership between Christchurch City Council, and the District Councils of Ashburton, Hurunui, Selwyn and Waimakariri, and the private sector to manage Canterbury's waste streams and provide assurance to the community that no further small-scale localised landfills will be developed across the region. This approach also had the support of Canterbury's Papatipu Runanga. Kate Valley is 15 km further from Christchurch CBD than the proposed location of the Whiterock landfill.
- Kate Valley already provides this service; there is no evidence provided demonstrating the need for a second landfill. Establishing a privately-owned landfill would duplicate existing infrastructure, fragment waste streams, and undermine the coordinated regional approach that led to Kate Valley being chosen and developed. This proposal is therefore unnecessary, inefficient, and inconsistent with good planning outcomes
- Accordingly, Hurunui District Council does not consider the project to be a priority, nor one that would deliver significant regional or national benefits. This is particularly so given the existing statutory waste management framework and the established role of Kate Valley Landfill in providing for the region's waste disposal needs

Judith Batchelor

Chief Strategy and Community Officer

10 September 2026

AMS REF Number**: FDB002429Z2W8**
Comments on a fast-track consenting application
Fast-Track Approvals Act 2024

Fast Track Application REQ002015LOJ2 Whiterock Quarry and Managed Fill

Thank you for your Invitation to provide written comments for the application for the Whiterock Quarry and Managed Fill project in Loburn under the Fast Track Approvals Act 2024. Please see below Waimakariri District Council's (WDC) comments on this application.

Hurunui District Council has reviewed the Whiterock Quarry and Managed Fill project proposal under the Fast-track Approvals Act 2024 and provides the following feedback on the proposal being placed on the fast-track process.

Key considerations:

- Competing Application Already Lodged – The same application has been lodged and being processed by Waimakariri District Council and Canterbury Regional Council. The application has been publicly notified, with 573 submissions, and is subject to hearing requests of 80 submitters. Allowing Whiterock to proceed via fast-track process would bypass the hearing process and undermine fairness and natural justice to the community who have submitted on the proposal.
- Not a Priority Project -The proposal is not identified in any central government or local government strategy, spatial plan, or infrastructure priority list, and therefore carries no recognised strategic weight.
- Lack of Regional or National Benefit – The project duplicates services already provided in North Canterbury and does not address any identified infrastructure gap. It would not deliver significant regional or national benefits.
- Environmental and Ecological Risks – The project, under the current resource consent process, was deemed to have adverse effects on the environment, particularly concerning biodiversity and freshwater.
- Cultural Opposition and Values – Based on advice received by the Waimakariri District Council as part of the resource consent process, mana whenua (Ngāi Tūāhuriri) strongly oppose the project due to effects to cultural landscapes, mahinga kai, and kaitiakitanga.
- Alternative Facility Already Available – Existing infrastructure already provides secure regional capacity for residual waste disposal, making the Whiterock proposal unnecessary.

- Canterbury has a Class 1 regional landfill at Kate Valley in the Hurunui District. It was established as a regional facility and consented by Hurunui District Council and Environment Canterbury to 2039. It has airspace remaining within the current consented profile and footprint to the mid-2040s at least.
- The Council understands the Transwaste Canterbury Limited will further seek to maximise the current landfill before looking at alternate suitable sites at Kate Valley utilising the existing facilities.
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- Accordingly, Hurunui District Council does not consider the project to be a priority, nor one that would deliver significant regional or national benefits. This is particularly so given the existing statutory waste management framework and the established role of Kate Valley Landfill in providing for the region's waste disposal needs

Judith Batchelor
Chief Strategy and Community Officer
10 September 2026

Your written comments on a project under the Fast Track Approvals Act 2024

Project name	FTAA–2607-1269 **Whiterock Quarry and Managed Fill Project**

Before the due date, for assistance on how to respond or about this template or with using the portal, please email contact@fasttrack.govt.nz or phone 0800 FASTRK (0800 327 875).
All sections of this form with an asterisk (*) must be completed.

1. Contact Details

Please ensure that you have authority to comment on the application on behalf of those named on this form.

Organisation name (if relevant)	Waimakariri District Council		
***First name**	Kelly		
***Last name**	LaValley		
Postal address	215, High Street ,Rangiora		
***Contact phone number**	s9(2)(a)	**Alternative**	s9(2)(a)
***Email**	s9(2)(a)		

2. Please provide your comments on this application

If you need more space, please attach additional pages. Please include your name, page numbers and the project name on the additional pages.

Note: All comments will be made available to the public and the applicant when the Ministry for the Environment proactively releases advice provided to the Minister for the Environment.

Managers signoff

Kelly LaValley

Kelly LaValley
General Manager Planning, Regulation and Environment Management

Date : 10 September 2026

Comments on a fast-track consenting application

Fast-Track Approvals Act 2024

Fast Track Application FTAA–2607-1269 Whiterock Quarry and Managed Fill

Our Reference:	RC265236
Date:	10 September 2026
To:	Stephanie Frame- Manager- Fast-track Operations
From:	Waimakariri District Council
Fast-track project:	FTAA–2607-1269 **Whiterock Quarry and Managed Fill**

Thank you for your invitation to provide written comments for the application for the Whiterock Quarry and Managed Fill project in Loburn under the Fast Track Approvals Act 2024. Please see below Waimakariri District Council's (WDC) comments on this application.

1. EXECUTIVE SUMMARY

This memorandum provides Waimakariri District Council's comments in response to the Minister's invitation under section 17(3) of the Fast-track Approvals Act 2024 regarding the Whiterock Quarry and Managed Fill referral application.

In accordance with section 17, Council has considered whether there are any applications lodged with the Council that would constitute a competing application if a substantive application for the project were lodged.

The Minister has also invited Council's comments under section 22 of the Act on:

- whether the project may involve an ineligible activity as defined in section 5 of the Act; and
- whether any of the grounds for declining a referral application under section 21(5) of the Act may apply.

This memorandum addresses each of these matters, drawing on information available to Council through the notified resource consent process, Council's section 42A reporting, independent technical reviews, and relevant planning and policy documents. In addition to these matters Council has considered areas under section 22 of the Act where relevant.

Waimakariri District Council has reviewed the Whiterock Quarry and Managed Fill proposal and does not support the project being referred into the Fast-track Approvals process.

Key considerations are summarised below:

- **Purpose of the Fast-track Approvals Act** – Council considers that the proposal has not demonstrated the significant regional or national benefits contemplated by the Fast-track Approvals Act. In particular, the managed fill/landfill component has not been shown to address a regional waste capacity shortfall, with existing consented facilities, including Kate Valley Landfill, continuing to provide substantial disposal capacity. In addition the Woodstock Class 2 landfill proposal near Oxford, also in the Waimakariri District area has recently received an interim decision from the Environment Court for approval subject to conditions and Council understands a further Class 2 landfill development is progressing in Timaru. Council is also not satisfied that the economic benefits identified by the applicant are sufficiently certain or of sufficient scale to represent significant regional or national benefits. This assessment is supported by the independent peer reviews attached as Appendix 1 (Economic Review) and Appendix 2 (Waste Demand Review). In Council's view, the proposal is more appropriately considered through the existing notified Resource Management Act process.

- **Existing Resource Consent Process**: The proposal is already subject to a comprehensive notified resource consent process before Waimakariri District Council and Environment Canterbury. The application has attracted 573 submissions and hearing requests from approximately 80 submitters. Council considers the environmental, cultural, technical and planning matters raised by the proposal are appropriately being addressed through the existing statutory process. Council considers the existing statutory process remains the most appropriate forum for assessing the merits of the proposal.

- **Strategic Need and Waste Capacity:** Existing and planned waste disposal infrastructure within Canterbury, including Kate Valley Landfill and other Class 2 landfill facilities, provides substantial existing and future disposal capacity. Council is not satisfied that the applicant has demonstrated an unmet regional need for the proposed facility. This conclusion is supported by the Waste Demand Peer Review (Appendix 2).

- **Lack of Strategic Recognition** – The proposal is not identified as a priority project in any national infrastructure strategy, regional infrastructure programme, spatial plan, waste management strategy, or local government policy document. Council therefore does not consider the proposal has demonstrated recognised strategic significance at a regional or national level.

- **Potential Significant Environmental Effects** – Both the Waimakariri District Council and Environment Canterbury section 42A officer reports identified concerns regarding the potential for significant adverse effects on indigenous biodiversity, freshwater environments, wetlands, and cultural values. These reports raise concerns regarding the appropriateness of the site and whether environmental effects can be adequately avoided, remedied, or mitigated. The Waimakariri District Council section 42A report (Appendix 3) recommended that consent be declined.

In summary, Council considers that the proposal has not demonstrated a strategic need, regional waste capacity shortfall, or significant regional or national benefits sufficient to justify referral under the Fast-track Approvals Act. Council further considers that the proposal may give rise to significant adverse environmental effects and is more appropriately assessed

through the existing notified Resource Management Act process. Accordingly, Council opposes the referral application.

2. SECTION 17(3) COMPETING APPLICATIONS

a) Any applications that have been lodged with the Council that would be a competing application or applications if a substantive application for the project were lodged.

WDC response

- An application for a quarry and managed landfill at 150 Quarry Road Loburn, was lodged with Waimakariri District Council on the 2 April 2024 (RC245076).

- The application was publicly notified at the request of the applicant. The project attracted 573 submissions, with 510 opposed, 57 in support, and 6 neutral.

- The application is currently on hold. Waimakariri District Council and Canterbury Regional Council planning officers have completed section 42A reports, with the Waimakariri District Council report attached as Appendix 3.

- Waimakariri District Council considers that a substantive application proceeding through the Fast-track process for the same, or a materially similar project, would risk undermining the fairness and integrity of the current process. This proposal has already attracted high community interest, demonstrated by the large number of submissions on the current resource consent process.

3. SECTION 21 OF THE FAST TRACK ACT

3.1 Whether you consider the project may involve an ineligible activity, and if so, why (as defined in section 5 of the Act)

In accordance with section 5 of the Act, WDC does not consider the project involves any ineligible activities.

3.2 Whether you consider any of the reasons to decline a referral application may be applicable to this application, and if so why (under section 21(5) of Act).

Under section 21(5) of the Act, Council considers the following matters are applicable to declining the application:

Section 21(5)(b) - It would be more appropriate to deal with the matters authorised by the proposed approvals under another Act or Acts

Council Comments

Council considers the proposal is more appropriately considered through the existing Resource Management Act consenting process and that referral is not justified when assessed against the purpose and intent of the Fast-track Approvals Act.

The Fast-track Approvals Act is intended to facilitate projects that deliver significant regional or national benefits. Council does not consider the material before it demonstrates that the proposed landfill achieves those outcomes.

The proposal has not been identified as a priority project in any national infrastructure strategy, regional infrastructure programme, waste management strategy, or other government planning document. Nor has the applicant demonstrated that the proposal addresses an identified infrastructure constraint, strategic deficit, or regionally significant gap in waste disposal capacity.

Council's review of the applicant's waste demand assessment, including the independent peer review commissioned by Council, found that the applicant relies primarily on national waste generation trends rather than demonstrating a Canterbury-specific shortage of landfill capacity. The peer review concluded that existing facilities, particularly Kate Valley Landfill, continue to provide substantial disposal capacity and that increased reuse, recycling, recovery and blending of waste streams further reduces the need for additional landfill capacity. Council therefore considers the evidence does not establish a critical regional demand for the proposed facility.

Council also notes the conclusions of the economic assessment evidence, which identifies the principal benefits of the proposal as increased market competition and the potential for reduced disposal costs. While these may provide commercial benefits for some operators and waste generators, Council does not consider they amount to the significant regional or national economic benefits contemplated by the Fast-track Approvals Act. Rather, the evidence indicates that the proposal would largely compete with existing and planned waste disposal infrastructure serving the same market.

Council further notes that Canterbury already has an established and strategically planned residual waste management framework centred on Kate Valley Landfill, which is recognised through the Christchurch and Waimakariri Waste Management and Minimisation Plan. Additional Class 2 disposal options also exist or are progressing within the wider region. In these circumstances, Council is not satisfied that the proposal addresses an unmet need or provides a level of benefit that would justify expedited consideration through the Fast-track process.

The proposal is already the subject of a comprehensive notified resource consent process under the Resource Management Act, through which detailed technical, environmental, cultural and planning issues are being assessed. Those matters are within the scope of the RMA framework and can be appropriately considered through that process.

Accordingly, Council considers the project does not demonstrate the significant regional or national benefits anticipated by the Fast-track Approvals Act and the matters associated with the proposal are more appropriately dealt with through the existing Resource Management Act process.

Section 21(5)(c) - The project may have significant adverse effects on the environment

Council considers the proposal may result in significant adverse effects on the environment and this weighs against referral of the project.

Council's section 42A report for the notified resource consent application concluded that the proposal gives rise to significant concerns regarding:

a) *adverse effects on indigenous vegetation, fauna and habitat;*
b) *loss and modification of ecosystems and indigenous biodiversity values;*
c) *effects on freshwater environments, wetlands, and natural character;*
d) *significant adverse effects on tangata whenua values and cultural associations with the site and surrounding waterways;*
e) *inconsistency with the National Policy Statement for Indigenous Biodiversity;*
f) *inconsistency with relevant objectives and policies of the Operative and Partially Operative Waimakariri District Plan;*
g) *inconsistency with relevant iwi planning documents; and*
h) *whether the proposal appropriately gives effect to the matters recognised and provided for under Part 2 of the Resource Management Act, particularly sections 6(e) and 6(f).*

Council's section 42A report ultimately recommended that consent be declined, concluding that the proposal would result in significant adverse effects on indigenous biodiversity and tangata whenua values and would be inconsistent with a number of relevant statutory planning documents.

Council acknowledges that ecological restoration, habitat enhancement, and other mitigation measures are proposed. However, uncertainty remains regarding the extent to which those measures will adequately address or offset the immediate and long-term environmental effects associated with the construction and operation of the landfill. In particular, Council considers the proposal will involve the loss and modification of existing ecological values and habitats, with restoration benefits largely reliant on future outcomes.

Council also notes that concerns regarding the scale and significance of environmental effects are not limited to Waimakariri District Council. Canterbury Regional Council's section 42A reporting has similarly identified the potential for significant adverse environmental effects arising from the proposal. While those matters fall within CRC's statutory responsibilities, Council considers that the concerns identified by both consenting authorities provide further support for the view that the proposal may result in significant adverse environmental effects.

Council further notes the opposition of Te Ngāi Tūāhuriri Rūnanga to the proposal, including concerns regarding effects on culturally significant waterbodies, customary use, cultural values, and the protection of sites and resources of significance to mana whenua.

Given the scale of the proposal, its location, the potential effects on ecological, freshwater and cultural values, and the conclusions reached by both Waimakariri District Council and Canterbury Regional Council, Council considers the proposal may have significant

adverse effects on the environment under section 21(5)(c) of the Fast-track Approvals Act.

Section 21(5)(g) a substantive application for the project would have 1 or more competing applications.

Council refers the Minister to its comments in section 2 of this report, relating to section 17(3) of the Act.

4. CRITERIA FOR ASSESSING REFERRAL APPLICATION – SECTION 22(1-2)

22(2)(a)(i) Whether the project has been identified as a priority project in a central government, local government, or sector plan or strategy (for example, in a general policy statement or spatial strategy), or a central government infrastructure priority list.

WDC Response:

The project has not been identified as a priority in any central government infrastructure strategy, sector plan, local government policy document, spatial strategy, or waste management planning document. Nor does it appear on any national or regional infrastructure priority list. Council therefore considers that the proposal lacks the strategic recognition typically associated with projects that deliver significant regional or national benefits.

Council notes that Canterbury already has an established regional waste disposal network centred on Kate Valley Landfill, which is expressly recognised in the Christchurch and Waimakariri Waste Management and Minimisation Plan as the region's primary residual waste disposal facility. Kate Valley was established through a long-term regional planning process involving Christchurch City Council, the Ashburton, Hurunui, Selwyn and Waimakariri District Councils, and private sector partners, with support from Canterbury's Papatipu Rūnanga. The facility was developed to provide a coordinated regional approach to waste management and to avoid the proliferation of smaller localised landfill facilities throughout the region.

Kate Valley Landfill remains Canterbury's primary regional Class 1 landfill and continues to provide substantial long-term disposal capacity. The 2025 Annual Report[1] of Transwaste Canterbury Limited states that the company actively maintains a minimum of 12 months of developed landfill airspace and has "significant potential future capacity (100+ years)". The report also notes that the remaining economic life of the currently consented landfill is estimated to be at least 17 years, with future extensions anticipated. During the 2024/25 financial year the landfill received 346,287 tonnes of waste. This demonstrates that Canterbury's primary regional landfill continues to have substantial existing and future capacity available and supports Council's position that no regional waste disposal capacity shortfall has been demonstrated

This position is supported by Council's independent review of the applicant's Waste

[1] *Microsoft Word - Transwaste Canterbury Ltd - 2025 Annual Report amended signed no EY report.docx*

Demand Assessment (Appendix 2). That review concluded that the applicant had not demonstrated a Canterbury-specific shortage of landfill capacity and had relied largely on national waste generation trends rather than evidence of a regional infrastructure constraint. The review further found that existing facilities, particularly Kate Valley Landfill, continue to provide substantial disposal capacity, with additional disposal options available or progressing within the wider region. Council therefore considers the proposal does not address an identified regional need or infrastructure deficit.

Council also notes the proposed Whiterock facility is not the only source of potential additional Class 2 landfill capacity within Canterbury. The Woodstock Class 2 landfill proposal near Oxford has recently received an interim decision from the Environment Court for approval subject to conditions and Council understands a further Class 2 landfill development is progressing in Timaru. While the merits of those projects are matters for the relevant consent authorities, their existence further demonstrates that additional waste disposal capacity is either already available or likely to become available within the wider region. This further weakens any suggestion that the Whiterock proposal is required to address a regional disposal capacity shortfall or provides infrastructure of regional significance.

Council also notes the findings of its independent review of the applicant's Economic Assessment (Appendix 1). That review concluded that many of the economic benefits advanced by the applicant are uncertain and dependent upon assumptions regarding future waste volumes, market behaviour, and pricing outcomes. While the proposal may provide increased competition within the waste disposal market and potential cost savings for some waste generators, the review found limited evidence that these benefits would translate into significant regional or national economic benefits. Rather, the proposal would largely compete with existing and planned waste disposal infrastructure serving the same market.

When considered alongside the existing capacity and expansion potential at Kate Valley Landfill, the additional Class 2 landfill capacity either consented or progressing elsewhere in Canterbury, and the findings of Council's independent Waste Demand Review, Council is not satisfied that the proposal addresses an identified regional infrastructure deficit or unmet waste management need. The proposal would largely duplicate existing and emerging waste disposal infrastructure rather than provide infrastructure that is critical to the functioning of the region.

Accordingly, Waimakariri District Council does not consider the project to be a priority project, nor does it consider that the proposal has demonstrated significant regional or national benefits. In the absence of a demonstrated infrastructure need, regional capacity shortfall, or significant economic benefit, Council considers the proposal does not align with the purpose of the Fast-track Approvals Act 2024, which is to facilitate the delivery of infrastructure and development projects with significant regional or national benefits.

22(2)(a)(ii) will deliver new regionally or nationally significant infrastructure or enable the continued functioning of existing regionally or nationally significant infrastructure:

WDC Response:

Council does not consider the proposal will deliver new regionally or nationally significant infrastructure, nor enable the continued functioning of existing regionally or nationally significant infrastructure. The applicant has not demonstrated a regional waste disposal capacity shortfall or an identified infrastructure gap requiring the development of the proposed facility. Council's independent review of the applicant's waste demand assessment (Appendix 2) concluded that the applicant relies largely on national waste data and has not demonstrated a Canterbury-specific need for additional landfill capacity.

The review further notes that existing facilities, particularly Kate Valley Landfill, continue to provide substantial disposal capacity, with additional disposal options available or progressing within the wider region. Council's review of the applicant's economic assessment (Appendix 1) similarly concluded that the primary benefits of the proposal relate to increased market competition and potential commercial efficiencies, rather than significant regional or national economic outcomes. While the proposal may provide an additional commercial disposal option, Council does not consider the evidence demonstrates that it constitutes infrastructure of regional or national significance for the purposes of the Fast-track Approvals Act.

22(2)a)(iv)will deliver significant economic benefits

WDC Response:

Council does not consider the information provided demonstrates that the proposal will deliver significant economic benefits at a regional or national scale. Council's independent review of the applicant's economic assessment (Appendix 1) concluded that many of the economic benefits advanced by the applicant are uncertain and rely on assumptions regarding future waste volumes, market behaviour, and pricing outcomes.

The review found that the primary economic benefits are associated with increased competition within the waste disposal market and potential cost reductions for some waste generators. While these may provide benefits to individual operators or customers, Council does not consider they constitute significant regional or national economic benefits for the purposes of the Fast-track Approvals Act. Council's independent review of the applicant's waste demand assessment (Appendix 2) further concluded that a Canterbury-specific demand for additional landfill capacity has not been demonstrated. In the absence of a demonstrated regional infrastructure need or clearly established broader economic benefits, Council considers the proposal does not meet the threshold of delivering significant economic benefits contemplated by section 22(2)(a)(iv).

22(2)(a)(ix) will address significant environmental issues

WDC Response:

Council does not consider the proposal will address a significant environmental issue for the purposes of the Fast-track Approvals Act. The applicant has not demonstrated that the proposal is required to resolve an identified environmental problem, remediate a contaminated site, restore a degraded environment, or address a recognised regional environmental constraint. Rather, the proposal seeks to establish additional landfill

capacity in a region where Council's independent waste demand review (Appendix 2) found no demonstrated regional waste disposal capacity shortfall.

Council also notes that both the Waimakariri District Council and Canterbury Regional Council section 42A officer reports identified concerns regarding the potential for significant adverse effects on indigenous biodiversity, freshwater environments, wetlands, and tangata whenua values. While the proposal includes mitigation and restoration measures, Council is not satisfied that these amount to addressing a significant environmental issue, particularly where the proposal itself has the potential to give rise to significant environmental effects. Accordingly, Council does not consider the proposal meets the criterion in section 22(2)(ix).

2(a)(x) is consistent with local or regional planning documents, including spatial strategies

WDC Response:

The applicant has highlighted that the project presented for FTAA referral is essentially the same as that presented in the RMA application, with minor changes that have resulted from a review of Waimakariri District Councils' s42A reports and feedback from submissions. The Hon Minister is referred to Appendix 3, which contains the Waimakariri District Council s42A report prepared for the RMA proposal. The findings of the report are summarized below.

Partially Operative Waimakariri District Plan (Decisions Version) Objectives and Policies

The s42A officer report (Appendix 3) concluded the proposal to be inconsistent with the Objectives and Policies of the Partially Operative District Plan. In summary the key issues were as follows:

i. **SD - Rautaki ahunga - Strategic Directions**
   As the project stands, WDC considers the project is contrary to the natural environment direction (as detailed in Annexure 1) for the following reasons:
   a) There will potentially be short-term loss of ecosystems, habitat and indigenous biodiversity during construction of the landfill and operation.
   b) The natural character of freshwater bodies and wetlands will not be preserved, enhanced or restored.
   c) The land being used is crown land and public access restricts anyone else from using the road reserve to access the Karetu River.
   d) An integrated approach which recognises the importance of ki uta ki tai to Ngāi Tahu and the wider community, and the inter-relationships between ecosystems, natural processes and with freshwater has not fully occurred.

ii. **SASM - Ngā whenua tapu o ngā iwi - Sites and Areas of Significance to Māori**
   WDC acknowledges the formal submission received during the resource consent process which outlines that Te Ngāi Tūāhuriri opposes the project due to the failure to protect culturally significant waterbodies and customary use and fails to integrate cultural values.

iii. **ECO - Pūnaha hauropi me te rerenga rauropi taketake - Ecosystems and indigenous biodiversity**

WDC consider the project does not fully align with the direction due to its initial biodiversity loss and uncertainty regarding mitigation effectiveness. While long term restoration efforts are proposed, they do not offset the immediate ecological damage, meaning there is no immediate net gain in indigenous biodiversity.

5. Conclusion

The purpose of the Fast-track Approvals Act 2024 is to facilitate the delivery of infrastructure and development projects that deliver significant regional or national benefits. Having considered the matters raised in sections 17, 21 and 22 of the Act, Waimakariri District Council does not consider the Whiterock Quarry and Managed Fill Project meets that threshold.

In particular, Council does not consider the applicant has demonstrated that the proposal will deliver significant regional or national benefits. The project is not identified as a priority project in any national, regional or local strategy, infrastructure programme, or waste management planning document. Nor does Council consider the applicant has demonstrated an identified regional infrastructure need, waste disposal capacity shortfall, or other strategic constraint that requires the development of the proposed facility. Council's independent reviews indicate that existing and planned waste disposal infrastructure within Canterbury are capable of meeting the region's foreseeable needs.

Council also considers the proposal may result in significant adverse environmental effects, including effects on indigenous biodiversity, freshwater environments, wetlands, and tangata whenua values. These concerns have been identified through the existing resource consent process and have resulted in Council's section 42A report recommending consent be declined.

The proposal is already being assessed through a comprehensive notified Resource Management Act process that has attracted substantial public participation and detailed technical review. Council considers that process remains the most appropriate mechanism for determining the merits of the proposal.

In conclusion, Council considers the proposal has not demonstrated the significant regional or national benefits required to align with the purpose of the Fast-track Approvals Act 2024. The project is therefore more appropriately considered through the existing Resource Management Act process, and Council respectfully requests that the Minister decline the referral application.

WAIMAKARIRI DISTRICT COUNCIL

SECTION 42A REPORT

FILE NO:	RC245076
DATE:	24 March 2025
REPORT TO:	Independent Hearings Panel
FROM:	Senior Resource Management Planner – Tim Johnston
SUBJECT:	Publicly notified land use consent application for the establishment of a landfill and associated quarrying at 150 Quarry Road, Whiterock.
ACTIVITY:	Waimakariri Operative District Plan – Discretionary Activity Waimakariri Proposed District Plan - Restricted Discretionary Activity
RECOMMENDATION:	Decline

INTRODUCTION

1. My name is Timothy Barrie Johnston, and I have prepared a Section 42A report for this resource consent application.

2. I am a Senior Resource Management Planner and employed by the Waimakariri District Council. I hold a Bachelor of Science in Geography and Environmental Management from Otago University.

3. I have had six years of resource management experience. I have prepared consent recommendations for a range of resource consents including land development projects, large residential developments, landfills, discharges to land, water and air, surface and groundwater takes and coastal permits.

4. This report is prepared under the provisions of section 42A of the Resource Management Act 1991 (RMA). This section allows a council officer, consultant or any other person commissioned by the consent authority to provide a report to the decision-maker on a resource consent application made to the Council and allows the Hearing Panel to consider the report at the hearing.

5. Section 41(4) of the RMA allows the Hearing Panel to request and receive, from any person who makes a report under section 42A "*any information or advice that is relevant and reasonably necessary to determine the application*".

6. This report will provide the Hearing Panel with information and advice related to:

    a) The background to the application;
    b) Details of the notification of the application and submissions received;
    c) An outline of the relevant legal and planning provisions;

d) An audit of the assessment of environmental effects provided by the applicant;
e) An assessment of Council policy relevant to the applications;
f) Recommendations in relation to the matters specified in section 104 and Part 2 of the RMA; and
g) Recommendations on the decision to be made by the Hearing Panel including comments on whether the application can be granted or should be refused; if the application is to be granted what measures are required to avoid, remedy or mitigate any adverse effects, and what monitoring could be undertaken.

7. This report draws on conclusions made in technical reports provided by a number of experts, each expert has prepared a report in accordance with Section 42A of the RMA, conclusions made in each report are referenced in this report. The following appendices attached to this report, include:

a) **Appendix 1**- Herpetology Section 42A report, prepared by Dr Mandy Tocher, LizardExpertNZ,(Note also attached to CRC Planning Report)

b) **Appendix 2**- Avifauna Section 42A report prepared by Hamish Dean, SLR Consulting, Hamish Dean

c) **Appendix 3**- Vegetation and Wetland Section 42A report, prepared by Dr Stephen Rate, SLR Consulting. ,(Note also attached to CRC Planning Report)

d) **Appendix 4**- Geotechnical Section 42A report, prepared by Clive Anderson, Tonkin + Taylor. (Note also attached to CRC Planning Report)

e) **Appendix 5**- Transportation Section 42A report prepared by Alan Gregory, Tonkin + Taylor,

f) **Appendix 6**- Landscape and Natural Character Section 42A report prepared by Naomi Crawford, Glasson Huxtable.

8. It should be emphasised that any conclusions reached, or recommendations made in this report are not binding on the Hearing Panel. It should not be assumed that the Hearing Panel will reach the same conclusion or decision having considered all the evidence to be brought before it by the applicant and submitters.

9. Following the initial, high-level review of the applicant's AEE by Waimakariri District Council staff and external experts, a request for further information (RFI) under Section 92(1) of the RMA was sent on 20 June 2024. A response to the RFI was received in late August and early September 2024.

10. The proposal, as amended by the RFI responses and further correspondence with the applicant, has been considered in this report.

11. I undertook a site visit on 30 June 2024, together with Regional Council staff, technical experts acting on behalf of the Wamakariri District Council (WDC) and Canterbury Regional Council (CRC), the applicant and the applicant's experts.

12. This resource consent application is being processed on a joint basis with CRC as resource consents are required from both Councils and the applications have been publicly notified. Accordingly, all resource consent applications will be considered concurrently by the Hearings Panel.

13. While this is not a hearing before the Environment Court, I can confirm that I have read the Code of Conduct for expert witnesses contained in the Environment Court of New

Zealand Practice Note 2023 and that I have complied with it when preparing my evidence. Other than when I state I am relying on the advice of another person, this evidence is within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

APPLICANT

14. Protranz International Limited

PROPERTY LOCATION

15. 150, 154 ,174 176 Quarry Road, Loburn.

LEGAL DESCRIPTION

16. Lot 1 DP 388690, Lot 2 DP 497185, Lot 4 DP 755, Part 2 DP 755, Crown - Riverbed and Road Reserve

ZONING

17. Operative Waimakariri District Plan – Rural

18. Proposed Waimakariri District Plan – Rural General

DESCRIPTION OF PROPOSED ACTIVITY

19. Protranz International Limited (The Applicant) has applied for resource consent to continue existing quarrying operations and establish and operate a construction and demolition waste (C+D waste) landfill at 150 150, 154 ,174,176 Quarry Road (the site). The site is shown in Figure 1.

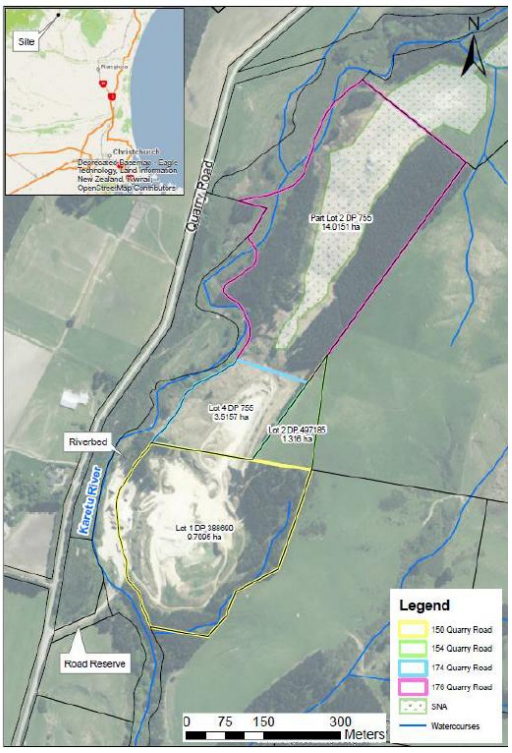


Figure 1 – Location of applicant's site

20. A detailed description of the proposal is provided in the AEE (pages 29 to 48). Further details, specifically on the landfill design and operation, are provided in the Landfill Engineering Report (Appendix 3 of the AEE), the Landfill Management Plan (Appendix 8 of the AEE) and the engineering drawings (Appendix 2 of the AEE). Proposed resource consent conditions were proffered in Appendix 10 of the AEE.

21. I adopt Ms Katie Nagy Canterbury Regional Council, s42A officer's report description.

22. The proposal includes the following:

    a) Earthworks and clearance within waterway margins

    b) General earthworks for information of a landfill

    c) Bridge structure within a waterway setback

    d) Increased rate of mineral extraction

    e) Operate a managed fill landfill

    f) Construction of outfall within a sites and Areas of Significance to Maori

    g) Earthworks and stockpiling associated with quarrying and landfill construction

23. The applicant has labelled the proposed landfill as a Class 3 Managed Landfill in accordance with the WasteMINZ Guidelines (2023), with the inclusion of inert and sorted construction and demolition (C&D) waste and other specific inert wastes including contaminated soils and asbestos.

24. I note that the proposal is more of a hybrid approach and should not be classified as a Class 3 Managed Landfill.

25. A liner design consistent with the Class 1 Landfill requirements is proposed for the site as shown in Figure 2 of this report.

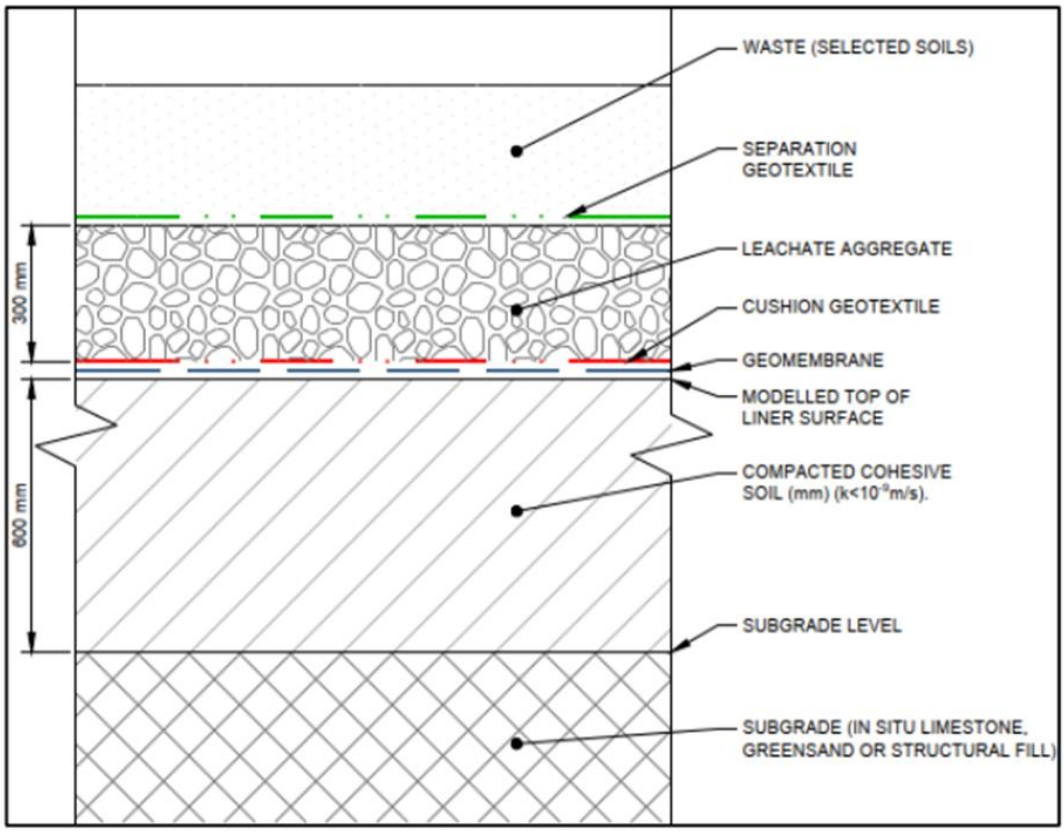


Figure 2: Landfill Liner Design

26. Leachate extraction will be designed to capture any mobilised contaminants.

27. The total airspace capacity of the landfill will be 500,000m^3 across a 4.0 ha waste placement footprint, with an average landfilling rate of 30,000 tonnes per year determined by demand. It is expected that the landfill will have a lifespan of approximately 20 years.

28. Prior to the commencement of the landfilling activity, a perimeter fence will be established around the landfill footprint. Fencing will be akin to a deer type fence and be constructed to a minimum 2.2 m in height and include security features that inhibit climbing or similarly restricts ease of access to the site.

29. Operating hours of the site will be restricted to 0700 to 1900 hours Monday to Saturday excluding public holidays.

30. Development of the landfill will occur in two stages in the existing quarry pit area. It is proposed to form a suitable floor and slopes.

31. Average vehicle movements per day associated with the operation of the combined lime quarrying and landfill activities are expected to be:

    a) 18 truck and trailer movements (9 vehicles)
    b) 6 service trucks (3 vehicles)
    c) 10 staff light vehicle movements (5 vehicles)
    d) 2 servicing light vehicle movements (1 vehicle).

32. The applicant has proposed fencing of the Significant Natural Area, riparian planting and wetland enhancement as per the below figure 3

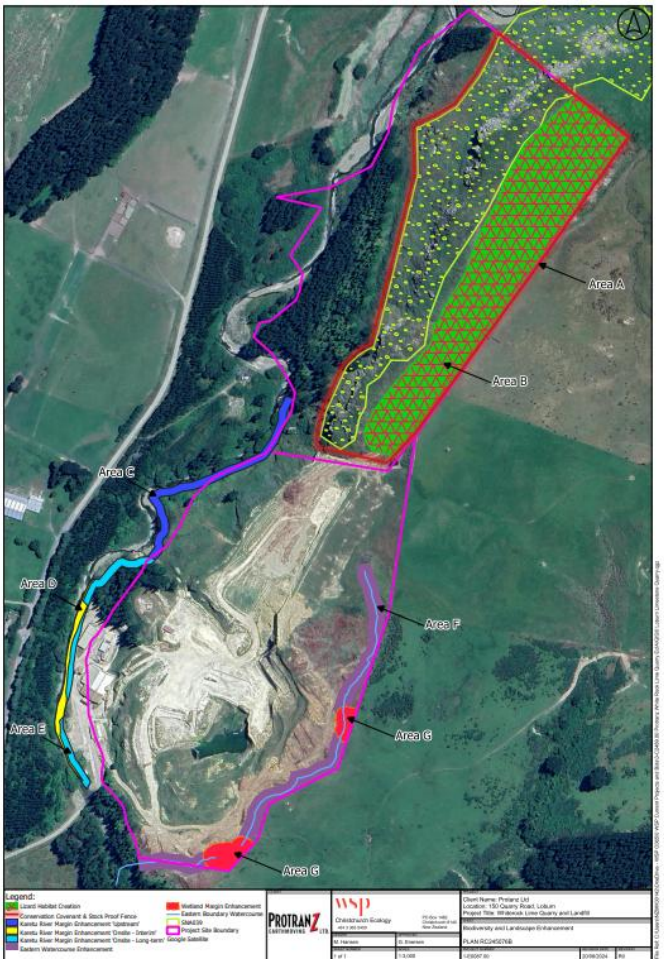


Figure 3;Applicant proposed ecological rehabilitation

Schedule 1

Column 1 Requirement by Consent Holder	Column 2 Applicable Area	Column 3 Objective to be achieved	Column 4 Timeframe
Conservation Covenant - *Register the area of land within 176 Quarry Road, Loburn (Part Lot 2 DP755) identified as "Area A" demarcated by the red boundary in **Plan RC245076C** as a conservation covenant with the Department of Conservation.*	A	➢ To provide additional enhancement opportunities and protection of naturally rare or distinctive ecosystems in perpetuity associated with SNA039 as identified and mapped in the Waimakariri District Plan. ➢ Provide a buffer protection area to the southeast of SNA039 in perpetuity which will provide additional protected areas for greater biodiversity enhancement.	Within 3 months of exercising the resource consent.
Stock Exclusion Fencing - *Install stock proof fencing around the perimeter of "Area A" demarcated by the red boundary in **Plan RC245076C.***	A	➢ Create a "habitat island" that support specialised plant communities and native fauna. ➢ Provide a safe refuge for relocated lizards and ongoing protection for the covenanted area from livestock. ➢ Provide clear on-ground identification of the conservation convent area.	Within 12 months of exercising the resource consent.
Lizard Habitat Creation - *Mass planting of suitable habitat (rank grass) for targeted lizard species within Area A identified in green and red hash in **Plan RC245076C.***	B	➢ Offset the loss of lizard habitat within the operational quarrying and landfill area. ➢ Provide an enhanced area of habitat for lizard species that fall within the geographical range of the site.	Within 12 months of exercising the resource consent.
Karetu River Margin Enhancement 'Upstream' - *Planting of a 10 m riparian margin in indigenous species on the true left bank identified as dark blue in **Plan RC245076C*** between NZTM50 BW23:5555-2179 and BW23:5536-2157. - *Undertake gradual removal of pest willow tree species as indigenous species mature.*	C	➢ General ecological and landscape enhancement. ➢ Improve the cultural health of the Karetu River and support Mahinga Kai opportunities. ➢ Indigenous riparian enhancement planting will replace gradually removed willow trees. ➢ Provide stabilisation of the banks of the Karetu River from erosion and scour. ➢ Provide habitat and a food resource for indigenous birds known on-site or that are present within proximity to the site.	Completed by the second planting season following exercising of the resource consent.
Karetu River Margin Enhancement 'Onsite-Interim' - *Planting of a riparian margin with an average width of 2-3 m with indigenous species where practicable along the true left bank identified as yellow in **Plan RC245076C** between NZTM50 BW23:5530-2155 and BW23:5528-2129.*	D	➢ Provide interim protection of the existing bund while the lower terrace is being actively used for limestone processing activities. ➢ Where a genuine conflict arises between the location of the site security fence and the requirement to achieve an average of 2-3m, the security of the site shall take precedence. ➢ The objective of the planting is to provide stabilisation of the bund and bank and achieve an ecological function at the low flow edge. The type of planting should reflect this objective and the potential need to undertake ongoing maintenance of the fence or bund (i.e., limit plantings to lower ground cover species).	Completed within the first planting season following the granting of resource consent.

Column 1 Requirement by Consent Holder	Column 2 Applicable Area	Column 3 Objective to be achieved	Column 4 Timeframe
Karetu River Margin Enhancement **'Onsite – Long-Term'** - *Planting of a 10 m riparian margin in indigenous species on the true left bank identified as dark blue in **Plan RC245076C** between NZTM50 BW23:5536-2157 and BW23:5528-2129.*	E	➢ Provide long term stabilisation of the banks of the Karetu River from erosion and scour. ➢ General ecological and landscape enhancement. ➢ Improve the cultural health of the Karetu River and support Mahinga Kai opportunities. ➢ Provide habitat and a food resource for indigenous birds known on-site or that are present within proximity to the site.	Completed within the first two planting seasons following the completion of limestone processing activities at the site.
Eastern Watercourse Enhancement - *Planting of a 10 m riparian margin in indigenous species on both margins identified as purple on **Plan RC245076C** between NZTM50 BW23:5563-2156 and NZTM50 BW23:5535-2120.* - *Where a 10 m margin cannot be achieved due to private property constraints, the planting shall cease at the legal boundary.*	F	➢ General ecological and landscape enhancement. ➢ Provide habitat and a food resource for indigenous birds known on-site or that are present within proximity to the site. ➢ Bank stabilisation through erosion and scour protection without compromising the flood carrying capacity. ➢ Enables complimentary lizard habitat to be naturally formed around riparian margins.	Completed by the third planting season following exercising of the resource consent.
Wetland Margin Enhancement - *Planting of a 10 m riparian margin of indigenous species.* - *Where a 10 m margin cannot be achieved due to private property constraints, the planting shall cease at the legal boundary.*	G	➢ General ecological and landscape enhancement. ➢ Improve the cultural health of the Karetu River and support Mahinga Kai opportunities. ➢ Provide habitat and a food resource for indigenous birds known on-site or that are present within proximity to the site.	
Stock Exclusion - *Install stock proof fencing to keep stock out of the eastern watercourse* -	F	➢ Erosion protection of the beds and banks of the waterway ➢ Protection of indigenous planting and associated habitats	Prior to plant-ing occuring

33. The applicant has provided a draft set of conditions in Appendix Y of the application.

SITE DESCRIPTION

34. A detailed description of the site is provided in the AEE. I also note the Canterbury Regional Council s42 A officer's report has provided a comprehensive description.

35. In summary:

a) The quarrying and landfill application site comprises an area across three adjoining properties being at 150, 154 and 174 Quarry Road, Loburn Canterbury as shown in Figure 1 and 4 of this report.



Figure 4: Existing Quarry Site

b) Existing quarry infrastructure at the site comprises a weighbridge (and building) adjacent to the site access with a site office to the northeast providing for onsite staff amenities. Further north are the main processing facilities including a furnace and rotary kiln, crusher, lime and urea silos, conveyor belt machinery and storage sheds for machinery and bunkers for coal storage. The coal storage area comprises two covered bunker stores.

c) The proposal lies within the rohe of Te Ngāi Tūāhuriri Rūnanga. The Karetu River is classed in the Proposed District Plan as a site of significance to iwi. The Karetu River SASM 028 is classified as a Nga Wai being a tributary to the Okuku River and which is identified as having Mahinga Kai environments, habitats and taonga species.

d) Three main lithological units exist within the quarry including the Tokama Siltstone, Whiterock Limestone, and Berrydale Greensand which are all part of the Motonau Group 5. The lithological units from youngest to oldest includes Loess, Kowai Formation, Tokama Siltstone, Whiterock Limestone and Berrydale Greensand.

e) The Significant Natural Area (SNA 039) as identified in the Proposed District Plan at 176 Quarry Road is owned by Protranz. SNA039 is known as the Whiterock Limestone Vegetation and described as containing indigenous grassland, shrubland and indigenous limestone rock outcrop vegetation. Notable flora on site includes at risk-declining species such as speargrass *(Aciphyllasubflabellata),* matagouri/tūmatakuru *(Discaria toumatou)* and New Zealand linen flax (*Linum monogynum).* It also contains threatened-nationally endangered species such as *Gingidia enysii var. enysii* and Weka Pass sun hebe *(Heliohebe maccaskillii),* kānuka *(Kunzea serotina)* (threatened-nationally vulnerable), and Waipara gentian *(Gentianella calcis subsp. waipara)* (threatened-nationally critical).

f) Two activities and or industries on the Ministry for the Environment Hazardous Activities and Industries List (HAIL) have been identified as occurring or have occurred within isolated areas of the site. These HAILs are A17 – Storage tanks

or drums for fuel, chemicals or liquid waste, associated with an Above Ground Storage Tank (AST) for diesel, and E3 – Cement or lime manufacture using a kiln including the storage of wastes from the manufacturing process.

g) Flood modelling for 1 in 200-year and 1 in 500-year flood events identifies the Karetu River, and the western part of the site, which includes the main accessway and buildings, as being within the High Hazard zone.

h) The site falls within the Oxford Ecological District (ED) of the Canterbury Foothills Ecological Region.

i) The site contains significant indigenous vegetation and fauna habitats, particularly for lizards (Canterbury grass skink, Waitaha gecko) and wetland plant species.

j) The site is not within an outstanding landscape area or within any of the sub areas, nor contains a prominent ridge.

k) There are two dwellings within 250 metres of the site both are located on the same property to the west of the site. I note these dwellings are within Hurunui District.

l) Quarry Road is not on a school bus or other bus route, the closest school being North Loburn School, about 8 km from the site located on Loburn Whiterock Road.

m) The Site is approximately 1.5km North of the intersection with Loburn Whiterock Road and Taaffes Glen Road

n) The accessway and quarry buildings are in Crown Land.

DISTRICT PLAN REQUIREMENTS

Operative Waimakariri District Plan

36. The application site is within a Rural zone. In assessing the proposed activity regard has first been given to the definitions in the District Plan and what definitions the activity would fall within. The following definitions are considered relevant:

Earthworks
Earthworks means the disturbance of land by excavating, placing or replacing soil or other material, and includes driveway and access construction, and land drainage works, but excludes earthworks involving:

a. cultivation for, or harvesting of agricultural and horticultural crops;

b. domestic gardening;

c. digging of postholes for the construction of fences;
d. works for research and monitoring such as coring, water bores and use of piezometers;

e. maintenance and enhancement of any wetland; or

f. ripping in of water pipes.

Landfill
Landfill means an area used for the disposal of solid waste into or onto the land other than a farm landfill.

Structure
Structure means any building, equipment, device, or other facility made by people and which is fixed to land; and includes any raft" (section 2 Resource Management Act 1991).

37. Following an analysis of the above it is considered that the proposed activity falls within the definition of being a landfill. This includes that all facilities ancillary to that activity such as internal roads, buildings and the transfer area are considered to also be part of a 'landfill'. The formation of the landfill, together with the establishment / building of transfer areas etc are also considered to constitute earthworks.

38. In addition, consideration has been given to whether the landfill would constitute a 'structure'. On the basis of the definition and that the landfill will be made by people, including careful construction via a series of cells, it is considered that the landfill could potentially also constitute a 'structure' but it is less clear whether a landfill could be considered to be 'fixed to land'. While uncertainty does exist as to whether the landfill would constitute a structure, a conservative approach has been taken and the landfill has been assessed as being a 'structure'. This ensures a comprehensive assessment of all relevant rules and avoids any later risk of it being identified that other rules might be applicable. It is anticipated this issue can be explored further, as part of later assessments, if considered necessary.

39. On the basis of the above, the various provisions of the District Plan have been assessed, and resource consent is required for the following reasons:

Chapter 23 Land and Water Margins	
Rule	**Comment**
23.1.1.3 There shall be no earthworks: a. within 20m of any river or lake; or b. within 50m of any wetland.	The proposal will undertake earthworks within 20 metres of the Karetu River. The earthworks include the earth bund, installing fencing, and constructing the bridge. Therefore, it does not comply with this rule.
23.1.1.4 There shall be no vegetation clearance: a. within 20m of any river or lake; or b. within 50m of any wetland	The proposal will undertake vegetation clearance within 20 metres of the Karetu River. The vegetation clearance is required to construct the earth bund, bridge and other erosion sediment controls required. Therefore, it does not comply with this rule.
23.1.1.8 Earthworks, including the extraction of minerals, in the Rural Zones, other than in the	The applicant has detailed that they assume the continuation of the quarrying activity and landfill construction activities will not be within the threshold of this rule.

bed of any river, shall not involve the disturbance of more than 1000m2 of soil and/or rock per any 1ha.	I agree with the applicant's assumption, therefore the proposal does not comply with this rule.
Rule 23.3.1 Any land use that does not comply with one or more of the conditions under Rules 23.1.1.1 to 23.1.1.6 is a discretionary activity (restricted), except where exempted by Rule 23.1.2.	As the proposal does not comply with Rule 23.1.1.4 and 23.1.1.4, earthworks and vegetation clearance within 20 metres of the Karetu River is a restricted discretionary activity.
23.3.2 Any land use involving earthworks, including the extraction of minerals, that does not comply with Rules 23.1.1.7 to 23.1.1.10 is a discretionary activity (restricted), except where exempted by Rule 23.1.2.	As the proposal does not comply with Rule 23.1.1.8, all earthworks are a restricted discretionary activity.
23.4.2 Landfills (excluding offal pits) and solid waste transfer stations are discretionary activities.	Under this rule landfilling is a discretionary activity.
Chapter 27 Natural Hazards	
Rule	**Comment**
27.1.1.2 Any structure shall be set back a minimum of 10m from the edge of the bed of any river, edge of any public drain, edge of any wetland, or the centreline of any stopbank, whichever is the further from the river or wetland, except where a different setback is provided for in Rule 27.1.1.1.	A new bridge structure will be within the 10m setback requirement. As there is no existing bridge, the exemption listed under 27.1.2.2 which applies to the replacement, maintenance and minor upgrading of an existing utility, does not apply. Therefore the proposed bridge does not comply with this rule is classified as a discretionary activity under Rule 27.2
27.2.2 Except as provided by Rules 27.3 or 27.4, or where exempted under Rule 27.1.2, any land use which does not comply with one or more of the conditions under Rule 27.1.1, is a discretionary activity (restricted).	

40. Overall, the proposal is considered to be a **discretionary activity** under the provisions of the Operative Waimakariri District Plan 2005.

Proposed Waimakariri District Plan

41. Consideration has been given to the applicability of the Proposed Waimakariri District Plan (PDP) which was publicly notified in September 2021. The hearings have been completed, but no decisions have been issued yet.

42. WDC has been granted a time extension for decisions to be released, until the end of June 2025. Therefore, the PDP provisions are subject to submissions and do not have legal effect yet. The only rules that have legal effect are those set out in Section 86B(3) and rules relating to subdivision and density in the General Rural Zone which were granted immediate legal effect status by the Environment Court.

43. The site is identified as being within the General Rural Zone. The applicant has undertaken an assessment of the relevant rules, which I have reviewed and delated the relevant rules to the proposal that have legal effect below.

SASM - Ngā whenua tapu o ngā iwi - Sites and Areas of Significance to Māori	
Rule	**Comment**
SASM-R4 **Earthworks and land disturbance associated with other activities** *This rule applies to Wāhi Tapu/Wāhi Taonga, Ngā Tūranga Tūpuna and Ngā Wai in SASM-SCHED1 except where SASM-R1 to SASM-R3 apply.* ***Activity status: PER*** *Where:* 1. *the earthworks and land disturbance is limited to:* a. *planting of trees;* b. *gardening;* c. *building foundations, septic tank and swimming pool installations where the combined volume of earthworks is 350m³ or less;* d. *freestanding sign foundations to a maximum depth of 200mm or to the depth already disturbed (whichever is the greater);* e. *drain and track maintenance;* f. *cultivation, stopbanks, roadworks and other activities*	The proposal breaches this rule as the applicant is proposing to undertake earthworks within SASM 028 for building a structure, being a bridge. The applicant is of the opinion that the bridge is a building and that the earthworks for "building foundations" are therefore a permitted activity. I note the definition of building is as follows: ***BUILDING*** *means a temporary or permanent movable or immovable physical construction that is:* *a) partially or fully roofed; and* *b) is fixed or located on or in land;* In my opinion the bridge is a structure but does not fall into the definition of a building as it is not roofed. Therefore, the earthworks related to the bridge do not meet any of the activities under SASM-R4. Therefore, the earthworks within the nga wai is a restricted discretionary activity.

	within land previously disturbed by previous earthworks to the depth already disturbed; *g. cultivation to a maximum depth of 200mm;* *h. a customer connection between a building, other structure, site, and infrastructure as per EI-R4; and* *i. the drilling of a well or bore.*	

44. Overall, the proposal is considered to be a **restricted discretionary activity** under the 'legal effect' provisions of the Proposed Waimakariri District Plan 2021.

Summary

45. Overall, the entire proposal is a **Discretionary activity** under the Operative District Plan. Under the Proposed District Plan, land use consent is only required for the earthworks for construction of the bridge, and this is a **Restricted Discretionary** activity.

46. Where more than one activity is proposed, and those activities are inextricably linked, best practice is that the activity statuses are bundled and the most restrictive activity status applies to the entire proposal.

47. In relation to the district council consents, I consider it is appropriate to bundle all activities together as a discretionary consent.

SUBMISSIONS

48. Submissions closed on 09 October 2024.

49. During late November 2024, the CRC became aware of issues with the online submission form on the CRC's website. Several submitters reported that submissions were not recorded, despite having received an automated email confirming receipt of the submission.

50. The applicant was advised of this issue on 11 December 2024. The week prior to Christmas, a notice was published on the CRC's website and the local papers used for the original notification, requesting that submitters notify their missing submission by the 31st January 2025 and requesting proof of the original confirmation email for late acceptance of the submission.

51. In total, 573 submissions were received. Of those, 24 were re-submissions. A summary of submissions is outlined below:

    a 510 submissions oppose the proposal in whole or in part;

    b 6 submissions indicated a neutral position in whole or in part;

    c 57 submissions support the proposal in whole or in part.

52. Of the submissions received, 89 indicated that they wish to be heard.

53. A full summary of submissions received is included in Appendix 3 of the CRC Officer Report.

54. The following is a list of the key issues raised by submitters that I will be addressing further in my report:

a) **Rural Amenity** – submissions focus on preserving rural character, scenic values, and minimising industrial impact, including that traffic noise and visual pollution reduce rural amenity.

b) **Cultural Matters** - submissions focus on water contamination, heritage protection, and land use conflicts. Te Rūnanga o Tūāhuriri specifically highlight the Karetu River's cultural significance. The submissions cite potential harm to Māori heritage and local communities.

c) **Traffic Matters -** 243 of the submissions raised concerns around the increase in heavy traffic, the routing of vehicles through the rural road network, increase in safety risk, maintenance liability for the local road network and concerns of increased traffic around North Loburn School.

d) **Terrestrial Ecology** - submissions focused on habitat destruction, re-homing concerns, and water contamination risks.

e) **Natural Hazards** - Concerns that the site is in an earthquake-prone area, risk of landfill containment failure, risk of flooding impacting landfill stability and leading to contaminated runoff, land stability and the potential for erosion to undermine the landfill structure.

f) **Recreation** - Submitters have raised concerns that the proposal will negatively affect walking, cycling, hiking, and horse riding in the area. Loss of access to public spaces and concerns that the landfill will limit access to popular recreational spots. Health and safety for recreational users, including risks from increased traffic, air pollution, and water contamination that could make the area unsafe for outdoor use.

55. In relation to water quality, aquatic ecology and air discharge matters, I defer to the reporting planner Ms Nagy's s42A report for CRC.

SECTION 104 OF THE RESOURCE MANAGEMENT ACT 1991

56. Under Section 104, when considering an application for a resource consent and any submissions received, the consent authority must, subject to Part 2, have regard to–

(1) (a) any actual and potential effects on the environment of allowing the activity; and

(ab) any measure proposed or agreed to by the applicant for the purpose of ensuring positive effects on the environment to offset or compensate for any adverse effects on the environment that will or may result from allowing the activity; and

(b) any relevant provisions of—

(i) a national environmental standard:

(ii) other regulations:

(iii) a national policy statement:

(iv) a New Zealand coastal policy statement:

(v) a regional policy statement or proposed regional policy statement:

(vi) (vi) a plan or proposed plan; and

(c) any other matter the consent authority considers relevant and reasonably necessary to determine the application.

(2) When forming an opinion for the purposes of subsection (1)(a), a consent authority may disregard an adverse effect of the activity on the environment if a national environmental standard or the plan permits an activity with that effect.

57. All matters listed in s104(1) are subject to Part 2 of the Act which contains its purposes and principles

58. In addition, Section 104B of the Act relates to the determination of applications for discretionary activities. It states that after consideration of an application, a consent authority may grant or refuse the application and if granted, may impose conditions under section 108.

59. Section 104(1)(a) of the Act requires that the Council have regard to any actual and potential effects on the environment of allowing the activity. 'Effect' is defined in section 3 of the Act as including:

a) Any positive or adverse effect; and
b) Any temporary or permanent effect; and
c) Any past, present, or future effect; and
d) Any cumulative effect which arises over time or in combination with other effects– regardless of the scale, intensity, duration or frequency of the effect, and also includes –
e) Any potential effect of high probability; and
f) Any potential effect of low probability which has a high potential impact.

60. Section 104(2) of the RMA directs that the decision maker may disregard an adverse effect on the environment of an activity if a rule in the District Plan permits an activity with that effect, a concept known as the permitted baseline. The application of the permitted baseline is discretionary, and case law has established that the permitted baseline test relates to the effects of non-fanciful hypothetical activities which could be carried out as of right under the District Plan, as well as any existing lawfully established activity on the site. The existing environment also includes any activity for which resource consent has been granted.

61. Quarrying is a restricted discretionary activity in the Rural Zone and landfill is a discretionary activity. Therefore, there is no permitted activity or other activity of a similar scale that is permitted that could provide an appropriate baseline against which to consider the effects of the proposal.

ACTUAL OR POTENTIAL ENVIRONMENTAL EFFECTS

62. I have considered the matters raised in the application and further information requests. I also note that in assessing the actual and potential effects of the proposal, I have considered the following expert assessments:

63. The applicant's assessment of actual and potential effects (pages 69 to 93 of the AEE) which focuses on the following effects:

a Effects on water quality;

b Effects on water quantity;

c Effects on aquatic ecology;

d Effects on water users;

e Effects on terrestrial ecology;

f Effects on land stability;

g Effects from fire and flood hazards;

h Effects on air quality and human health;

i Effects of greenhouse gas emissions;

j Effects of transportation;

k Effects on Te Ngai Tūāhuriri Runanga values and use;

l Effects on landscape values;

m Effects on amenity and recreation values;

n Effects on wider community;

o Containment failure risks.

64. As a discretionary activity, the consent authority's discretion is unrestricted and all actual and potential effects of the activities must be considered.

65. Given the nature of the proposal, I consider that the following District matters provide for the principle actual or potential adverse effects to be considered:

a Effects on amenity and character (visual, landscape, nuisance).

b Effects on terrestrial ecology;

c Effects on land stability;

d Effects from fire and flood hazards;

e Effects of transportation;

f Effects on Te Ngai Tūāhuriri Runanga values and use;

g Positive effects

66. I have not provided an assessment of effects on groundwater, water quality, drinking water, stormwater management and landfill design, as these effects have been comprehensively considered by Ms Nagy.

67. In considering the potential effects of the proposal, I have turned my mind to the following potential or actual adverse environmental effects.

Rural Amenity and Character

68. The proposal will be located in the Rural Zone of the Operative District Plan and General Rural Zone of the Proposed District Plan. Therefore, it is important to understand the effects of this type of proposal on the amenity and character of the rural zone and local environment and whether the location is appropriate.

69. I do acknowledge that the quarry is existing, however the effects from the proposed activity should be understood together with the quarry activities and the landfill activity.

70. The anticipated effects on the rural landscape have been considered as part the Landscape Assessment lodged in support of the application (in the RFI response supplied by the Applicant). The Applicant's landscape expert from WSP provided an assessment of the current landscape value of the site, as set out in the Table below.

LEGAL SITE	DESCRIPTION	CURRENT LANDSCAPE VALUE
150 Quarry Road	Broadly characterised as an open lime quarry landscape on the upper portion of the site (quarry pit) with the associated quarrying and processing infrastructure on the lower terrace. Access to the site is via a gravel road from Quarry Road which crosses the Karetu River via a ford.	Very low
154 Quarry Road	Includes a triangular area above the quarry bench currently comprising pasture grass.	Low
174 Quarry Road	Comprises a benched hillslope area from previous lime extraction originally under lease, which has had quarry overburden spread to the west over time.	Very Low
176 Quarry Road	SNA. Whiterock Limestone Vegetation containing indigenous grassland, shrubland, and indigenous limestone rock outcrop vegetation.	Moderate

71. The applicant has assessed the visual amenity effects on the surrounding environment which is in table 6.1 of the landscape assessment in the RFI. In summary the Applicant has detailed:

"From properties on Quarry Road where the Proposal will not be visible, other landscape effects are considered including the increase in vehicle movements. Overall, the landscape effects during the operation of the Proposal will be at most low. At the conclusion of the Proposal, the effects will be very low. There will also be positive effects during and at the conclusion of the Proposal due to returning the proposal site to a landform to a landscape more in line with the former character, habitat enhancement in riparian areas, wetland areas and within the SNA and disestablishment of built form such as the buildings."

72. Ms Naomi Crawford on behalf of Council has undertaken an assessment of the visual and landscape values in Appendix 6 of this report. In summary:

a. *"The Application is adequately described, key aspects of the statutory context are discussed, the landscape context and character are covered appropriately, potentially effected neighbours are correctly identified, and an assessment of effects is undertaken using the TTatM prescribed 7-point scale. The assessment is supported by helpful graphics including site location maps, plans, character images, a viewpoint location map and supporting panoramas.*

b. *The Site is screened by topography to the north and east. The area is also visually contained by the hillscapes and roadside vegetation. Ms. Back assessed the effects of the Application on landscape values when viewed from ten locations. She determined that the visual effect on the residents of 144 and 179 Quarry Road will be* ***low*** *during the works and* ***very low*** *following disestablishment of the landfill (presumably adverse). Visual effects at all other locations were determined to be* ***very low****. I agree with the above findings. However, I would also include numbers 62 and 12 Quarry Road within the above property cluster. Number 62 Quarry Road (which is a dwelling located close to the roadside, plus a secondary dwelling immediately next door) was not accessed by Ms. Black as part of her LVA. This property is located closer to the quarry than some of the properties previously assessed. Again, the visual effect on the residents of this address are likely to be* ***low*** *due to the approximate 835 metre distance from the quarry.*

c. *Number 12 Quarry Road is also located next to the road but at a distance of 1.3km. Adverse visual effects are likely to be* ***very low****.*

d. *It is my understanding that the SNA will be avoided by the Application and will be protected by fencing it off from the rest of the Application Site. If appropriate, the Applicant may also like to consider further rehabilitation or enhancement of this area.*

e. *Submitters concerns in relation to landform centre around the modification of the river and the possibly of earthworks within the waterway. The Applicant has confirmed that there will be no central pier used in the new bridge crossing the Karetu River. However, further information is needed on the location of bunds and their locations and dimensions near the waterway. It is not clear whether the existing bunds beside the river are being utilised and stabilised. Without this information, it is difficult to quantity the effect of the Application on landform.*

f. *upon completion quarrying and then landfill activity, the site will be rehabilitated into a pastoral landuse, much like the surrounding hillscape. The addition of the aforementioned further planting areas and the rehabilitation of the disturbed areas of the site will result in long-term* ***entirely positive effects on landcover****."*

73. Ms Crawford agrees with the applicant in principle around visual amenity and rural landscape with recommendations made in Ms Crawfords s42 A report on the proposed conditions which I agree with and recommend the changes if the consent was to be granted.

74. Further, Rural Character is defined in the operative district plan under Objective 14.1.1. as:

a) *the dominant effect of paddocks, trees, natural features, and agricultural, pastoral or horticultural activities;*

b) *separation between dwellinghouses to maintain privacy and a sense of openness;*

c) *a dwellinghouse clustered with ancillary buildings and structures on the same site;*

d) *farm buildings and structures close to lot boundaries including roads;*

e) *generally quiet – but with some significant intermittent and/or seasonal noise from farming activities;*

f) *clean air – but with some significant short term and/or seasonal smells associated with farming activities; and*

g) *limited signage in the Rural Zone.*

75. The proposal is using an existing site that has been disturbed by quarrying and is extending the margin of the quarry activities slightly which as detailed by Ms Crawford will not have significant visual effects on the surrounding environment.

76. Noise from the site will predominantly consist of vehicle movements including the arrival and departure of delivery trucks and the operation of mule vehicles, but also the loading and unloading of vehicles both at the container terminal area and also at the dump face of the landfill.

77. Due to the scale of the site and surrounding area, it is not anticipated that noise will be of such a level as to be a nuisance, but noise is likely to be audible from the surrounding area such that persons will be aware of the operation of the activity. This can lead to impacts on a person's appreciation of the amenity and character of the area.

78. The applicant has provided a noise assessment (Appendix V) and detailed that the operational areas of the quarry and proposed landfill are at least 180 m from the nearest resident. Also, that the proposed haul road access will be approximately 150 – 160 m from the nearest residential dwelling, which again provides a substantial separation distance from a potential vibration source.

79. I concur with the applicant's noise assessment and consider that noise is sufficiently addressed and can be appropriately managed through the proposed hours of operation and number of truck movements.

80. The proposal will have limited signage, with one sign at the site entrance and internal signage for health and safety purposes.

81. I note that, due to the location of suitable rock formations and the nature of the activities, quarries and landfills are usually located in rural areas. Overall, I am of the opinion the proposal is best suited in the Rural Zone, is not out of character and the effects on rural character would be less then minor. In terms of amenity values including visual, noise from operations and traffic, I consider the effect to be minor.

Natural Character

82. The proposed site is directly adjacent to the Karetu River classified as a 'Significant Site to Māori' and adjacent to a Significant Natural Area. Therefore, the surrounding environment, in my opinion, has significant natural character values that need to be protected and enhanced.

83. The Applicant is proposing works within the margins of the Karetu River to construct a bridge, install a bund (which has been undertaken already) and riparian planting. In terms of the SNA, the applicant is proposing fencing and weed control methods within the SNA.

84. The Applicant's Landscape expert has assessed the natural character, and provided the following assessment:

"The current natural character is degraded with many years of quarrying operations altering the form of the hillside and natural concourse of the Karetu River (with the ford and berms). Effects on natural character resulting from the proposed landfilling are considerably diminished with the bulk of the Proposal occurring within the existing quarried space. The proposal includes positive effects such as:

a) The removal of the ford and the inclusion of a bridge structure, which will generate a short duration adverse effect but a permanent positive effect by returning to a natural rivercourse through removing vehicle movements through the waterway as well as removing the need for ongoing maintenance of the ford.
b) Removal of buildings and access tracks.
c) Indigenous riparian planting of the Karetu River, eastern watercourse and onsite wetland areas which will improve the riparian surrounds.
d) Return to a more natural landform, with vegetation (pasture grass) re-established in keeping with surrounding agricultural properties.
e) Fencing for protection and enhancement of the SNA, including increasing the suitability of the area for fauna such as lizards."

85. Ms Crawford has undertaken a **landscape** natural character assessment in her s42A report which in principle Ms Crawford agrees with the applicants assessment that the effects will be positive due the Karetu River being degraded.

86. In summary Ms Crawford has detailed the following:

*"The Application will result in **positive effects** on natural character due to:*

i. Less disturbance to the riverbed due to traffic no longer moving through it.

ii. Additional riparian planting of the Karetu River, eastern watercourse and onsite wetland areas.

iii. *Longterm removal of buildings and access tracks and a return of the land to pastoral grass (removing much of the existing quarry scar). "*

87. Ms. Crawford has provided recommendations including on conditions in Appendix 6 of this report. However, I am of the opinion the key recommendation is that prior to consent being(if) granted is for the applicant to provide a detailed landscape plan and cross sections.

88. I agree with Ms Crawford and the applicant that the rehabilitation of the river margins will be positive and begin to restore the natural character of the Karetu River.

89. However Natural Character involves the landscape features along with the freshwater ecosystems, water quality and Cultural Values.

90. Therefore, taking into account the cultural effects assessments and I defer to CRC technical experts and planning reports for wetlands, freshwater ecosystems and water quality.

91. I am of the opinion the natural character of the riparian margins landscape values is enhanced but other features of natural character are potentially adversely affected with the current form of the proposal.

Effects on Terrestrial Ecology.

92. The Applicant has undertaken an assessment of terrestrial ecology within the AEE and Appendix G being the Ecological Impact Assessment (EcIA).

93. SLR Consulting Ltd and LizardExpertNZ were engaged to review the assessment methodology presented by the applicant and audit the applicant's conclusions in relation to terrestrial effects expected to arise from the proposal. The s42A reports of Dr Mandy Tocher (herpetology) can be found in **Appendix 1** of this report.

94. Hamish Dean,SLR Consulting Ltd has addressed terrestrial ecology, including bats, birds and mammalian pests. The s42A report can be found in **Appendix 2** of this report.

95. Dr Stephen Rate, SLR Consulting Ltd was engaged to review the proposal's effects on vegetation and wetlands. The s42A report can be found in **Appendix 3** of this report.

Herpetofauna

96. The site contains lizards, Canterbury Grass Skink, and Waitaha geckos as detailed by Dr Tocher evidence in **Appendix 1** of this report.

97. In February 2025, the Applicant obtained a DOC permit to salvage and relocate lizards which was provided to the Council alongside the Lizard Management Plan.

98. Dr Mandy Tocher has undertaken a review of the applicants' assessment and lizard management plan which evaluates the effects on indigenous lizard populations and their habitats.

99. Dr Tocher has identified concerns about the lizard survey and effects assessment. In summary:

a) The survey was inadequate as it lacked a permit to handle lizards, leading to misidentification of species.
b) The extent of lizard habitats affected by quarry activities is underestimated.
c) The pre-mitigation effects assessment, which rated the impact as "negligible," is flawed.
d) The applicant referenced a Department of Conservation (DOC) salvage permit in the Application, but no valid permit existed at that time.
e) The DOC permit later issued (107310-FAU) is considered unlawful as it allows incidental harm to lizards, conflicting with recent case law.
f) Avoidance and remediation measures are insufficient.
g) Lizard salvage from 1.9 ha is planned, but the actual affected area may be much larger (~4.5 ha).
h) Proposed pest control and habitat enhancement actions are vague and may not adequately compensate for habitat loss.

100. Submissions raised concerns about the impact on lizards, questioning the effectiveness of the relocation plan and the underestimation of effects.

101. To better understand the effects on lizards, Dr Tocher recommends that the applicant fully identifies affected lizard species and estimated population. The LMP should be revised prior to consent being granted (if granted) to improve clarity on habitat and avoidance strategies, align with best practice principles for lizard salvage and relocation, and assess residual effects and apply compensation following the NSP-IB principles.

102. Further, I agree with Dr Tocher's following statement:

"that managing effects over indigenous lizard habitats are very clearly within the mandate of the RMA (1991) and its planning tools overseen by WDC and ECAN. This is especially so for significant fauna habitats occupied by grass skinks (and perhaps Waitaha gecko) that are addressed in the RMA as a Part II matter (Section 6c), and feature prominently in the NPS-IB."

103. I am of the opinion that requiring a survey and updating a lizard management plan after the consent being granted to address potential effects, is potentially not lawful.

104. This forms part of my opinion that the consent should not be granted until the decision makers are satisfied that all the critical and adverse effects are identified as detailed on the quality planning website[1] which states the following:

"It has become relatively common in these situations to either provide for subsequent management plans or some technical matter to be approved by a council representative after consent has been granted. However, this type of condition is not lawful because it leaves a decision to a subjective discretion.

Instead of requiring management plans conditions must provide clear performance or environmental standards that are to be certified by an appropriately qualified and experienced person as being achieved. This approach is appropriate for both simple and complex applications, with requirements responding to the issues to be addressed

[1] https://www.qualityplanning.org.nz/node/917

varying from being relatively minimal, to stringent and complex for complex developments.

Critical actual or potential adverse effects need to be identified, appropriately avoided, remedied or mitigated with conditions before a decision to grant is made and not left to be addressed via a future management plan. Management plans should be limited to non-critical operational processes that lie behind a performance or operational standard. For example, a certified Noise Management Plan could be used to complement noise limits specified by other conditions."

105. Overall, I am of the opinion there is uncertainty around the effects on lizards. At this stage I am of the opinion the proposal fails to meet RMA requirements for protecting indigenous fauna, and without stronger mitigation and compensation measures, significant residual effects on lizard populations are likely.

Avifauna

106. The applicant provided an assessment and detailed that:

"an existing low ecological value and a resultant negligible magnitude of effect on avifauna, a pre mitigated level of effect on avifauna is assessed as very low. Avifauna utilising the SNA to the north are not expected to experience any disturbance from proposed activities due to the distance from the project site.

Notwithstanding a very low level of effect on avifauna, bird management protocols will be incorporated into the overarching ecology management plan for the project. Protocols will include an Accidental Discovery Protocol (ADP) for all 'Threatened' and 'At Risk' species that could utilise vegetated habitats onsite during development. Example protocols will likely include site walkovers pre vegetation clearance"

107. Mr Hamish Dean's s42A report is attached in Appendix 2 of this report. Mr Dean has reviewed the applicants' sections in the EcIA relating to Avifauna.

108. Mr Dean is of the opinion the assessment of effects on avifauna were understated given that habitat for indigenous bird species is being destroyed and there is potential for nests. The assessment on kārearea (NZ Falcon) may be slightly understated because there is at least potential for a greater level of effect than has been assessed which is further discussed in Appendix 2 of this report.

109. Mr Dean on behalf of Council has undertaken a review of the applicant's assessment of Avifauna and concluded the following:

"I consider that the proposal is likely to have only a Low level of effect on avifauna with two exceptions:

a) Potential adverse effects on kārearea could be of a Moderate level and need to be managed;
b) Potential downstream adverse effects on threatened avifauna in the Okuku and Ashley/Rakahuri rivers resulting from contaminants entering the Karetu river need to be carefully considered."

110. Mr Dean has reviewed the submissions in relation to avifauna and has detailed the following:

"large number of submissions mentioned effects on birds or wildlife in general. These varied in the level of specificity but were generally relating to the following potential or perceived effects on birds:

a. Adverse effects on birds resulting from contaminants entering the environment via dust or discharge of leachate. This included concern about impacts on the bird habitats of the Ashley River downstream of the site;

b. *Disturbance of birds by increased levels of noise from traffic and other activity associated with the site;*

c. *Non-specific effects on flora and fauna from the activity as a whole; and*

d. *An increase in scavenger birds."*

111. Mr Dean has detailed that the only concern is around kārearea and no other bird species and that he is of the opinion that scavenger birds and rodents will not be an issue due to the type of waste.

112. Mr Dean has provided recommendations to ensure the effects on avifauna are mitigated, in particular on kārearea. Mr Dean recommended the following:

a) *"a suitably qualified and experienced ecologist to undertake a search for kārearea nests prior to any expansion of earthworks or vegetation clearance during their peak breeding season (September to March). If nests are found, the area should be avoided, and an appropriate buffer set up until the chicks have fledged.*
b) *The applicant's ecologist should be required to provide a brief report to the consenting authority on the findings of any such nest search and the management measures to be undertaken.*
c) *an advice note on compliance with the Wildlife Act 1953 should also be included.*
d) *Monitoring recommendations made by Ms Tiernan (CRC Expert), including the addition of PFAS/PFOS monitoring as a means of assessing potential risk on downstream avifauna*."

113. Overall, after reviewing Mr Dean's evidence and the Applicant's assessment, I consider the effects on Avifauna will be less than minor, as long as the recommendations by Mr Dean are adopted to ensure the kārearea are protected.

Wetland

114. I note the CRC Planning officer, Ms Nagy has comprehensively assessed effects on wetlands due to the National Environmental Standards for Freshwater being triggered, which is the responsibility of the Regional Council.

115. Therefore, the effects assessment is more suited to be undertaken by Ms Nagy.

Vegetation

116. The applicant has detailed that:

"the earthworks associated with landfill development and track widening is likely to result in the clearance of scattered exotic shrubs and some amenity plantings around the fringes of the existing excavated area equating to approximately 5 ha. Potential bund improvements, designed to manage flood risk associated with the Karetu River may also require the removal of a small number of exotic trees and shrubs."

Due to the minor shift away from the existing baseline condition of the site, the magnitude of effect is however low with changes arising from the loss or alteration of vegetation within the site being discernible. On closure of the landfill, the vegetation cover across the site will be substantially increased and well in excess of the 5-ha removed during the construction phase.

In combination with negligible baseline values, the increase in vegetation cover at project completion, the inclusion of stock fencing around the SNA and proposed enhancement planting around riparian margins with indigenous planting, the resultant effect on vegetation is considered positive with their being a net gain."

117. The site adjoins a Significant Natural Area which is known as the Whiterock Limestone Vegetation and described to contain indigenous grassland, shrubland and indigenous limestone rock outcrop vegetation

118. The Applicant reiterated in the RFI response that the proposal does not seek to undertake works within the SNA. However, as per the application a stock proof fence is proposed to protect the SNA area. In most part, this fence already exists but it is proposed to upgrade the fence to ensure it achieves the objective of stock proofing the SNA.

119. The evidence of Dr Stephen Rate is attached Appendix 3 of this report. Mr Rate has reviewed the applicants' sections in the EcIA relating to vegetation. Dr Rate focuses on potential impacts on terrestrial vegetation and wetlands. The report evaluates the applicant's assessment and mitigation proposals, and recommends further actions.

120. In summary, Dr Rate's evidence has highlighted:

a) *It was noted that the highest ecological values lie within the Significant Natural Area (SNA 039), which will not be directly affected in terms of vegetation.*
b) *The quarry operations will primarily impact exotic vegetation; significant indigenous vegetation is within the SNA.*
c) *The proposed mitigation (redirecting groundwater, planting native vegetation) is uncertain in effectiveness.*
d) *Some mitigation measures are appropriate (e.g., fencing riparian margins, hydroseeding, wetland plantings).*
e) *A Wetland Management Plan (WMP) should be developed to ensure no net loss of wetland function.*
f) *Additional weed control is necessary to manage impacts from fencing the SNA.*

The concerns of the submitter regarding potential adverse effects on terrestrial vegetation has been addressed by the applicant and Dr Rate's evidence in Appendix 3 of this report.

121. Overall, I am of the opinion the effects on terrestrial vegetation can be managed appropriately to ensure the effects are less than minor. I acknowledge that there remain issues around the wetland assessment, but I defer this to Ms Nagy, as she has completed a comprehensive assessment on wetlands.

Geotechnical effects

122. The Applicant provided a geotechnical assessment (Appendix E) and slope stability assessment (Appendix Q) as part of the application.

123. An assessment was undertaken by Tonkin and Taylor reviewing the applicant's AEE and submitter's concerns. The evidence of Mr Clive Anderson is attached in Appendix 4.

124. In summary Mr Anderson has detailed the following:

a) *Movement on the observed small-scale faults within the quarry is unlikely during the life of the landfill. There is no evidence of movement on these faults since the overlying loess soils were deposited following the end of the last ice- age about 12,000 years ago (Ref Appendix E Section 5.1.2). Therefore, a loss of contaminants caused by short fault rupture of any containment structure is unlikely during the life of the landfill.*

b) *The impact of the wedge failure mechanisms on the landfill design was queried during my initial review of the application. The applicant's response states that the wedge failures are "relatively uncommon", of "small volume and do not significantly affect the overall stability of the slopes. The wall liner detail can accommodate any small-scale wedge failures that occur following slope cutting". I observed these potential failure mechanisms during my site visit on 25 June 2024 and based on my geotechnical experience and engineering judgement I concur with the Applicant.*

c) *A further Section 92 question was in regard to the potential for existing landslides to move further and enter the quarry area. The reviewer agrees with the explanation provided by the applicant that this is considered a low risk as the slope between the existing landslide and the quarry is 'considerably flatter'.*

d) *The Applicant's proposed bench heights of 15 m max together with benches of 8m minimum width are endorsed from a stability and safety perspective.*

e) *the proposed landfill design is properly executed in the detailed design and then construction, then there is no geotechnical impediment to developing the proposed landfill. However, this conclusion is totally dependent on the proposed containment system being properly constructed. This is because the local geology and topography would not provide effective long-term containment of fugitive leachate.*

125. Overall, I consider that the risk of failure of the landfill in terms of geotechnical should be considered low but could still lead to a high impact consequence if failure was to occur, which could lead to significant regional effects as identified in Ms Nagy's report.

Effects of transportation

126. The anticipated effects resulting from traffic generation and effects on the network have been considered as part the Transport Assessment lodged in support of the application.

127. The proposed local transportation network consists of Loburn Whiterock Road which is approximately 14.5 km long and links Dixon Road (Arterial Road) with Quarry Road (Collector Road), passing through the villages of Loburn and North Loburn.

128. The application notes that the quarry and landfill operations will result:

"*on average 36 vehicle* movements *per day which equates to approximately 14% of the threshold that the operative district plan anticipates before consideration is given to a high trip generating activity. Based on the annual average daily traffic volumes for Quarry Road, the proposal is expected to result in an overall increase of 24% for vehicle movements on Quarry Road while on Loburn Whiterock Road an increase of 18% is expected"*

The Assessment of Effects prepared by WSP concludes the following: The proposed vehicle movements are also well below the proposed district plan thresholds.

On the basis of the activity generating a small fraction of the district plans high trip generating threshold and the minor increase in expected movements on the surrounding road network, traffic impacts on the network associated with the proposal are assessed as negligible."

129. I do note that the Applicant has undertaken an effects assessment based on the Operative District Plan's permitted activity rule of 250 vehicle movements per day and the Proposed District Plan's high traffic generation threshold for activity within a Rural Zone being:

a) Greater than 200 vehicle movements per day (average).
b) Greater than 50 heavy vehicle movements per day (average).

130. In my opinion, care should be undertaken when using the above numbers for an activity that is a discretionary activity. As I note, roads throughout the district vary in the ability to handle certain volumes of traffic movements and contain specific characteristics in the environment (e.g. schools nearby, high crash rates, traffic speeds, undersized roads) that need to be considered when consent is being sought for a new activity.

131. Mr Aaron Gregory from Tonkin and Taylor has provided evidence on behalf of Council. Mr Gregory s42A report is attached as Appendix 5 of this report.

132. Mr Gregory provides a more detailed analysis, however in summary, the key findings are as follows:

a) *the proposal has the effect of increasing the existing heavy vehicle movements on Quarry Road to 24, a net increase of 18 to 20 truck movements, or 10 trucks in each direction. This represents a 50% increase in average daily heavy vehicle movements on Quarry Road, or an overall increase in average daily traffic (ADT) of approximately 12%. As the total traffic is likely to remain between 150 and 200 vehicles per day, I do not consider this to be a significant change.*

b) *A Section 92 query was raised about the potential impact the proposed activity has on the existing high crash rate on the route to the site. The Applicant's response stated most of the crashes occurred at night and none involved heavy vehicles and concluded that as the proposed activity would generally result in traffic generated in day light that there was no reason to consider that there would be an identifiable increase in crashes resulting from the proposed activity. I agree with the Applicant's assessment of risk.*

c) *Whilst there are minor safety risks associated with this, there are likely to be ongoing maintenance liabilities for Council as continued overrunning will result in edge break on the seal of Quarry Road.*

d) *The sensitivity test carried out referred to in paragraph 30 above, examines the scenario of doubling the landfill volume and I anticipate that an infrequent intensification of daily traffic to 40 truck movements is unlikely to have a significant detrimental effect*

e) *the traffic generation through the proposed activity, being a lime quarry and landfill operation, will not present any significant detriment to the safety and efficiency of the existing transport network if the aforementioned changes to the conditions and mitigating measures are enacted.*

133. Mr Gregory addresses the 243 submissions related to traffic matters within his report. The main concerns raised by the submitters were increase in heavy traffic, increase in safety risk, increase in maintenance liability for the local road network and the routing of vehicles through the rural road networks, in particular past North Loburn School.

134. Mr Gregory is recommending the following*:*

1. Truck movements do not exceed 40 on any one day,
2. A condition should be included with the effect that the entrance to the site will be sealed to a sufficient width for a length of 20m to allow for two-way traffic.
3. Provide a W18-4 "trucks operating" sign in advance of the site entrance.
4. Carry out a baseline assessment of Loburn Whiterock Road and include an appropriate review and repair clause to the satisfaction of the road controlling authority.

135. I agree with Mr Gregory's recommendations, in particular changing the applicant's suggested condition from an average to a maximum of cars per day, as this will provide certainty of the transport effects.

136. Overall, after reviewing the Applicant's AEE, Mr Greogory's evidence and the concerns raised by the submitters, I am of the opinion that the effects on the transport network and user's safety will be less than minor.

Effects on Te Ngai Tūāhuriri Runanga values and use

137. The application details that the proposal lies within the rohe of Te Ngāi Tūāhuriri Rūnanga.

138. Th application site is not mapped as being a Runanga sensitive area, silent file area, statutory acknowledgement area or subject to any other Ngāi Tahu layers.

139. The Karetu River is identified in the Proposed District Plan (SASM028) as an area of significance to Māori as it is a tributary of the Ōkuku River, which is recognised as having mahinga kai environment, habitats and taonga species.

140. The applicant has provided an assessment of the proposal against the Mahaanui Iwi Management Plan 2013 (Mahaanui IMP) and the Ngāi Tahu Freshwater Policy (NTFWP) in section 10.9, and Appendix X of their AEE.

141. Actual and potential adverse effects on cultural values have been assessed in the applicant's application (see section 8.12 of the AEE). In summary, the Applicant states that:

1. *"It is acknowledged that the site, and Karetu River in particular, is an area of significance to Māori due to mahinga kai values, and habitat of taonga species.*
2. *The level of effects on cultural values is therefore stated to be strongly associated with effects on the Karetu River and its water quality, and consequently effects on mahinga kai.*
3. *The applicant references an attempt to engage with Te Ngāi Tūāhuriri Runanga, but in the absence of a response has deferred its assessment to the consents process".*

142. WDC sought advice on the potential effects of the proposed activity on cultural values from Mahaanui Kurataiao Limited.

143. A response was received, dated 23rd April 2024, which provides a position on behalf of Te Ngāi Tūāhuriri Rūnanga following presentation of the proposal to Kaitiaki representatives of the Rūnanga. The response includes an assessment of relevant objectives and policies and an outline of the values that are associated with the project site area.

144. In summary, "*Te Ngāi Tūāhuriri Rūnanga are opposed to the granting of this resource consent and consider themselves to be an adversely affected party due to the proximity of Karetu River, the impact on (and risk to) the cultural landscape, mahinga kai, taonga species and water quality."*

145. The Runanga has provided further comment via a submission. These are addressed in the next section.

Submission

146. Following notification of the proposal, Te Ngāi Tūāhuriri Rūnanga provided a submission outlining the following:

a) *The proposed site is located between both the Ōkūkū and Rakahuri rivers, both of these awa and their surrounding environment are of significant cultural value to Ngai Tūāhuriri.*
b) *This ongoing connection with the Rakahuri River, and its tributaries, continues into the modern day, where the Ngāi Tahu Claims Settlement Act 1998 provides for two customary fishing entitlement areas, being the Taerutu Reserve (schedule 113(b)) and Te Aka Aka Reserve (schedule 113(c)).*

147. Te Ngāi Tūāhuriri Rūnanga request that the application be declined and state that "*the potential for significant long-lasting harm to the cultural heritage and customary food gathering practices has not been avoided, remedied or mitigated.*

The Karetu River is a significant cultural landscape which would be adversely affected. The proposal is inappropriate at the head of the catchment and would diminish the mauri of the waterway.

The Applicant failed to engage with Ngai Tūāhuriri during the site selection process and has therefore failed to abide by industry best practice, represented by the WasteMINZ Guidelines (2023). Ngai Tūāhuriri Runanga were approached following site selection, at which stage the options for meaningful input were reduced to a level that are described as pointless.

Overall, the proposal:

i *poses an unacceptable risk of contaminant discharge;*

ii *has an unacceptable cumulative impact on the lower wetland;*

iii *creates an unacceptable construction phase impact on the river and biota;*

iv *uses an unacceptable assessment of the magnitude of effects;*

v *fails to provide relevant information; and*

vi *suffers from a lack of clarity about the degree of impact from the current unmitigated impacts on the receiving environment."*

Summary

148. Based on the submission by mana whenua, who are the cultural experts, I consider that there is a potential for significant effects on mana whenua from the proposal as currently sought.

149. If consent is to be granted, it is my opinion that conditions around ongoing consultation with mana whenua are strongly recommended alongside management plans that integrate cultural values.

150. Based on the feedback from MKL and the assessment of effects above, I have also undertaken a review of the IMP and commented on the relevant policies. This is set out below in the other matters section of this report.

Fire & Natural Hazards

151. It is understood that landfills can be more vulnerable to the risk of fire. Active on-site management is required to reduce any potential risk. The Applicant has detailed a combination of measures to manage this risk including:

- The lack of putrescible material.
- Permanent presence of large earth moving machinery that can be quickly utilised to address any fire.
- For fires occurring outside of the landfill footprint such as within buildings on the lower terrace of the site, adequate onsite storage and couplings for the delivery of water for firefighting purposes will be available.
- Fire Emergency Management Plan

152. Generally, it is considered that the risk of fire can be controlled through the use of conditions and management plans such that potential effects can be reduced but given the risk associated with fire and the potential impacts if a fire was to occur, careful management of this issue is required

153. With regards to risk from natural hazards, it is considered that the position of the landfill potentially reduces some risks, such as flooding but heightens other risks such as slippage due to a seismic event. This matter, including the design of the landfill, its' containment and structural design are matters that need to be considered in assessing the potential effects of the proposal. I do note that Ms Nagy and the CRC Landfill Engineer have provided a comprehensive assessment of natural hazard effects relating to the landfill design. Therefore, the outcome of their assessment will determine if there are potential effects on the proposal from natural hazards and likewise whether the proposal will exacerbate any natural hazard risks.

Crown Land

154. The proposal includes existing structures, bunds, riparian planting, a bridge, access to the site and other ancillary activities to the quarry and landfill, which are located within Crown Land, being the land adjacent to the Karetu River which is administered by LINZ.

155. I am not aware of any formal agreement between the Crown and the applicant. There is no evidence that the applicant has landowner approval. The applicant considers that land ownership is not an RMA function. However, the encroachment of these ancillary activities associated with the quarry and landfill onto riparian land has the potential to affect the Karetu River.

156. As discussed in this report, the technical expert and CRC planning officer's reports consider there is potential for adverse effects. Consequently, in my opinion, the location of the ancillary activities on Crown Land is relevant in considering the application. Mitigation measures could include moving some of these activities away from the river and rehabilitating the land.

Public Access

157. The proposal includes access to the quarry via Crown Road reserve, from Quarry Road to the Karetu River, and Crown riverbed.

158. The applicant currently has a security fence, gate and camera located on the Crown Road Reserve which restricts access to the site. This also restricts access to the Karetu River. The public are entitled to use the road reserve to access the Karetu River, as I am not aware of the applicant having any formal agreement restricting public use.

159. Further, it is recognised in the applicant's AEE that there are no obvious public access points (paper roads etc) to the Karetu River immediately downstream of the site other than the Loburn Whiterock Road bridge which is 2 km downstream. Public access is available to the Karetu River where its confluence meets the Grey River approximately 6 km from the site, off Loburn Whiterock Road.

160. For access to the site for the landfill operation, the applicant is proposing that a new 23m single span bridge will be constructed across the Karetu River, to replace the existing ford crossing.

161. The current security gate (which is potentially unlawful) will remain in the same location, in the Crown Land and will continue to prevent public access to the Karetu River. It is noted that if public access was available to the river in this location, the intensification of truck movements and cautionary signs about contaminated waste would be likely to deter people from using the access.

162. Therefore, I am of the opinion the proposal creates adverse effects on public access to the Karetu River due to the restrictions in place, and the further intensification of activity on the site.

163. I recommend the applicant either move the security gates to the proposed bridge, or provide a new public access point to the Karetu River in another location that avoids the waste disposal heavy vehicles.

Site Rehabilitation, Liability and Long-Term Management

164. The applicant proposes capping the landfill post-closure to restrict rainfall infiltration into the landfill. The final landform will be revegetated to support final land uses such as light grazing or natural state vegetation as shown in figure 3 of this report.



Figure 3: Applicants proposed remediation – Current (left) and Rehabilitated (right)

165. The rehabilitation of the site will have a significant impact on the scale of effects from the proposed activity. These effects are also relevant in the long-term management of the site, including when the landfill has ceased operation. For example, the liner of the landfill has a specified life, and it needs to be determined whether there is the potential for environmental impacts beyond this period.

166. As part of any long-term management of the site, and ongoing maintenance and rehabilitation, the applicant needs to detail how these issues will be addressed including any questions as to the legal arrangements for the site, how the area will be maintained and monitored after the closure of the landfill and what mechanisms will be in place for long term responsibility of the landfill. These details need to be addressed before it can be determined that any long-term effects from the proposal can be adequately managed.

167. In assessing the potential effects of the proposal, it is recognised that the landfill will be operational for a long period of time and once completed, the landfill site will continue to need to be actively managed. Submitters have expressed concerns regarding the long-term management of the site and also responsibility for the site both during and after the landfill activity has been completed.

168. The applicant has proposed a bond, and a Landfill Closure and Aftercare Plan will be prepared within 5 years of landfilling commencing and updated every 5 years thereafter. This is to detail the activities required for closure of the landfill and during the aftercare period.

169. Key activities required for closure and aftercare include:

- Removal of facilities not required during the landfill aftercare period (Closure): Site office and weigh bridge, lime processing plant, kiln, maintenance workshops and bulk storage sheds

- Removal of any erosion and sediment control and stormwater facilities no longer required.

170. Aftercare activities:

- Maintenance of the landfill access roads remaining post closure

- Ongoing maintenance of the leachate removal and collection system and removal of leachate long term

- Ongoing operation and maintenance of the groundwater drainage system

- Maintenance of the landfill cap, including filling any areas that may have been subject to differential settlement, repair of any surface erosion

- Ongoing environmental monitoring and reporting as required by consents and responding to contingent events.

171. While the Applicant has acknowledged the aftercare requirements, a more detailed consideration of the proposal is required through the resource consent process, and significant measures can be implemented. There does remain a risk that an unforeseen event may occur, and consequently necessary measures need to be put in place to manage this risk.

172. Further, as the landfill is a long-term proposal, further consideration should be in place around ecological values, landscape values, natural character and cultural values within the aftercare and closure plan. In addition, I note Dr Massey from CRC has recommended a longer minimum aftercare period. Whether this is feasible or not, it should be strongly considered if consent is granted, as land use consents are forever attached to the land unless a duration is formally conditioned.

173. On this basis, it is considered that the Applicant needs to provide a comprehensive plan, supported by financial measures, to adequately address any unforeseen events.

Positive effects

174. The Applicant considers there to be some positive effects with respect to terrestrial ecology, landscape values and the wider community, including:

a) A contribution to the longevity of Kate Valley landfill, by diverting inert construction and demolition waste to an alternative deposition site;
b) A reduction of cost for depositors, particularly for contaminated soils, with will provide a roll-on effect and economic benefit to end users;
c) A reduction of roadside and riverbank dumping by providing competitive pricing for deposition of material;
d) Reduction in greenhouse gas emissions due to shorter cartage distances from waste source.

175. Several Submitters were in support of the proposal for the following reasons:

a) **Economic Benefits:** The project is seen as beneficial for the local economy and the construction industry, providing employment opportunities and supporting business growth.
b) **Efficient Waste Management:** Supporters emphasize the need for additional managed fill facilities in the Canterbury region, especially with existing landfills nearing capacity. This project would help manage construction and demolition waste effectively.
c) **Cost-Effective Solution:** The landfill offers a cost-effective option for disposing of waste, reducing illegal dumping and avoiding the overuse of higher-class landfills like Kate Valley.
d) **Reduced Environmental Impact:** By providing a dedicated facility for inert waste, the project minimizes the risk of inappropriate waste disposal, leading to better environmental outcomes.

e) **Support for the Construction Industry:** The landfill supports the ongoing development in the region by providing a reliable disposal option for construction materials.

176. I do agree with the Applicant and Submitters in support that the proposed purpose-built deposition site for soil and inert construction and demolition waste materials, in principle, could provide benefit for the industry. However, careful consideration around site selection is required to ensure the positive effects outweigh the negatives.

Effects Conclusion

177. Overall, the above assessment considers various aspects, including:

a) **Terrestrial Ecology:** The site hosts significant indigenous flora and fauna, including lizards. The lizard management plan was criticized for being insufficient, potentially affecting species like the Canterbury grass skink and Waitaha gecko.
b) **Land Stability:** The geotechnical assessment found the risk of significant land instability to be low. However, potential risks from earthquakes and flooding exist.
c) **Transportation:** Increased heavy vehicle traffic could impact local road safety, especially near North Loburn School. Recommendations include traffic limits and speed restrictions.
d) **Cultural Impact:** Te Ngāi Tūāhuriri Rūnanga strongly opposes the project due to its proximity to the culturally significant Karetu River. Concerns include contamination, loss of mahinga kai (food gathering areas), and diminished cultural values.
e) **Access Impact:** Potential restrictions on access to the Karetu River and risks from increased traffic.

f) **Amenity and Character:** Not out of character for a rural zone and is efficient use of land by using an existing quarry site. However potential loss of amenity relating to cultural and community perception of pleasantness.

g) **Natural Character-** The river margins and landform will be rehabilitated therefore rehabilitating part of the natural character. However, I note that cultural, wetlands, freshwater ecosystems and water quality will be impacted by this proposal which also makes up natural character.

h) **Positive effects:** the proposal will be a purpose-built deposition site for soil and inert construction and demolition waste materials which, in principle, could provide benefit for the industry.

178. Other matters such as water quality, wetlands, landfill design, air quality and human health, I defer to Ms Nagy's S42A officer report as these are matters best addressed by CRC experts and within the jurisdiction of CRC.

179. Overall, I am of the opinion the proposal will have adverse effects that are more than minor on cultural values and terrestrial ecology, in particular on lizards.

Relevant Statutory Provisions (Section 104(1)(b))

180. Section 104(1)(b) requires the decision maker to have regard to the relevant provisions of the following documents:

a A national environmental standard;

b Other regulations;

c A national policy statement;

d A New Zealand coastal policy statement;

e A regional policy statement or proposed regional policy statement;

f A plan or proposed plan.

181. Of relevance to this application are the following documents and provisions:

a National Policy Statement for Indigenous Biodiversity (2023)

b Canterbury Regional Policy Statement

c Operative Waimakariri District Plan

d Proposed Waimakariri District Plan

National Policy Statement for Highly Productive Land

182. The NPS-HPL came into force in October 2022. Clause 3.5(1) requires that regional councils must map the highly productive land in their region, being most Class 1-3 land. Until that work is done, Clause 3.5(7) specifies that highly productive land is all Class 1-3 land as mapped by the NZ Land Resource Inventory (NZLRI). Using the NZLRI, the site is Class 4 land and therefore is not highly productive land. As a result, the NPS-HPL does not apply to the site.

183. **National Policy Statement for Indigenous Biodiversity 2023 (NPS-IB)**

184. The NPS-IB came into force on the 4th August 2023. It is applicable to the management of indigenous biodiversity in the terrestrial environment of Aotearoa New Zealand and prioritises its mauri and intrinsic value. This recognises that the health and wellbeing of people and communities is dependent on the health and wellbeing of indigenous biodiversity and that people have a responsibility to care for it in return.

185. The Canterbury Regional Policy Statement (CRPS) 2013 (revised 2017) made territorial authorities:

"solely responsible for specifying the objectives, policies and methods for the control of the use of land for the maintenance of indigenous biodiversity on all land outside of wetlands, the coastal marine area, and beds of lakes and rivers"

186. While this new national policy direction must be "given effect to" through the future development of regional policy statements, regional plans, and district plans, consent decision-makers must "have regard to" the relevant provisions of the NPS-IB as soon as it took effect on 4 August 2023.

187. This means that, where activities requiring consent under a District Plan/s would have effects on terrestrial indigenous biodiversity, and those effects are within the discretion of consent decision makers, the policy direction of the NPS-IB is relevant to those decisions, needs to be 'weighed' against other matters in Section 104 of the RMA and carries significant weight (as it post-dates the CRPS and all WDC plans).

188. The sole objective of the NPS-IB is:

"*The objective of this National Policy Statement is:*

a. to maintain indigenous biodiversity across Aotearoa New Zealand so that there is at least no overall loss in indigenous biodiversity after the commencement date; and

b. to achieve this:

i. through recognising the mana of tangata whenua as kaitiaki of indigenous biodiversity; and

ii.by recognising people and communities, including landowners, as stewards of indigenous biodiversity; and

iii.by protecting and restoring indigenous biodiversity as necessary to achieve the overall maintenance of indigenous biodiversity; and

iv. while providing for the social, economic, and cultural wellbeing of people and communities now and in the future."

189. This is informed by 17 general policies which provide direction on how this objective is to be met. I have provided an assessment of the policies I consider relevant below:

Assessment of the NPS-IB	
Policy	**Comment**
Policy 1: Indigenous biodiversity is managed in a way that gives effect to the decision-making principles[2] and takes into account the principles of the Treaty of Waitangi.	In my opinion, the proposal does not align with Policy 1 of the NPS-IB, as it does not ensure meaningful consultation, active participation of tangata whenua, or integration of Māori values into decision-making. The concerns raised by Te Ngāi Tūāhuriri Rūnanga further reinforce that the principles of the Treaty of Waitangi have not been adequately considered. If consent was to be granted, I would strongly recommend that the applicant continue to seek participation from Te Ngāi Tūāhuriri Rūnanga.
Policy 2: Tangata whenua exercise kaitiakitanga for indigenous biodiversity in their rohe, including through: ` *a. managing indigenous biodiversity on their land; and* *b. identifying and protecting indigenous species, populations and ecosystems that are taonga; and* *c. actively participating in other decision-making about indigenous biodiversity.*	Although Iwi have participated via a submission, I am of the opinion the proposal is inconsistent with Policy 2 as iwi will have no further opportunity for active participation in decision making about indigenous biodiversity. If the application is granted, I recommend that further consultation is undertaken with iwi to allow for active participation in the management of the Karetu River and the indigenous biodiversity affected by this proposal.

[2] Consistent with this, the decision-making principles that must inform the implementation of this National Policy Statement are as follows: (a) prioritise the mauri, intrinsic value and wellbeing of indigenous biodiversity: (b) take into account the principles of the Treaty of Waitangi (Te Tiriti o Waitangi): (c) recognise the bond between tangata whenua and indigenous biodiversity based on whakapapa relationships: (d) recognise the obligation and responsibility of care that tangata whenua have as kaitiaki of indigenous biodiversity: (e) recognise the role of people and communities (including landowners) as stewards of indigenous biodiversity: (f) enable the application of te ao Māori and mātauranga Māori: (g) form strong and effective partnerships with tangata whenua.

Policy 3: A precautionary approach is adopted when considering adverse effects on indigenous biodiversity.	The precautionary approach requires avoiding adverse effects where possible and fully understanding risks before approving activities. Given the uncertainties in wetland impacts, lizard habitat effects, and long-term contamination risks, I am of the opinion the proposal is inconsistent with this policy.
Policy 8: The importance of maintaining indigenous biodiversity outside SNAs is recognised and provided for.	The proposal acknowledges the importance of indigenous biodiversity outside SNAs through proposed riparian planting but lacks immediate protective measures. While long-term vegetation cover may improve, short-term biodiversity losses are not fully mitigated, meaning the proposal is inconsistent with Policy 8.
Policy 13: Restoration of indigenous biodiversity is promoted and provided for.	The proposal does not meet Policy 13 because it lacks short-term restoration efforts, delays meaningful restoration for decades, and mischaracterizes remediation as restoration. While some long-term restoration is proposed, the uncertainty around implementation and effectiveness raises concerns.
Policy 15: Areas outside SNAs that support specified highly mobile fauna are identified and managed to maintain their populations across their natural range, and information and awareness of highly mobile fauna is improved.	The proposed site contains one highly mobile fauna being the Karearea. As long as the recommendations from Mr Dean are adopted, I am of the opinion the effects would be less then minor on the Karearea. Therefore, the proposal is consistent with this policy to ensure the population are managed and the awareness of the Karearea is improved. In addition to Mr Dean's recommendation of surveying the site for nesting prior to works, I would recommend a survey of the site and surrounding area over time to continue to provide further information and awareness of the Karearea. For completeness, I note lizards are not classed as highly mobile fauna under the NPS-IB.

190. In my opinion, I consider the proposal is inconsistent with the NPS-IB, particularly with the polices related to tangata whenua participation, precautionary biodiversity management, and restoration efforts. While I acknowledge the proposal does include riparian planting, the lack of immediate protections, incomplete assessments, and reliance on future mitigation results in the application being inconsistent with the NPS-IB.

191. Recommendations for alignment with NPS-IB:

a) Engage with tangata whenua to incorporate their role in decision-making and site management.

b) Adopt a stronger precautionary approach by avoiding biodiversity loss rather than relying on mitigation.

c) Ensure immediate protections for biodiversity outside SNAs.

d) Improve monitoring and reporting on highly mobile fauna and wetland restoration efforts.

e) Strengthen indigenous planting plans with clear weed management and survival rate targets.

Canterbury Regional Policy Statement

192. The Canterbury Regional Policy Statement (RPS) became operative on 15 January 2013 and provides an overview of the significant resource management issues facing the Canterbury Region, including issues of resource management and Ngāi Tahu.

193. An assessment of the objectives and policies which are considered relevant to the proposed activity are detailed below:

<table>
<tr><td colspan="2">Assessment of the CRPS</td></tr>
<tr><td colspan="2">Chapter 9 Ecosystems and Biodiversity</td></tr>
<tr><td>Objective 9.2.1:

Halting the decline of Canterbury’s ecosystems and indigenous biodiversity</td><td rowspan="2">In my opinion the proposal does not meet Objective 9.2.1, as it contributes to the decline of indigenous biodiversity in Canterbury through habitat loss and uncertain mitigation and offsetting. Addressing these gaps would require further survey work, stronger precautionary measures, and habitat restoration.</td></tr>
<tr><td>Objective 9.2.3:

Protection of significant indigenous vegetation and habitats.</td></tr>
<tr><td>Objective 9.3.4:

Promote ecological enhancement and restoration To promote the enhancement and restoration of Canterbury’s ecosystems and indigenous biodiversity, in appropriate locations, where this will improve the functioning and long term sustainability of these ecosystems.</td><td>In my opinion, the proposal does not fully align with Objective 9.3.4 because it focuses on mitigation rather than proactive restoration, and its long-term ecological success is uncertain. While riparian planting and habitat restoration are positive steps, delayed implementation and lack of robust management plans reduce the effectiveness of the proposal in promoting ecosystem sustainability.</td></tr>
<tr><td colspan="2">Chapter 11 Natural Hazards</td></tr>
<tr><td>Objective 11.2.1: Avoid new subdivision, use and development of land that increases risks associated with natural hazards.</td><td>As discussed in the applicant’s assessment and above in my report, the proposal will not increase the risk associated with flooding nor exacerbate the flood risk beyond the application site.

The proposed bridge will be designed in accordance with the Engineering Code of Practice and meet the permitted standards of CRC rules around design standards.

Therefore, I consider the proposal to be consistent with the Natural Hazards chapter.</td></tr>
<tr><td>Chapter 12 Landscape</td><td></td></tr>
</table>

Objective 12.2.2 Identification and management of other landscapes The identification and management of other important landscapes that are not outstanding natural landscapes. Other important landscapes may include: 1. natural character 2. amenity 3. historic and cultural heritage	The applicant is proposing riparian planting to rehabilitate the natural character in terms of landscape values. I acknowledge this is a positive. However, I am still of the opinion the proposal is inconsistent with this objective, as the applicant has not sufficiently managed the cultural aspects of the landscape appropriately as per the submission. I note there are also concerns around the potential impacts on wetlands and water quality from the proposal. However, I defer to CRC, as the experts.
Chapter 13 - Heritage	
Objective 13.2.2 Historic cultural and historic heritage landscapes Recognition that cultural and heritage values are often expressed in a landscape setting and to make provision for the protection of such landscapes from inappropriate subdivision, use and development.	In my opinion, the proposal is inconsistent with Objective 13.2.2, as it threatens a cultural heritage landscape, lacks tangata whenua involvement, and does not include strong protection measures. Without clearer recognition of cultural protection and active engagement with mana whenua, the proposal should provide clearer recognition of cultural protection and active management with mana whenua. I recommend if the consent was granted, mana whenua are provided the opportunity to have ongoing input in the project throughout its lifespan.
Objective 13.3.2 Recognise places of cultural heritage significance to Ngāi Tahu To recognise places of historic and cultural heritage significance to Ngāi Tahu and protect their relationship and culture and traditions with these places from the adverse effects of inappropriate subdivision, use and development.	

Summary

194. Overall, I consider the proposal is inconsistent with the CRPS as the proposal creates tension with the objectives and polices relevant to terrestrial ecology, landscape values and Maori values.

<u>Operative Waimakariri District Plan</u>

195. The objectives and policies of the Waimakariri District Plan that I consider relevant are set out in the following table. In reviewing these provisions, I have also considered the applicant's assessment of these matters, and I have stated where I agree with the Applicant's assessment.

Operative Waimakariri District Plan (2005)	
Chapter 2- Maori	
Objective 2.1.1 Effective and appropriate processes and practices that acknowledge the status of tangata whenua as treaty partner and take into account the principles of the Treaty of Waitangi (Te Tiriti o Waitangi).	The applicant has undertaken an assessment of the iwi management plan and assessed cultural values. However, did not consult iwi directly prior to the site being selected. During the consenting process and submission period Tangata Whenua has provided advice on the proposal. As detailed in this report above, Iwi do not support the proposal due to the proximity of the
Policy 2.1.1.1 In identifying tangata whenua, Te Runanga o Ngai Tahu is recognised as the iwi authority and Te Ngai Tuahuriri as manawhenua.	

	Karetu River, the impact on (and risk to) the cultural landscape, mahinga kai, taonga species and water quality." I note that although the proposal over time may be acceptable to western science, but there still will remain the issue of the cultural landscape and spiritual aspects to the water quality and taonga species that may not be recognised. If consent is to be granted, I strongly recommend that ongoing consultation is provided as a requirement in the consent conditions, to ensure iwi have the chance to provide their expertise and input in the management of the landfill over its lifetime, to ensure manawhenua and kaitiakitanga is recognised throughout the life span of the proposed landfill and the closure and after care. I am of the opinion the proposal is contrary to the objectives and policies of the Maori chapter.
Policy 2.1.1.2 Provide for the participation of tangata whenua in the management of the District's natural and physical resources.	
Objective 2.1.2 Recognition and provision for the manawhenua concept and practice of kaitiakitanga in the management of natural and physical resources.	
Policy 2.1.2.1 To have particular regard to manawhenua and spiritual kaitiakitanga in the management of natural and physical resources.	
Objective 2.1.3 Recognition and protection of wahi taonga that is culturally, spiritually and/or physically important to Ngai Tuahuriri.	
Policy 2.1.3.2 Avoid, remedy or mitigate adverse effects on the cultural and traditional values associated with wahi taonga identified in this District Plan.	
Objective 2.1.4 Recognition of the importance of mahinga kai to Ngai Tuahuriri and provision for protection of associated resources and access to them	
Policy 2.1.4.1 Enable the enhancement of mahinga kai and surrounding taonga, consistent with the principles of kaitiakitanga, to provide a sustainable resource that meets the needs of future generations.	
Chapter 3 Water	
Objective 3.3.1 Maintain and enhance the water quality of confined and unconfined groundwater aquifers.	I have reviewed the CRC planning officers report and technical experts on groundwater. I am of the opinion that there remains uncertainty around maintaining groundwater quality in the long term. Therefore, I consider the proposal to be inconsistent with this objective. However, I do defer to CRC assessment as the authority over groundwater.
Policy 3.3.1.1 Avoid or mitigate the adverse effects of the use, development and protection of land on the water quality of confined and unconfined groundwater aquifers.	
Objective 3.4.1 Public access to and along the rivers of the Waimakariri District is maintained or enhanced.	The applicant considers the proposal is not inconsistent with these objectives and policies. I disagree with the Applicant, as there is no public access provided to the Karetu River via the paper road and the applicant has not proposed any other alternative access. As a result, public
Policy 3.4.1.1 Maintain and enhance public access to and along rivers of the District where access does	

not conflict with conservation values, the legal rights of private property owners and public safety.	access is not maintained and the applicant has no lawful right to block access, currently. Overall, I consider the proposal will be inconsistent with this objective and policy.
Chapter 4 - Land and Water Margins	
Objective 4.1.1 Maintain and enhance the life-supporting capacity of the land resource in the District. Policy 4.1.1.1 Promote sustainable land management practices that avoid or mitigate environmental impact such as soil loss, soil structure deterioration, soil nutrient depletion, land contamination, and non-point pollution of waterways. Policy 4.1.1.3 Land use activities should avoid, remedy, or mitigate adverse effects on environments susceptible to degradation such as river and stream margins, aquatic habitats, wetlands, coastal dunes, areas of significant indigenous vegetation and significant habitat of indigenous fauna.	As detailed in the CRC report, the landfill design is adequate in the short term to ensure contaminants being placed in the land are managed appropriately. However, in the long term, questions remain around how the contaminants will be manged without causing adverse effects on the Karetu River. I acknowledge the site is an existing quarry so the soil quality and structure are already compromised, and the proposal is an appropriate use of the land. However as discussed in this report, the effects on cultural values are a significant concern and there remains uncertainty around the management of lizards. Further, non-point source pollution of the waterway may not be able to be avoided or mitigated in the long term as discussed in the CRC reports (which I defer to, for the assessment of aquatic habitats and water quality). The site is surrounded by SNA, Wetlands, and the Karetu River and the proposal does not promote sustainable land management practices. The applicant has not provided significant offsetting or compensation for the proposed activity. The contaminants will be everlasting which have been detailed in Ms Nagy's report and Dr Massey from CRC. For the above reasons, I am of the opinion the proposal is inconsistent with this objective and policies.
Chapter 6 - Indigenous Vegetation Fauna and Habitats	
Objective 6.1.1 Safeguard indigenous biological diversity and ecosystem integrity, and recognise and provide for the protection of significant indigenous vegetation and significant habitats of indigenous fauna.	While some mitigation measures are proposed, the proposal does not provide sufficient certainty that the project will safeguard biodiversity and maintain ecosystem integrity. The disturbance of wetlands, lizard habitats, and native vegetation suggests that the proposal is inconsistent with Objective 6.1.1.

Policy 6.1.1.1 Identify areas of significant indigenous vegetation and significant habitats of indigenous fauna.	Stronger conditions, such as additional conservation commitments, habitat restoration, and stricter monitoring requirements, would be required to align more closely with this objective and policy. The proposed project does not strongly align with Policy 6.1.1.1 in terms of preserving significant indigenous habitats but includes mitigation strategies to compensate for the potential loss of biodiversity. As detailed in Ms Tocher's report, the proposal is lacking in Lizard Management. In addition, as detailed in Mr Rate and Ms Nagy's reports, concerns remain around wetland management. Therefore, I am of the opinion the proposal is inconsistent with this objective and polices.
Policy 6.1.1.4 Avoid or remedy adverse effects of activities on the ecological integrity of areas of significant indigenous vegetation and significant habitats of indigenous fauna including vegetation and habitat sites identified in the District Plan.	
Policy 6.1.1.5 Avoid, remedy or mitigate the adverse effects of activities on the intrinsic values of indigenous ecosystems, including effects on: a. integrity, form, functioning and resilience; and b. indigenous vegetation, habitats and indigenous fauna.	In my opinion, the proposal is inconsistent at this stage with Policy 6.1.1.5, as it does not avoid or adequately remedy ecosystem impacts. While some mitigation is proposed, it is reactive rather than proactive, and biodiversity losses remain likely due to incomplete assessments and uncertain restoration efforts.
Policy 6.1.1.6 Maintain and enhance the ecological integrity of vegetation and habitat sites identified in the District Plan and the attributes which make them significant.	The proposal is inconsistent with Policy 6.1.1.6, as it does not fully protect or enhance significant vegetation and habitat sites. There is insufficient information on lizard habitat impacts, uncertain mitigation outcomes, and a lack of proactive ecological enhancement measures. I do acknowledge the applicant has proposed riparian planting and other mitigation, however further details are required to understand if its just mitigation or its offset to provide positive effects to the environment.
Objective 6.2.1 Maintain, enhance and, where appropriate, restore wetland ecosystems.	After reviewing Mr Rate's evidence, I am of the opinion that there is uncertainty around the effects on the lower wetland from the proposal and that further thought is required around how the wetland will be maintained and the ecological integrity safeguard. Therefore, I am of the opinion the proposal is inconsistent with this objective and policy.
Policy 6.2.1.1 Safeguard the ecological integrity and natural functioning of wetlands.	
Chapter 8 - Natural Hazards	
Objective 8.2.1 The community's desired level of protection from flood events is achieved through an appropriate combination of measures to modify the level of	As discussed in the applicant's assessment and above in my report, the proposal will not increase the risk associated with flooding nor exacerbate the flood risk beyond the application site.

flooding, modify susceptibility to damage and deal with the consequences of floods. Policy 8.2.1.2 In areas identified in the District Plan as having a history of localised flooding, and in areas adjacent to water bodies, give specific consideration to the consequences and probability of flooding at the time of subdivision or land use consent, to avoid or mitigate a flood hazard. Policy 8.2.1.4 Avoid, remedy, or mitigate the adverse effects of activities that impede or redirect the movement of floodwater on a site, and/or exacerbate flood risk.	The proposed bridge will be designed in accordance with the Council's Engineering Code of Practice and will meet the permitted design standards of CRC rules. Therefore, I consider the proposal to be consistent with the Natural Hazards chapter.
Chapter 11- Utilities and Traffic Management	
Policy 11.1.1.5 New developments and activities in relation to their traffic generation characteristics should: a. locate on or establish primary access to an appropriate level of road within the road hierarchy; b. not have vehicular access to an inappropriate level of road in the hierarchy; and c. provide cycleways along arterial, strategic and collector roads where: i. necessary to provide an identified transport or recreation function; and ii. alternative opportunities do not exist within the road hierarchy.	The connection of the proposed activity, including utilisation of the roading network has been highlighted including the need to address impacts on the network. This includes the need to maintain or enhance the community's social, economic and cultural wellbeing, and its health and safety with regards to the network. Mr Gregory has determined that the transport network can accommodate the number of vehicle movements associated with the proposed activity but that specific measures will be required at various points. I consider that, with the recommendations proposed by Mr Gregory, the application is consistent with this policy.
Chapter 12 - Health Safety and Wellbeing	
Objective 12.1.1 Maintain the amenity values and a quality of environment appropriate for different parts of the District which protects the health, safety and wellbeing of present and future generations, and ensure that any potential adverse environmental effects from buildings and structures, signs, glare, noise and hazardous substances are avoided or mitigated. Policy 12.1.1.5	These provisions seek to maintain amenity values and the characteristics that impact the amenity values of an area. This includes the effects of structures, noise and hazardous substances. Recognition needs to be given to the existing amenity of the area which includes an operational quarry and as such the character of the site is different to that of an undeveloped site.

In the Rural Zones maintain the amenity values and quality of the environment by ensuring that the land is not dominated by dwellinghouses.	
Policy 12.1.1.10 Control noise to a level that is not unreasonable, measured against the character and circumstances of the zone. Policy 12.1.1.11 Avoid noise adversely affecting the amenity values and health and safety of people on neighbouring sites or zones.	The Applicant has provided a noise assessment and the proposal will comply with the permitted noise rules of the operative district plan. I am of the opinion noise from the site will not be unreasonable and will not be out of character for the zone. Therefore, I am of the opinion that the proposal is consistent with the objective and policies.
Objective 12.1.3 Protect people, vegetation, animals, and other natural and physical resources, from the adverse effects resulting from the discharge of contaminants to air. Policy 12.1.3.1 Locate and/or design activities, that lead to the discharge of contaminants to air, so that any adverse effects on people, vegetation, animals and/or other natural and physical resources are avoided or mitigated.	I defer to the CRC planning officer in relation to air discharge. I have reviewed CRC technical expert evidence and relying on that assessment, I am of the opinion that the proposal is consistent with this objective.
Chapter 14 - Rural	
Objective 14.1.1 Maintain and enhance both rural production and the rural character of the Rural Zones, which is characterised by: a. the dominant effect of paddocks, trees, natural features, and agricultural, pastoral or horticultural activities; b. separation between dwellinghouses to maintain privacy and a sense of openness; c. a dwellinghouse clustered with ancillary buildings and structures on the same site; d. farm buildings and structures close to lot boundaries including roads; e. generally quiet – but with some significant intermittent and/or seasonal noise from farming activities; f. clean air – but with some significant short term and/or seasonal smells associated with farming activities; and g. limited signage in the Rural Zone.	The applicant has detailed that the existing site comprises a limestone quarry which has existed since circa 1950's and has stated that: *"Upon completion of the landfilling activity the site will be capped and revegetated to be suitable for light livestock grazing (i.e sheep) or for ecological purposes consistent with the adjacent SNA.* *The proposal will enhance both rural production and the rural character of the zone.* *During construction activity / operation, nuisance activities (noise / dust) will not compromise the rural amenity character which has been informed by relevant technical assessments.* *The odour generation risk of the inert waste accepted is negligible and will not be detected off site."* I disagree with the Applicant that the proposal will enhance the rural character, however, I agree that the proposal is consistent with the rural zone character.

Policy 14.1.1.3 Maintain and enhance the environmental qualities such as natural features, air and noise levels, including limited signage and rural retail activities that contribute to the distinctive character of the Rural Zones, consistent with a rural working environment.	I am of the opinion the proposal is inconsistent with this policy due to the potential effects it could have on natural features surrounding the site, including cultural features such as the Karetu River and the terrestrial ecology within and surrounding the site. Therefore, the proposal would not maintain the local environmental qualities.

Summary – Operative District Plan Objectives and Policies

196. Overall, I am of the opinion the proposal is consistent with the zone and traffic objectives and policies. However, there is tension with the objectives and policies relating to ecology, water, land and water margins and significant tension with Māori objective and polices.

197. Therefore, I am of the opinion the proposal is inconsistent with the Waimakariri District Plan 2005.

Proposed Waimakariri District Plan

198. The Proposed Waimakariri District Plan 2021 sets out Objectives and Policies for uses across the District. I have undertaken a review of the objectives and policies of the Proposed Plan. I consider the following Objectives and Policies from the Proposed District Plan are key to my final recommendation and the decision makers decision.

Proposed Waimakariri District Plan (Post Hearing)	
SD - Rautaki ahunga - Strategic Directions	
SD-O1 **Natural environment** Across the District: 1. there is an overall net gain in the quality and quantity of indigenous ecosystems and habitat, and indigenous biodiversity; 2. the natural character of the coastal environment, freshwater bodies and wetlands is preserved or enhanced, or restored where degradation has occurred; 3. outstanding natural features and outstanding natural landscapes are identified and their values recognised and protected; 4. people have access to a network of natural areas for open space and recreation, conservation and education, including within riparian areas, the coastal environment, the western ranges, and within urban environments; and 5. land and water resources are managed through an integrated approach which recognises the importance of ki uta ki tai to Ngāi Tahu and the wider community, and the inter-relationships between	I am of the opinion the proposal is contrary to SD-01 for the following reasons: a) There will potentially be short-term loss of ecosystems, habitat and indigenous biodiversity during construction of the landfill and operation. b) The natural character of freshwater bodies and wetlands will not be preserved, enhanced or restored. c) The land being used is crown land and public access restricts anyone else from using the road reserve to access the Karetu River. d) An integrated approach which recognises the importance of ki uta ki tai to Ngāi Tahu and the wider community, and the inter-relationships between ecosystems, natural processes and with freshwater has not fully occurred.

ecosystems, natural processes and with freshwater.	
SD-O4 **Rural land** Outside of identified residential development areas and the Special Purpose Zone (Kāinga Nohoanga), rural land is managed to ensure that it remains available for productive rural activities by: 1. providing for rural production activities, activities that directly support rural production activities and activities reliant on the natural resources of Rural Zones and limit other activities; and 2. ensuring that within rural areas the establishment and operation of rural production activities are not limited by new incompatible sensitive activities.	I am of the opinion the proposal is consistent with SD-04 as the site has been an established quarry for over 60 years, and the proposal will not remove any active rural production land from use. In addition, the Applicant will, in the long term, restore the site to a rural environment which will be consistent with the rural environment.
SD-O5 **Ngāi Tahu mana whenua/Te Ngāi Tūāhuriri Rūnanga** Te Ngāi Tūāhuriri Rūnanga's role in the management of natural and physical resources is recognised, so that: 1. Ngāi Tūāhuriri's historic and contemporary connections, and cultural and spiritual values, associated with the land, water and other taonga are recognised and provided for; 2. the values of identified sites and areas of significance to Ngāi Tūāhuriri are protected; 3. Ngāi Tūāhuriri can retain, and enhance access to sites of cultural significance; 4. Māori land is able to be occupied and used by Ngāi Tūāhuriri for its intended purposes and to maintain their relationship with their ancestral land; 5. recognised customary rights are protected; 6. Ngāi Tūāhuriri are able to carry out customary activities in accordance with tikanga; and 7. Te Ngāi Tūāhuriri Rūnanga are able to actively participate in decision-making and exercise kaitiakitanga.	In my opinion, the proposal is contrary with the Ngāi Tahu Mana Whenua / Te Ngāi Tūāhuriri Rūnanga objective due to: 1. Lack of support from mana whenua, and not further requirment to cosult which prevents meaningful long term input. 2. Potential harm to cultural landscapes and water bodies, including significant sites for customary fishing and mahinga kai. 3. Failure to adequately protect kaitiakitanga. Ngāi Tūāhuriri strongly opposes the proposal due to its long-term cultural and environmental risks, indicating that the proposal does not meet the objective's intent.
TRAN - Ranga waka - Transport	
TRAN-O4 **Effects of activities on the transport system** Adverse effects on the District's transport system from activities, including reverse sensitivity, are avoided, remedied or mitigated.	I agree with the applicant that the proposal will be consistent with this objective and policies. As detailed above, in the Operative District Plan assessment, the connection of the proposed activity, including utilisation of the roading network has been highlighted including the need to address impacts on the network. This
TRAN-P4 **New activities**	

New activities: 1. locate on or establish primary access to the classification of road within the District Plan road hierarchy best able to accommodate the level and type of traffic generated; 2. provide safe entry and exit for vehicles to and from a site to a road without compromising the safety or efficiency of the road corridor or rail corridor; 3. where a site has two or more road frontages, provide access from the classification of road within the District Plan road hierarchy best able to accommodate the level and type of traffic generated; 4. provide safe and efficient access, including ease of access by service and emergency service vehicles; and 5. provide facilities for safe active transport, including through marked on-road cycle lanes, separated cycle lane, sealed road shoulders with sufficient width to safely accommodate cyclists, off-road formed cycle paths, cycling end-of-journey facilities for staff, shared use path and footpaths.	includes the need to maintain or enhance the community's social, economic and cultural wellbeing, and its health and safety with regards to the network. Mr Gregory has determined that the transport network can accommodate the number of vehicle movements associated with the proposed activity but that specific measures will be required at various points. I consider, with the recommendations adopted by Mr Gregory, that the application is consistent with the objective and policies.
TRAN-P15 **Effects of activities on the transport system** Ensure, to the extent considered reasonably practicable, that other activities do not compromise the safe and efficient operation, maintenance, repair, upgrading or development of the transport system, including through: 1. managing access to the road corridor, and activities and development adjacent to road/rail level crossings, particularly where it is necessary to achieve protection of the safe and efficient functioning of the transport system, including those parts of the transport system that form part of critical infrastructure, strategic infrastructure and regionally significant infrastructure; 2. avoiding, remedying or mitigating adverse reverse sensitivity effects on the transport system; and 3. providing for ease of access for service and emergency service vehicles.	
HS - Matū mōrearea - Hazardous Substances	
HS-O1 **Hazardous substance use, storage and disposal**	I defer to CRC in relation to hazardous substances (e.g. the landfill design leachate ponds).

Hazardous substance use, storage and disposal activities are located, and in the case of flood events, managed, so that: 1. risk to people, property and the environment from any major hazard facility is minimised, including avoiding unacceptable risk to sensitive activities; 2. risk to any sensitive area is minimised; and 3. risk to land and water as a result of flood events is minimised.	
SASM - Ngā whenua tapu o ngā iwi - Sites and Areas of Significance to Māori	
SASM-O1 **Ngā tūtohu whenua** The historic and contemporary cultural significance for Ngāi Tūāhuriri mana whenua, of and their relationship with ancestral lands, water, sites, wāhi tapu, wāhi taonga and coastal environment is recognised and provided for.	The proposal does not align with SASM-P5, as it fails to adequately protect culturally significant waterbodies and Ngāi Tūāhuriri customary uses. The opposition from Ngāi Tūāhuriri, risks to wetland health, and failure to integrate cultural values into design decisions all contribute to a high potential for negative cultural and environmental impacts.
SASM-P5 **Ngā Wai** Recognise the cultural significance of the waterbodies, repo/wetlands and those parts of the coastal environment identified as Ngā Wai, and manage the effects of land uses, and activities on the surface of water, to: 1. protect the health of these waterbodies and associated coastal waters, including by maintaining their natural character where it is high and enabling enhancement where it is degraded, including through the reinstatement of original water courses where practicable; 2. recognise historic and contemporary Ngāi Tūāhuriri customary uses and values associated with these waterbodies and coastal waters and enhance opportunities for customary use and access; 3. ensure any land uses adjoining these sites, or structures and activities on the surface of water do not adversely affect taonga species or Ngāi Tūāhuriri customary uses in these areas; 4. ensure new land uses do not create an additional demand for the discharge of sewage or stormwater directly into Ngā Wai, and where the opportunity arises, reduce the need for existing land uses to discharge untreated wastewater or stormwater into these areas; 5. protect the health, natural functions and processes of riparian margins and the coastal environment from the adverse effects of adjoining land use activities; and 6. provide for opportunities for the recognition of cultural values within the design, location and installation of infrastructure, while enabling their safe, secure and efficient installation.	

ECO - Pūnaha hauropi me te rerenga rauropi taketake - Ecosystems and indigenous biodiversity	
ECO-O1 **Ecosystems and indigenous biodiversity** Overall, there is an increase in indigenous biodiversity throughout the District, comprising: 1. protected and restored SNAs; and other areas of indigenous vegetation and habitat of indigenous fauna that are maintained or enhanced.	The project does not fully align with ECO-O1 due to its initial biodiversity loss and uncertainty regarding mitigation effectiveness. While long-term restoration efforts are proposed, they do not offset the immediate ecological damage, meaning there is no immediate net gain in indigenous biodiversity.
ECO-P4 Maintenance and enhancement of other indigenous vegetation and habitats Maintain and enhance indigenous vegetation and habitats of indigenous fauna that do not meet the significance criteria in ECO-APP1 by: 1. continuing to assess the current state of indigenous biodiversity across the District; 2. restricting indigenous vegetation clearance or modification of habitat of indigenous fauna, by recognising that indigenous vegetation within: a. the Lower Plains Ecological District and High Plains Ecological District has been widely destroyed, fragmented and degraded by land use and pests and therefore clearance of any remaining indigenous vegetation needs to be restricted in order to protect what remains; and b. the Oxford Ecological District, Torlesse Ecological District and Ashley Ecological District, has a larger proportion of indigenous vegetation remaining and therefore some clearance of indigenous vegetation may be acceptable; 3. recognising that the District contains species that are threatened, at risk, or reach their national or regional distribution limits in the District, and naturally uncommon ecosystems, and limiting their clearance; 4. providing information, advice and advocacy to the landowner and occupier; 5. supporting and promoting the use of covenants, reserves, management plans and community initiatives; and 6. working with and supporting landowners the Regional Council, the Crown, the QEII National Trust, NZ Landcare Trust and advocacy groups.	The project partially aligns with ECO-P4, as it includes vegetation restoration and habitat protection measures, but it still results in significant short-term habitat loss. Stronger commitments to ecological partnerships and stricter vegetation clearance controls would improve alignment with the policy.
ECO-P5 Offsetting residual effects A biodiversity offset will only be considered where there are residual adverse effects which cannot practicably be avoided, remedied or mitigated (in that order of hierarchy); and: 1. the biodiversity offset is consistent with ECO-APP2; 2. the biodiversity offset will recognise the limits to offsets due to irreplaceable and vulnerable biodiversity (including effects that must be avoided in accordance with ECO-P7 (1));	The proposal does not align with ECO-P5, as it fails to demonstrate that offsets will provide a true net gain in biodiversity.

3. there is a strong likelihood that the offsets will be achieved in perpetuity; and 4. the biodiversity offset will achieve a net gain of indigenous biodiversity if the area contains any of the following: a. indigenous vegetation in land environments where less than 20% of the original indigenous vegetation cover remains; b. areas of indigenous vegetation associated with sand dunes and wetlands; c. areas of indigenous vegetation located in 'originally rare' terrestrial ecosystem types not covered under (a) and (b) above; or habitats of threatened, and at risk, indigenous species.	
NATC - Āhuatanga o te awa - Natural Character of Freshwater Bodies	
NATC-O1 **Preservation of natural character** The preservation of the natural character of the surface freshwater environment, its wetlands, and lakes and rivers and their margins. **NATC-O2** **Restoration of natural character** Restoration of the natural character of surface freshwater bodies and their margins where degradation has occurred. **NATC-O3** **Use of freshwater body margins** The use of wetlands, and lakes and rivers and their margins are managed to preserve their natural character.	As detailed in Ms Crawford's report, the Karetu River margins are degraded currently. The applicant is proposing riparian planting along the river margins. This will contribute to restoring the natural character of the river, however further plans are required to understand the extent of the restoration of the Karetu River margins. The proposal seeks to restore the physical aspect of the river margins. However, the objectives also discuss the full surface freshwater environment. This also includes mahinga kai, water quality, and other cultural values the river has to Iwi. Therefore, I defer to CRC in relation to water quality and wetlands, where I understand there remain concerns. Iwi have raised significant concerns around cultural landscape and the freshwater impact for the proposal Overall, I am of the opinion the proposal is inconsistent with the natural character objectives.
NATC-P1 **Recognising natural character** Recognise the following natural elements, patterns, processes and experiential qualities which contribute to the natural character values of freshwater bodies: 1. freshwater bodies and their margins in their natural state or close to their natural state;	The proposal does not meet NATC-P1 because it: a) Impacts indigenous biodiversity and wetland ecosystems. b) Does not adequately incorporate Ngāi Tūāhuriri cultural values.

2. freshwater landforms and landscapes, biophysical, geologic and morphological aspects; 3. hydrological and fluvial processes, including erosion and sedimentation; 4. indigenous biodiversity, habitats and ecosystems; 5. water flow and levels, colour and clarity, and water quality; 6. the cultural values of the water body to Ngāi Tūāhuriri, including values associated with traditional and contemporary uses and continuing ability of the freshwater body to support taonga species and mahinga kai activities; and 7. the experience of the above elements, patterns and processes.	c) Concerns have been raised from CRC experts around water quality. To improve alignment, the proposal must include stronger commitments to restoring freshwater habitats and enhancing cultural values.
NATC-P3 **Customary harvesting and Ngāi Tūāhuriri values within the freshwater body and their margins** Recognise the cultural significance of wetlands, lakes and rivers and their margins, to mana whenua, and manage the effects of land use activities through limiting the size, visual appearance, and location, to ensure they do not adversely affect taonga species, mahinga kai or customary harvesting, access, and other cultural values.	The proposal is inconsistent with this policy as it does not recognise and protect Ngāi Tūāhuriri customary values as detailed in their submission.
NATC-P5 **Structures within surface freshwater body setbacks** Enable activities that have a functional need or operational need to be located within the freshwater body setbacks, provided that adverse effects on natural character values are avoided, remedied or mitigated.	I am of the opinion the bridge has a functional to be in the proposed location, for safe access to the site during rainfall events and to stop vehicles driving through the river. I agree with the Applicant that the bridge provides positive outcomes. Ms Crawford has also detailed that the natural character of the Karetu River would be enhanced with the bridge being constructed. Therefore, I consider the proposed bridge is consistent with this policy.
NATC-P6 **New and existing structures within and over freshwater bodies** Provide for new structures, and upgrades to existing structures, on the surface of freshwater where: 1. public access to, and along, the freshwater body is maintained; 2. the structure has a functional need or operational need to be located on the surface of freshwater; 3. the structure does not compromise the use of the surface of freshwater for existing users; 4. the structure does not disturb the habitat of indigenous species or hinder passage of migratory fish species; 5. the structure avoids creating new, or exacerbating existing natural hazards, or river or stream bank erosion; and	The single span bridge will be designed appropriately, will replace the existing ford crossing, and provide more secure and safer access for vehicles and persons, especially at times of higher flood flows. However, the bridge and security fencing will restrict public access to the river. In terms of cultural values, works will be undertaken in the river margins impacting the Karetu River. Therefore, I consider that the proposal is inconsistent with this policy. I recommend the security gate is relocated to the landfill side of the

6. any adverse effects to the natural character and cultural values, associated with freshwater bodies are avoided, remedied or mitigated in order to preserve those values.	bridge to enable public access to the river, or that alternative access is provided.
PA - Tomonga mārea - Public Access	
PA-O1 **Provision of public access** Public access to and along the CMA, water bodies, and to reserves with high recreational, scenic or amenity values is provided for, maintained and enhanced, where this does not create adverse effects to natural character, landscape, indigenous biodiversity, cultural or recreational values, health and safety, or the rights of private property owners.	The proposal does not align with PA-O1 and PA-P1, as it restricts public access to the Karetu River and does not provide for the maintenance or enhancement of access. This creates negative effects on recreational users and Ngāi Tūāhuriri cultural access. Therefore, I am of the opinion the proposal is inconsistent with Public Access objective and polices.
PA-P1 **Maintaining and enhancing public access** Maintain and enhance existing public access to and along the CMA, surface freshwater bodies, and reserves by managing the adverse effects of activities and development, where these would limit public access, or compromise the use or enjoyment of these areas.	
EW - Ketuketu whenua - Earthworks	
EW-O1 **Earthworks** Earthworks are undertaken in a way that minimises adverse effects on amenity values, cultural values, property, infrastructure and the health and safety of people and the environment.	The project partially aligns with EW-O1 and P1 as I acknowledge the visual amenity, noise, vibration and natural hazards effects will be mitigated and/or avoided. However, the proposal does not adequately minimise risks to cultural values, and ecological health. Stronger commitments to erosion control, sediment retention, and cultural engagement are needed to meet the objective and policy.
EW-P1 Enabling earthworks Enable earthworks where they: 1. are compatible with the character, values and qualities of the location and surrounding environment; 2. avoid, remedy or mitigate any adverse effects on any sites or areas identified as ONL, ONF, SAL, Coastal Environment Overlay, SNA, sites and areas of significance to Māori, Natural Open Space Zone, surface freshwater bodies and their margins, or any notable tree, historic heritage or heritage setting; 3. minimise erosion and avoid adverse effects from stormwater or sediment discharge from the site; 4. avoid increasing the risk to people or property from natural hazards; 5. maintain the stability of land including adjoining land, infrastructure, buildings and structures; 6. minimise the modification or disturbance of land, including any associated retaining structures, on the visual amenity values of the surrounding area; and 7. minimise adverse dust, vibration and visual effects beyond the site.	

EW-P5 **Rehabilitation** Require site rehabilitation during or immediately following the completion of earthworks activity to: 1. minimise adverse effects on amenity values, natural values, cultural values, quality of the surrounding environment and the future use of the site, and 2. encourage rehabilitation that incorporates ecological enhancement and habitat for indigenous fauna and the use of locally sourced indigenous vegetation.	The project partially meets EW-P5, as it includes rehabilitation efforts but lacks certainty on immediate ecological restoration and long-term success. To be consistent, the plan should: • Ensure rehabilitation starts immediately after earthworks. • Strengthen long-term maintenance of restored habitats. • Provide specific monitoring and success criteria to track ecological recovery. • Provide for cultural values.
EW-P6 **Water resources** Avoid adverse effects of earthworks on ground and surface water bodies that could result in water contamination and adverse effects on mahinga kai.	In my opinion the proposal is currently inconsistent with EW-P6, as it does not adequately address long-term risks of water contamination and potential adverse effects on mahinga kai.
NOISE - Te orooro	
NOISE-O1 **Adverse noise effects** Noise does not adversely affect human health, communities, natural values and the anticipated amenity values of the receiving environment.	After undertaking a review of the site and the applicant's noise assessment, I consider noise will be appropriately managed. Therefore, I consider the proposal is consistent with this objective.
RURZ - General Objectives and Policies for all Rural Zones	
RURZ–O1 Rural Environment An environment with a predominant land use character comprising primary production activities and natural environment values, where rural openness dominates over built form, while recognising: 1. the east of the District has a predominant character of small rural sites with a pattern of built form of residential units and structures at more regular intervals at a low density compared to urban environments; and 2. the remainder of the District, while having a range in the size of rural sites, has a predominant character of larger rural sites with a corresponding density of residential units and built form.	The predominant land use character of the rural environment will be retained. The built form will not change significantly with the final product resulting in remediation of the site to its likely former rural character. The proposed activities have a functional need to be located within a rural zone. Noise, odour and traffic will be managed appropriately and there will be no density issues related to the proposal. Therefore, I agree with the applicant that the proposal is consistent with the objective and policies for the rural zone.
RURZ–O2 **Activities in Rural Zones** Rural Zones support primary production activities, activities which directly support primary production, and activities with a functional need to be located within Rural Zones.	
RURZ–P1	

Amenity values and character Recognise the contribution of amenity values to maintaining the character of the zones, and maintain amenity values in Rural Zones by: 1. requiring separation between buildings on adjoining properties to maintain privacy and a sense of openness; 2. retaining generally low levels of signs, noise, traffic, odour, outdoor lighting, and built form from activities while recognising that in association with primary production and rural industry, which are part of the character of each rural zone that: a. there may be seasonal, short term or intermittent odour, noise, dust, traffic and outdoor lighting effects; and b. large buildings may have a functional need. 3. restricting the density of residential units and minor residential units that can be established on a site consistent with the character of each rural zone, unless a development right has been protected through a legacy provision or is associated with a bonus allotment.	
RURZ–P2 Rural land Maintain the availability and life supporting capacity of land in recognition of its importance for undertaking primary production, and to maintain or enhance natural environment values in Rural Zones, including by: 1. providing for primary production activities; 2. providing for those activities that directly support primary production, or those activities with a functional need to be located within Rural Zones, where: a. adverse effects on soil and highly productive land are minimised; b. the amenity values and character of Rural Zones are maintained; and c. to the extent practicable, adverse effects are internalised within the site where an activity is being undertaken. 3. ensuring subdivision and subsequent development is managed so that it does not foreclose the ability for rural land to be utilised for primary production activities including not diminishing the potential for rural land to meet the reasonably foreseeable needs of future generations.	
RURZ–P6 **Industrial activity** In relation to industrial activity: 1. provide for rural industry where the scale of the activity is compatible with the character and amenity values of the rural zone; 2. limit the establishment of industrial activity (other than rural industry) to circumstances where:	The applicant has detailed: *'The locating of the proposal within an industrial zoning is not considered reasonable with a rural location being most appropriate.*

a. there is no reasonable and available site for the activity within any Industrial Zones; b. amenity values and character of the Rural Zones can be maintained; c. the scale of the industrial activity is such that it will not affect the availability of highly productive land within the zone to be used for primary production, to the extent that the productive potential of rural land to meet the reasonably foreseeable needs to future generations is undermined; and d. the nature, scale and degree of permanent changes that will occur on the land and soil resources on the site where the activity is located is minimised. 3. ensure that any rural industry or other industrial activity does not limit or constrain the operation of any existing primary production activity in the zone, and does not have adverse effects on any sensitive activity; 4. provide for existing large-scale industrial activities outside of urban environments where these are well established and have been in continuous industrial use, in order to recognise their existing environmental effects; and 5. to the extent practicable, manage adverse effects of rural industry or other industrial activity so that they are internalised within the site and any adverse effects not internalised are minimised.	*It is considered that the proposal will maintain the amenity values and character of the surrounding rural receiving environment. Positive effects will occur at the conclusion of the activity being derived from the return of the current quarry use to a more natural form more consistent with surrounding land.* *The location is not assessed as highly productive land with the site comprising an open quarry landscape which has existed for circa 60 years'.* I agree with the Applicant's assessment that the proposal is consistent with this policy.
RURZ–P8 **Reverse sensitivity** Minimise the potential for reverse sensitivity effects by: 1. avoiding the establishment of any new sensitive activity near existing intensive indoor primary production activities, intensive outdoor primary production activities, waste management facilities, quarrying activities, mining activities, and rural industry in circumstances where the new sensitive activity may compromise the operation of the existing activities; 2. managing the establishment of new sensitive activities near other primary production activities; 3. ensuring adequate separation distances between existing sensitive activities and new intensive indoor primary production activities, intensive outdoor primary production activities, quarrying activities, mining and rural industry; and avoiding quarry, landfill, cleanfill area, mining activities adjacent to urban environments where the amenity values of urban environments would be diminished.	The applicant has detailed adequate separation distances are afforded to the activity at the site, to ensure effects are minimised on sensitive activities in the surrounding area. Technical assessments have informed nuisance related effects including noise. I agree with the applicant's assessment and consider the proposal to be consistent with this policy.
GRUZ-O1 **Purpose of the General Rural Zone** Natural and physical resources and primary production activities which contribute to the District's rural	The provisions recognise and provide for activities which contribute to the district's rural productive economy while also maintaining the character of the zone.

productive economy dominate while fragmentation of land into small rural parcels is restricted. **GRUZ–P1** **Character of the General Rural Zone** Maintain the character in the General Rural Zone which comprises: 1. primary production being the predominant land use; 2. a dominance of open space and vegetation, including paddocks, trees, agriculture and natural elements over buildings; 3. a landscape strongly influenced by patterns and processes of human activity associated with primary production, with a focus of open farmland areas and larger scale primary production activities, along with areas with natural environment values and sites and areas of significance to Māori; 4. separation between residential units and farm buildings on adjoining sites, with an overall low density of residential units and buildings; and 5. contrasts with urban environments through having a general absence of the type and scale of infrastructure and built form found in urban environments.	In this instance, the activity will establish within an existing quarry, there will be no loss of productive land and the character of the site will be maintained including a landscape influenced by patterns and processes of human activity, but it is recognised that the site will not be dominated by vegetation, trees and natural elements. For the above reasons, it is considered that the proposal is not inconsistent with the above provisions, but neither is it supported by the provisions.

Summary – Proposed District Plan Objectives and Policies

199. Overall, the proposal is consistent with the zone and traffic objectives and policies however there is tension with the ecology, water, land and water margins and significant tension with Māori objective and polices. Therefore, I am of the opinion the proposal is inconsistent with the Proposed Waimakariri District Plan 2021.

Weighting Assessment

200. In my view, there is no tension between the objectives and policies of the Proposed and Operative District Plans. The two plans have clear objectives and policies that the proposal is inconsistent with, being Māori values, ecology, water, access to Karetu River, and land and water margins.

PART 2 OF THE RESOURCE MANAGEMENT ACT 1991

201. Following the guidance of *RJ Davidson Family Trust v Marlborough District Council* [2018] I must consider whether it is necessary to resort to Part 2 in order to determine this application. The Court of Appeal has clarified how to approach the assessment of "subject to Part 2" in section 104(1). In R J Davidson, the Court of Appeal found that (in summary):

a) Decision makers must consider Part 2 when making decisions on resource consent applications, where it is appropriate to do so. The extent to which Part 2 of the RMA should be referred to depends on the nature and content of the planning documents being considered.

b) Where the relevant planning documents have been prepared having regard to Part 2 of the RMA, and with a coherent set of policies designed to achieve clear

environmental outcomes, consideration of Part 2 is not ultimately required. In this situation, the policies of these planning documents should be implemented by the consent authority. The consideration of Part 2 "would not add anything to the evaluative exercise" as "genuine consideration and application of relevant plan considerations may leave little room for Part 2 to influence the outcome". However, the consideration of Part 2 is not prevented, but Part 2 cannot be used to subvert a clearly relevant restriction or directive policy in a planning document.

c) Where it is unclear from the planning documents whether consent should be granted or refused, and the consent authority has to exercise a judgment, Part 2 should be considered.

d) If it appears that the relevant planning documents have not been prepared in a manner that reflects the provisions of Part 2, the consent authority is required to consider Part 2.

202. Although the CRPS, ODP and PDP have all been prepared having regard to Part 2, both the CRPS and ODP are under review and nearly at the stage of being replaced, and the PDP is still subject to submissions. In addition to the age of the plans, higher order documents such as the National Policy Statement for Freshwater Management (covered by CRC) and the NPS-IB have come into place after these documents were drafted. For the above reasons and due to the scale and significance of the proposal, I am of the opinion that Part 2 will provide further guidance for the decision makers to either grant or decline the consent, and I provide an assessment below.

203. The purpose of the Resource Management Act 1991 is to promote the sustainable management of natural and physical resources. This includes safeguarding of the life supporting capacity of soil. To achieve the most relevant parts of Part 2 of the Act, this application must demonstrate that the proposal will not detrimentally affect the existing and future community or impose on the finite nature of resources.

204. Part 2 of the RMA sets out the purpose (Section 5) and principles (Sections 6 – 8) of the RMA, which are discussed below.

205. Section 6 of the RMA identifies a number of matters of national importance which shall be recognised and provided for to achieve the purpose of the RMA. Of these, I consider the following of relevance:

(a) the preservation of the natural character of wetlands, lakes, rivers and their margins and the protection of them from inappropriate subdivison, use and development

(c)The protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna:

(d) the maintenance and enhancement of public access to and along the coastal marine area, lakes, and rivers:

(e) The relationship of Maori and their culture and traditions with their ancestral lands, water, sites, wahi tapu, and other taonga:

206. I consider that the proposal would not achieve matters (a) (c) (d) and (e) of Section 6 of the RMA, as the proposal may have adverse effects on the receiving environment and the mauri of the water. In addition, I have considered the submission of Te Ngāi

Tūāhuriri Rūnanga, which is in strong opposition and outlines concerns on how the proposal will affect the cultural values of the area.

207. Section 7 "Other Matters" of the RMA states: "In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall have particular regard to—"

The "Other Matters" considered potentially relevant to this proposal are:

(a) kaitiakitanga:
(b) the efficient use and development of natural and physical resources
(f) Maintenance and enhancement of the quality of the environment.

208. In relation to (b) and af) it is debatable whether the amenity values are being maintained and enhanced alongside the quality of the environment. As discussed, there remain significant cultural concerns alongside other attributes relating to terrestrial ecology and effects as discussed in Ms Nagy's report, that does not show the proposal achieves (a) and (f) of section 7 of the RMA.

209. In relation to (b) the applicant is proposing to use a quarry that is at the end of its life as a landfill, therefore it is an efficient use of the resource. However, there are questions marks around the site selection, being close to the Karetu River, Wetlands and a SNA which detract from the positives of rehabilitation of an old quarry site.

210. Section 8 of the RMA states: "In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall take into account the principles of the Treaty of Waitangi (Te Tiriti o Waitangi)." While the site does not contain an identified site of significance, it has been identified that there will potentially be cultural effects, and therefore the proposal does not achieve the purpose of Section 8.

211. In conclusion, having considered the actual and potential adverse effects of the proposal and its relationship with plan provisions, I consider there is tension between the proposal and the purpose and principles of the RMA and whether the proposal is in fact achieving the purpose of the Act as set out in Part 2.

OTHER MATTERS

212. Section 104(1)(c) allows the Consent Authority to consider other matters it considers relevant and reasonably necessary. In this instance it is considered that the Mahaanui Iwi Management Plan and the WasteMINZ Guidelines are relevant documents that should be considered.

Mahaanui Iwi Management Plan

213. This Iwi Management Plan (IMP) is a manawhenua planning document reflecting the collective efforts of six Papatipu Rūnanga that represent the hapū who hold manawhenua rights over lands and waters within the takiwā from the Hurunui River to the Hakatere River and inland to Kā Tiritiri o Te Moana. The plan provides a values based, plain language policy framework for the protection and enhancement of Ngāi Tahu values, and for achieving outcomes that provide for the relationship of Ngāi Tahu with natural resources across Ngā Pākihi Whakatekateka o Waitaha and Te Pātaka o Rākaihautū. The plan has the mandate of the six Papatipu Rūnanga, and is endorsed

by Te Rūnanga o Ngāi Tahu, as the iwi authority. As such, it is applicable to policy and planning processes under the Resource Management Act (RMA) 1991.

214. Provisions within the plan include:

- To protect the mauri of air from adverse effects associated with discharge to air activities (Policy R1.1).

- To require the improvement of water quality as a matter of regional and immediate importance and to require that water quality in the takiwā is of a standard that protects and provides for the relationship of Ngāi Tahu to freshwater (Policies WM6.1 and WM 6.2).

- To require that local authorities recognise that there are particular cultural (tikanga) issues associated with the disposal and management of waste (Policy P7.1), to actively work with local government to ensure that waste management practices protect cultural values such as mahinga kai and wāhi tapu and are consistent with Ngāi Tahu tikanga (Policy P7.2) and to require waste minimisation as a basic principle of, and approach to, waste management (Policy P7.3).

- Ngāi Tahu whānui, both current and future generations, must be able to access, use and protect mahinga kai resources, as guaranteed by Te Tiriti o Waitangi Policy TM1.1).

- To require that local and central government recognise and provide for the ability of tāngata whenua to identify particular landscapes as significant cultural landscapes (Policy CL1.1), and to require that local and central government give effect to cultural landscapes in policy, planning and decision making processes (Policy CL1.2).

215. There are also policies that are specific to the Waimakariri District which include:

- To recognise and provide for the groundwater resource beneath the Waimakariri Rakahuri Plains as a wāhi taonga resource (Policy WAI3.1), to require that water management in the catchment recognises and provides for the relationship between groundwater and surface water as a matter of priority (Policy WAI3.2) and to protect groundwater resources in the Waimakariri catchment from effects as a result of inappropriate or unsustainable land use and discharge to land activities (Policy WAI3.3).

216. In consideration of the above, it is again recognised that a number of the provisions identified above should be considered and addressed by Environment Canterbury, particularly regarding the potential effects of the proposal on water quality and the impacts of this for mahinga kai.

217. It is noted that a submission received also identifies the site as being within a cultural landscape. In reference to this, I have not been able to identify specific documentation within the management plan which identifies the site as being within a cultural landscape, but I note the following statement at page 220 of the management plan:

> *"The whole of the Waimakariri catchment can be identified as a cultural landscape. Ngāi Tahu land use and occupancy extended from the mountains to the sea (and beyond) in this catchment. The traditional place names and other cultural*

landscape features associated with the lower Waimakariri catchment are evidence of the extensive use of the area.

All along the river are kainga nohoanga, mahinga kai areas and wāhi tapu such as urupā.

However, within this larger landscape of land use and occupancy particular areas are identified as cultural landscapes with significant historical, traditional, cultural and contemporary associations. The ability to designate particular areas as cultural landscapes enables tāngata whenua to provide for the physical and cultural connections and connectivity between particular places, sites and resources, rather than "dots on maps" (see Section 5.4 Issue CL1)."

218. Ngāi Tūāhuriri Rūnanga clearly outline the significance of the environment stating the following:

"The Karetu River (which flows from Mount Karetu, to the Ōkūkū River and then to the Rakahuri River), as described above, is of cultural importance to Ngāi Tūāhuriri. Water in the Ngāi Tūāhuriri takiwā is bound to Ngāi Tūāhuriri through whakapapa, and a determinant of the welfare and mana of Ngāi Tūāhuriri. The concept of kaitiakitanga carries an obligation to protect the mauri of a resource. Ngāi Tūāhuriri is concerned that the proposed location next to a culturally significant waterway further diminishes the mauri and mana of that water and its interconnected ecosystem. Further, the Karetu River would be adversely affected should the landfill liner and/or the leachate pond fail. The proposal does not consider the cultural landscape. It is highly industrial in both nature and effects, and is consequently inappropriate at the head of a catchment adjacent to areas of high natural character, landscape values and wetlands."

219. Overall, I consider on the basis of the submission provided that there are adverse cultural effects, in particular related to the relationship of Te Ngāi Tūāhuriri Rūnanga to their ancestral lands, freshwater resources and taonga.

220. Therefore, the proposal is contrary to the Maahanui Iwi Management Plan

WasteMINZ Guideline Site Selection

221. WasteMINZ, New Zealand's leading organisation in waste management and resource recovery, has developed a series of guidelines to promote best practices across the industry. These guidelines serve as valuable resources for waste industry professionals, producers, consumers, and advertisers, ensuring environmental sustainability and public health.

222. The WasteMINZ guidelines have guidelines around landfill site selection, which highlights the following:

a) Geological & Hydrogeological Suitability: Sites should be located in areas with low permeability soils and natural barriers to prevent leachate contamination.
b) Distance from Water Sources: Avoid locations near groundwater recharge zones, rivers, lakes, or wetlands to prevent pollution.
c) Land Use Compatibility: Sites should be far from residential areas, culturally sensitive sites, and high-value agricultural land.
d) Accessibility & Infrastructure: The site must have suitable road access for waste transport and emergency response.
e) Environmental Impact: Consideration of air quality, noise, and ecological impact when selecting a site.

223. I have turned my mind to the site selection guidelines due to submissions raising concerns over the process, and also the effects that have been discussed above in my report and the technical expert's s42A reports.

224. I conclude that the proposal is inconsistent with the WasteMinz guidelines site selection process for the following reasons:

a) The Karetu River is directly adjacent to the proposed site therefore the proposal does not avoid water sources.
b) The site is within close proximity to a Significant Natural Area and no significant protection and enhancement has been proposed to the SNA.
c) Cultural advice was not sought until after the site was chosen. I concur with the Iwi that this not best practice and that the applicant should have sought cultural advice through the site selection process to be consistent with the WasteMINZ guidelines.

Summary of Statutory Assessment

225. This report has assessed the proposal to continue to operate a quarry and to establish and operate a landfill.

226. The proposal is a discretionary activity under the provisions of the Operative District Plan and Restricted Discretionary under the Proposed Waimakariri District Plan.

227. My assessment has highlighted effects on cultural values that are more than minor, alongside uncertainty of the effects on terrestrial ecology at this time, in particular from the proposed lizard management and the impact the proposal will have on the wetlands.

228. I acknowledge that the location in the Rural Zone and the use of an existing quarry is appropriate. However, I am of the opinion that the proposal is inconsistent with both Operative and Proposed District Plans as there is tension with the objectives and policies relating to cultural values, water, natural character and ecology.

229. The purpose of the Resource Management Act 1991 includes managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety while safeguarding the life supporting capacity of soil. In this instance, it has not been demonstrated that the proposal will be consistent with this purpose.

230. Therefore, I recommend that the application be declined.

Draft conditions

231. I have considered the draft conditions provided by the Applicant, along with the technical experts for WDC and CRC. I consider that the conditions of consent will develop over the course of the ordered joint witness statements. Therefore, I will provide a version of draft conditions through the planning joint witness statement as directed by the Commissioners in Minute 1.

Recommendation

232. I recommend, pursuant to sections 104 and 104B, and subject to Part 2 of the RMA, that the application made by Protranz International Limited for resource consent to continue operation of and expand an existing hard rock quarry and to establish, maintain and operate a landfill at 150, 154 ,174 and 176 Quarry Road Quarry Road, Loburn be **REFUSED.**

233. The reasons for this recommendation are related to:

a) The adverse effects on indigenous fauna and habitat.
b) The significant effects on Tangata Whenua values.
c) The proposal being inconsistent with the NPS-IB.
d) The tension the proposal has with the objectives and policies of the Operative District plan and the Proposed District Plan relating to Māori values, terrestrial ecology, water and land, and water margins.
e) The proposal not meeting the purpose of Part 2 of the RMA, in particular sections 6(e) and (f).
f) Uncertainty around the site selection process and alternative assessment.
g) The proposal being contrary to the Iwi Management Plan.
h) The absence of a sufficient site selection process as defined by the WasteMINZ guidelines.

Recommended by:

Tim Johnston

Date: 24th March 2025

Tim Johnston
Senior Planner

Appendix 1- Herpetology Section 42A report, prepared by Dr Mandy Tocher, LizardExpertNZ,

Before the Independent Hearing Panel appointed by the Canterbury Regional Council
IN THE MATTER OF The Resource Management Act 1991

AND

IN THE MATTER OF Application CRC243699 by Protranz International Limited for earthworks, quarrying and landfilling at Whiterock Quarry, 150 and 174 Quarry Road, Loburn, North Canterbury.

Supplemental Section 42A Officer's Report

Report of Dr Mandy D Tocher

Introduction

Background

1. This report forms part of the Environment Canterbury's (ECAN) audit of the assessment of environmental effects (AEE) provided by Protranz International Ltd (the applicant) in support of ECAN resource consent applications CRC243699-CRC243706, and RC245076 (Waimakariri District Council).
2. This report will provide the decision-maker with information and advice related to:
    a. The actual and potential effects of the proposed activities on indigenous lizards.
    b. The scale and significance of the anticipated environmental effects as they relate to lizard populations and habitats.
    c. The proposed management of lizard-related actual and potential adverse effects.

Qualifications

3. I have worked in the field of New Zealand herpetology (lizards and frogs) for over 30 years with almost all my career based in Canterbury and Otago.
4. I currently hold the position of Principle Herpetologist at LizardExpertNZ, my own business that I initiated April 2021.
5. I obtained a M.Sc. with first class honours in 1992 and a Ph. D in Zoology in 1997. These were both awarded by the University of Canterbury. I also hold a master's degree in planning (Distinction), awarded from the University of Otago in 2017.[1]

[1] Tocher, M. (2016). Biodiversity Maintenance and Protection under RMA Section 6(c) (Thesis, Master of Planning). University of Otago.
Tocher Mandy D., Theo Stephens, Claire Freeman, and Chris Garden (2017). Biodiversity Maintenance and Protection Under Both Clauses of s 6(c) of the RMA. Resource Management Theory & Practice 2017, pages 136-260.

6. I am a member of the New Zealand Amphibian Specialist Group for the IUCN, the New Zealand Reintroduction Specialist Group. I am a past member of the Department of Conservation (DOC*)* lizard Technical Advisory Group (TAG*),* the Native Frog Recovery group, grand and Otago skink Recovery group and the Resource Management Law Association. I am an Associate Editor for the New Zealand Journal of Zoology and an accredited RMA hearings commissioner.

7. From 2011-2016 I was employed as Senior Ecologist by Wildland Consultants Ltd, and then as Principal Ecologist/Herpetologist by Ryder Environmental until April 2021 when I initiated LizardExpertNZ. Before I took up my position with Wildland Consultants I was employed by the DOC as the South Island Herpetologist for 16 years, specialising in research and management of South Island lizards and frogs.

8. Under contract to DOC, I helped to develop the DOC lizard management plan template[2] and the key principles for lizard salvage in New Zealand.[3]

Scope of Report

9. This report is prepared under the provisions of Section 42A of the Resource Management Act 1991 (RMA). This section allows a council officer or consultant to provide a report to the decision-maker(s) on a resource consent application made to the council and allows the decision-maker(s) to consider the report at the hearing.

10. Section 41(4) of the RMA allows the decision-maker(s) to request and receive from any person who makes a report under Section 42A "any information or advice that is relevant and reasonably necessary to determine the application".

11. This report is supplementary to the Section 42A Report prepared by the Environment Canterbury/WDC for the above resource consent applications. Full details of the consent applications are provided in the respective Section 42A reports.

12. To carry out this audit of the consent applications, I have:

    a. Considered the relevant sections of the Applications and Assessment of effects on the environment (AEE) submitted by the applicant, dated 28th March 2024.

    b. Considered the technical Appendix G 'Ecological Impact Assessment' (EcIA) attached to the AEE/Application.

    c. Considered the proffered conditions dated 27/03/2024 attached to the AEE as Appendix Y. These conditions cover Region and District conditions in separate sections.

    d. Considered the revised set of conditions (Appendix Y Rev1) that formed part of the s92 response to ECAN, dated 27/08/2024. These conditions address lizard management in 'District Proposed Conditions' 'Biodiversity & Landscape Enhancement' and its accompanying Schedule 1.

    e. Considered the Site Management Plan (draft Rev B; Appendix L).

    f. Reviewed further information that was provided to WDC by the applicant on draft Management Plans, stock fencing & Terrestrial Ecology (Lizards) (dated 23/8/2024).

[2] https://www.doc.govt.nz/globalassets/documents/about-doc/concessions-and-permits/wildlife-research-permits/lizard-management-plan-template.pdf

[3] DOC TAG, 2019. Key principles for lizard salvage and transfer in New Zealand. Department of Conservation. 19 pages.

g. Reviewed further information that was provided to ECAN by the applicant on crown land (GEN-003) and draft MPs (GEN-002) (dated 16/8/24).

h. Considered Section 6(c) significance criteria in the Canterbury Regional Policy Statement and its supporting guidance document.[4]

i. Looked at Appendix H rev1 to determine footprint and locations of proposed activities.

j. Undertaken a site visit on 24th January 2025 to determine lizard habitats onsite.

k. Considered lizard specific issues raised by 22 submitters: namely concerns related to effects of the proposal on lizards and the management of actual and potential effects.

l. Reviewed the following report: Hutchison, M. August 2024. Botanical Survey of White Rock Limestone Site, Loburn, Waimakariri District. 57 pages.

13. Of note, I was not provided with a copy of a Lizard Management Plan (LMP) that I understand has been submitted to DOC for permitting.[5] As a result, I have had to assess the application 'as lodged' which deferred in many places to the LMP as the primary lizard management document.

14. This report also provides my assessment of the scale and significance of adverse and positive effects.

15. Finally, if the decision makers are of a mind to grant the application, this report provides recommendations on the scope of conditions of consent that are required to ensure adverse effects on lizards can be adequately avoided, remedied or mitigated, and/or compensated for.

Description of the Activity

16. I have relied on the description of the activity provided in Section 4 of the Applications & AEE. The proposed activities are located at 150, 154, 174 Quarry Road, Loburn as well as WDC road reserve and crown land (Karetu riverbed & margins). Mitigation is proposed for part of 176 Quarry Road (a WDC Significant Natural Area (SNA)[6]).

17. The proposed activities will affect a mix of disturbed land e.g., the quarry pit and associated disturbed surfaces, and lesser disturbed land such as:

a. recently felled pine plantations

b. wetlands

c. exotic grasslands

d. the riparian margins of the Karetu River and

e. the WDC road reserve area[7].

[4] UpdatedGuidelinesfortheApplicationofEcologicalSignificanceCriteriaforIndigenousVegetationandHabitats ofIndigenousFaunainCanterburyRegion%20(10).PDF

[5] DOC reference 107310-FAU.

[6] WDC SNA039 'Whiterock Limestone Vegetation'.

[7] The applicant's response to WDC issue 5 a) i. at page 23 does not unequivocally rule out works over the road reserve.

18. I define ‘lesser’ disturbed land as land that has been disturbed in the past, e.g., from farming, afforestation/logging and/or historic fires and no longer retains a predominately indigenous vegetation cover but nonetheless can and does provide lizard habitat.[8]

19. The extent and location of ‘lesser’ disturbed land affected by the proposed activities was not clearly set out in the AEE. Using Google earth imagery, observations during the site visit and a visual appraisal of Appendix H rev1[9] and Figure 43 of the EcIA[10], I have estimated these areas to cover a combined area of *ca*. 1.5-3 ha.

20. In making my estimate I note the applicant estimates the anticipated loss of lizard habitats to be *ca*. 0.5-1.0 ha[11] but does not provide a map/plan showing where loss will occur.

21. Activities most likely to affect lizard values, i.e., earthworks and concurrent vegetation removal (including exotic pasture) and spoil disposal (if required) over most of these lesser disturbed areas are well described in terms of consents required by both ECAN and WDC, and Appendix H (rev1) shows site plans where activities will generally take place.

22. Exceptions, where descriptions of activities over potential lizard habitats are not well set out by the applicant include:

    a. The width and method of installation of the proposed security fence. The installation of this fence may affect a variety of lizard habitats over exotic grasslands, wetlands and recently cleared plantation forestry.

    b. The width and method of installation of the proposed herbivore exclusion fencing around SNA. The installation of this fence may affect a variety of lizard habitats over exotic grasslands and recently cleared plantation forestry.

    c. The width and method of installation of the proposed stock exclusion fencing around watercourses. The installation of this fence may affect a variety of lizard habitats over exotic grasslands/shrublands of riparian areas.

    d. Proposed activities (if any) over the existing access road (WDC road reserve) from Quarry road and before the proposed new bridge.[12] Activities such as widening to accommodate entry onto the new bridge and/or introducing culverts/water tables could affect potential Canterbury grass skink (*Oligosoma* aff. *polychroma* clade 4) habitat along the roadsides, e.g., along the existing fence line that is not regularly mown.

    e. The location and description of offsite overburden storage[13]. I was unable to be assured by the information provided by the applicant that overburden will not be placed on top of offsite lizard habitats thus extending potential effects off site to a second location.

    f. The location and description of any wastewater disposal areas/trenching from weighbridge buildings.[14] I was unable to be assured by the information provided by the applicant that wastewater disposal onsite will avoid lizard habitats including wetlands.

[8] Figure 17, Page 35 of EcIA (Appendix G of application) and observations during the January 2025 site visit.
[9] Provided in the s92 response to ECAN.
[10] Page 51 of EcIA (Appendix G of AEE).
[11] Page 36 and 53 of the EcIA (Appendix G of AEE).
[12] The applicant’s response to WDC issue 5 a) i. does not unequivocally rule out works over the road reserve (page 23).
[13] Application Section 4.5.3 page 31.
[14] Application Section 2.2.22 page 5.

Description of the Receiving Environment

23. I consider the existing environment is represented by baseline lizard populations and habitats, and any factors that are currently influencing them e.g., predator loading of the site.

24. The application provides a general and mostly high-level description of the existing environment in Section 3. Section 3.10 addresses 'Ecology' and defers to Appendix G the Ecological Impact Assessment (EcIA) for existing lizard-environment.

25. The WDC SNA forms an important part of the application as it is a proposed release site for lizards salvaged from the development footprint. I expected, therefore, a description of lizard values of the site and details of any management being carried out there now that may affect existing lizard values. This information was not provided.

26. As I understand it the onsite pine plantations were cleared as a permitted activity under the WDC plan. Nonetheless, the activity of clearing the plantations from the site forms part of the proposal, i.e., there was a need to clear the plantations to enable the development of the site as per the applicant's proposal.

27. Given potential lizard habitat is present in and around the pine plantations and indeed, lizards may ultimately benefit from their removal; a commentary on the applicant's position on this activity as it pertains to lizards/lizard habitat was warranted and was provided in the EcIA.[15]

28. Bunding work has begun onsite and as I understand it forms part of the applicant's proposal. A description of onsite bunding work already carried out over potential lizard habitats was appropriately provided in the EcIA.[16]

Lizard Values – Assessment and Characteristics

29. To determine potential lizard values of the site, the results of a desktop appraisal of the DOC Herpetofauna database was provided.[17]

30. I agree with the applicant that the potential lizard values present are Canterbury grass skink and McCann's skink (*O. maccanni*) along with either Waitaha gecko (*Woodworthia brunnea*) or greywacke gecko (*Woodworthia "*Southern Alps northern*"*) and possibly jewelled gecko (*Naultinus gemmeus*), and their respective habitats.[18] All are nationally At Risk – Declining except McCann's skink (Not Threatened).[19] Jewelled geckos are very unlikely to be present.[20]

31. It would have been helpful to have more commentary on the herpetological context of Waitaha/greywacke gecko, and Canterbury grass skink complex and McCanns skink. For example, greywacke gecko is a recent split from Southern Alps gecko meaning its distribution is not well documented. Likewise, Canterbury grass skink cannot be easily physically differentiated from sister grass skinks, or from McCann's skink, which creates difficulties identifying the boundaries of their respective distributions and necessitates handling lizards to identify them from each other.

[15] Page 53 of the EcIA (Appendix G of the AEE).
[16] Based on oobservations made during January 2025 site visit, and reference to this is made in the EcIA page 53 (Appendix G of AEE).
[17] Table 33 of the EcIA (Appendix G of AEE).
[18] Page 30 of the EcIA (Appendix G of the AEE).
[19] Hitchmough *et al.* 2021.Conservation status of New Zealand reptiles, 2021. New Zealand Threat Classification Series 35. Department of Conservation, Wellington. 15 p.
[20] Based on observations of habitats present during January 2025 site visit.

Lizard Species Affected

32. To determine actual lizard values (populations and habitats), a 'passive' lizard survey was conducted over parts of the footprint whereby lizards were not handled. The survey was carried out without a Department of Conservation (DOC) handling permit which although appropriately acknowledged,[21] lessened the accuracy and thus usefulness of the lizard survey. A case in point, the two skinks photographed in the EcIA are grass skinks (probably Canterbury grass skinks)[22]; neither are McCann's skink as suggested by the applicant.[23]

33. It is standard & best practice to carry out a lizard survey under a DOC handling permit. This allows the surveyor to handle lizards and be sure of identification either by using their own experience or by taking high-quality photographs to enable others more experienced to assist with identification. As a result of the inability to handle lizards, the lizard species affected by the proposal are not entirely known.

34. What is known is that At Risk-Declining grass skinks (probably Canterbury grass skinks) are present in good numbers across the site including in areas recently cleared of pine plantation. Also, potential habitat for *Woodworthia* spp. geckos is present in the WDC SNA of 176 Quarry Road.[24] The presence of McCann's skink and *Woodworthia* sp. geckos is not certain.

35. To remedy this situation regarding lizard survey, the applicant has suggested the survey although not ideal, is sufficient and by erring on the side of caution and assuming At Risk declining lizards are present, the information collected from the survey is sufficient to assess effects and design appropriate mitigation.

36. Although I commend the applicant for being cautious and as it turns out At Risk Declining grass skinks are indeed present, I don't believe it is sufficient to simply guess at which of the likely species are present.

37. My view originates from the need to have a solid and robust foundational assessment of lizard values to then accurately determine effects and in turn, accurately determine appropriate mitigation to balance any adverse effects. A shaky foundation based on inadequate survey can, in my view, only lead to inaccuracies along the line, ultimately to the detriment of affected lizard values.

Lizard Habitats Affected

38. The EcIA states that an area of 11 ha will be affected across all proposed activities.[25] Of this, the applicant suggests that at least 0.5 ha of lizard habitat could be adversely affected by the landfill development and a further *ca*. 0.5 ha of habitat loss has already occurred relating to bunding work.[26]

39. The applicant's assessment of lizard habitat loss appropriately acknowledges that this estimate does not include all "other possible impacts"[27] such as improvement of the existing flood protection bund. I note that this estimate also does not include areas that were not surveyed (described in paragraph 46 of this statement).

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[21] This situation is acknowledged in the EcIA page 30 (Appendix G of AEE).
[22] The only way to be sure is to collect a genetic sample – tail tip – from a handful of skinks. Grass skinks cannot be identified by physical appearance alone, but location does point to the grass skinks onsite being Canterbury grass skinks.
[23] EcIA Figures 15 & 6 (Appendix G of AEE).
[24] Observations made during the site visit, January 2025.
[25] Appendix G, Section 1.2. page 10.
[26] Page 36 and 53 of the EcIA (Appendix G of AEE).
[27] Page 33 of the EcIA (Appendix G of AEE).

40. My own estimate of lizard habitats affected is provided in paragraph 19. My estimate is approximately double the estimates provided by the applicant, i.e., *ca*. 1.5-3.0 ha versus *ca.* 0.5-1.0 ha, my estimates and the applicants estimate respectively.

41. If my estimates are correct, the lizard habitat (and lizard populations within) affected by the proposal has been underestimated by the applicant and so too has the effects assessment and 'mitigation package' offered.

42. My view is supported by statements in the EcIA such as: "suitable habitat for indigenous lizards exists across much of the site, in the form of rank grass and where limestone rocks/boulder are present"[28] and "skinks were confirmed to be present across much of the site".[29] To me, these statements imply large areas of lizard habitat are present. Lizard populations also seem high over the site[30].

43. Despite the problems I have raised regarding the lizard survey, the applicant states that lizard values are 'high' when considered at the Ecological District (ED) level.[31] I generally agree with this assertion as areas of the site that provide habitat for Canterbury grass skinks represent Section 6c RMA 'significant fauna habitat' under the Canterbury Regional Policy Statement i.e., having an At Risk Declining threat status is enough to trigger significance.

44. Finally, in terms of the receiving environment and factors influencing lizard populations and habitats, the application along with Appendix G of the AEE addresses relevant issues except for existing pest control. I was unable to ascertain based on information provided by the applicant and an ecological report of the SNA[32] if any predator control was underway over the site or the SNA; I have assumed not.

Supplementary Lizard Survey

45. The areas that were subjected to lizard survey were confirmed in the s92 response[33] and as I understand it, survey was not carried out over all areas affected by the proposed activities.

46. Areas to be affected by the proposed activities that were not surveyed include:

    a. Areas recently cleared of pine plantation.

    b. Wetlands.

    c. The riparian margins/riverbed of the Karetu River and footprint of proposed stock exclusion fencing.

    d. The road reserve.

    e. An area of grassland over 154 Quarry Road.

    f. The WDC SNA and footprint of proposed stock exclusion fence.

    g. The footprint of the security fence that will encompass the site[34].

47. To illustrate by an example the potential consequence of this survey deficit I note that grass skinks (probably Canterbury grass skinks) were easily found over an area recently cleared of pine plantation during the January 2025 site visit. The area in question was

[28] Section 4.3 of the EcIA, page 30 (Appendix G of AEE).
[29] Section 4.3.2. of the EcIA page 33 (Appendix G of AEE).
[30] EcIA Figure 17, page 35 (Appendix G).
[31] Section 3.10 of application page 26 & Section 4.3.1. page 36 of the EcIA (Appendix G of AEE).
[32] Hutchison, M. August 2024. Botanical Survey of White Rock Limestone Site, Loburn, Waimakariri District. 57 pages.
[33] s92 response to WDC issues 5 a) i. or 5 a) ii. and shown in Figures 13 & 17 of the EcIA (Appendix G).
[34] Appendix H rev1 'Location Plan'.

directly adjacent to the WDC SNA on 176 Quarry Road. As far as I can tell, this area was not surveyed by the applicant which means effects on this area and other similar non-surveyed habitats are likely to have been underestimated.

48. Moreover, some or all these habitats maybe 'significant fauna habitat' under the Canterbury Regional Policy Statement (CRPS) necessitating 'protection' through application of the effects management hierarchy. For this reason, the location and extent of these habitats should have been documented in the EcIA to enable an assessment of proposed 'protection' of these areas.

49. In my opinion, an additional supplementary lizard survey is justified ahead of consenting (or otherwise) this application for the following reasons:

    a. It is best practice to carry out a lizard survey robust enough to determine which lizard species are present and the extent and quality of their habitats, and numbers of each species affected. This is the purpose of a lizard survey. Unfortunately, for reasons relating to DOC permitting, the current survey was unable to ascertain which species are present, i.e., there may be 1 species of lizard affected or more and up to three. The numbers affected has not been provided.

    b. The effects assessment described over the next section will be inherently flawed if the number of lizard species affected and the extent of each of their habitats is unknown. Moreover, the scale and significance of effects cannot be ascertained unless the survey informing the assessment is adequate.

    c. A flawed effects assessment cannot be used to design an appropriate mitigation package; for example, avoidance actions cannot be considered unless there is an understanding of where lizard values lie, and which places are priority for avoidance. I note that no definitive lizard avoidance actions have been suggested, nor indeed any remediation measures; these issues are covered over paragraphs 70-75 below. This information deficit that is presumably addressed in the LMP for that was not provided, needs addressing given grass skinks occupy significant fauna habitat across the site (significant under Section 6c, RMA 1991).

    d. The sufficiency (adequacy) of the proffered mitigation described below, itself lacking in substantive detail, cannot be determined based on a flawed effects assessment.

50. I note that even if the LMP provides some additional information that is lacking from the application as lodged, additional survey will still be required to properly inform the effects assessment required under the RMA (1991), and in particular, Section 6c. Proper and appropriate 'protection' of significant fauna habitat can only be achieved if we know where such habitat lies.

Actual and Potential Effects on Lizard Values

Description of Effects

51. I have raised concerns over paragraphs 45-49 relating to inadequate survey that has likely resulted in an underestimate of effects on lizard values. Moreover although I assume effects are clearly described in the LMP submitted to DOC, I cannot be sure.

52. Notwithstanding my concerns on the application as lodged, a high-level list of actual and potential project impacts (effects) of the proposed activities on lizard values was

supplied in the EcIA.[35] Some listed effects were nonspecific in terms of affected values, mechanism and location so I have assumed these related to all biodiversity over all habitats of the proposal and in adjacent areas. e.g., temporary to short term increase in dust, noise and vibration.

53. A further commentary on effects specific to lizards is provided in Section 4.3.2 of the EcIA.[36] This commentary appropriately acknowledges that effects maybe more severe during the colder months, and as noted in paragraph 39, the applicant acknowledges that there may be other potential effects too.

54. The Zone of Inference (ZOI) is defined in the EcIA as follows: "*lizard habitats immediately adjacent (within 5 m) to activities onsite*" but as noted above, lizard habitats have not been mapped and extent quantified over all areas of the site, so it is not possible to deduce where the ZOI is to then determine scale and magnitude of effects. Also, the 5 m buffer into adjacent habitats is inconsistent with the 1 m described in the 'pre-mitigated level of effects assessment' for lizard habitats.[37]

55. Overall, however, most relevant actual and potential unmitigated effects were documented in Section 4.3.2. of the EcIA.[38] The exceptions are injury to lizards, potential permanent fragmentation of lizard habitats & populations both onsite and over surrounding areas including the WDC SNA, and the potential positive effects to lizards of removing pine plantations that were shading their habitats.

Magnitude & Significance of Effects

56. I note that the RMA (1991) gives no guidance on how practitioners are to assess the magnitude or significance of effects.

57. *In lieu* of guidance under the RMA, the applicant has used EIANZ guidelines to assess level, magnitude and significance of lizard-related effects.[39] I do not generally support the application of the EIANZ guidelines as resulting effects assessments can be formulaic and rigid rather than bespoke for the site. As a result, there is a risk that effects can be downplayed. Moreover, the RMA (1991) and as far as I am aware ECAN too, do not formally support the EIANZ approach.

58. Using the EIANZ tables, the applicant has assessed:

    a. The pre-mitigated level of effect of the proposal on lizards as "very low".[40]

    b. The pre-mitigated magnitude of effect of the proposal on lizards as "negligible".[41]

59. For level and magnitude of effect 'lizards' have been clumped into a single entity, i.e., the applicant has assumed there is only 1 lizard species affected by the proposal despite inferring otherwise.[42] As a result, the level and magnitude of effect is only provided for 'lizards' rather than for each lizard species affected, the latter being more appropriate in my view.

60. For reasons detailed in paragraph 49 I have formed the view that effects have likely been underestimated and underestimates will have affected the applicants' assessments of both level and magnitude of effect, i.e., it follows that both level and

[35] Section 2.2.3 of EcIA (Appendix G of AEE).
[36] Page 36 (Appendix G of AEE).
[37] Section 4.3.2. page 36 of EcIA (Appendix G of AEE).
[38] Dust, noise and vibration, permanent habitat loss, disturbance & death of protected wildlife.
[39] https://www.eianz.org/document/item/4447
[40] Table 6, page 38 of the EcIA.
[41] EcIA page 36.
[42] Page 30 of the EcIA (Appendix G of the AEE).

magnitude of effect are also underestimated. For these reasons, I advocate for a fulsome reassessment of level and magnitude of effect following additional survey.

61. The pre-mitigated significance of effect is not provided by the applicant. In my opinion, inadequate survey has meant that an assessment of 'significance of effects' is also not possible now, ahead of supplementary survey.

62. However, Table 6 of the EcIA[43] assesses the 'post-mitigation magnitude of effect' as 'positive'. In my opinion, the level of detail provided by the applicant is insufficient to enable this assessment to be made and I recommend this assessment is disregarded.

RMA 1991 v Wildlife Act 1953

63. I firstly note that permitted activities under the RMA (1991) are not permitted activities under the Wildlife Act 1953 (WLA) i.e., there is no permitted baseline equivalent under the WLA. Moreover, the presence of a single lizard (including a Not Threatened species such as McCann's skink) triggers the Wildlife Act (1953), which in my view is a very blunt tool that is administered inconsistently by DOC.

64. The applicant suggests that managing effects under the Wildlife Act (1953) process is preferable to reduce "*a potential duplicated and or inconsistent approach with the Waimakariri District Council*."[44]

65. Managing effects over indigenous lizard habitats are very clearly within the mandate of the RMA (1991) and its planning tools. This is especially so for significant fauna habitats occupied by grass skinks that are addressed in the RMA as a Part II matter (Section 6c), and feature prominently in the NPS-IB. I strongly disagree, therefore, that the RMA (1991) devolves responsibility for 'effects management' to the Wildlife Act (1953) permitting process as the applicant proposes.[45]

66. A Lizard Management Plan is proposed in Section 5.6.2 of the application. This LMP is to be developed to "avoid, minimise, and remediate project effects to indigenous lizards and their habitat and minimise the risk of disturbing or killing lizards pursuant to the Wildlife Act 1953".[46]

67. I agree with the stated purpose of the LMP but fail to see why the applicant has not provided the LMP that has been submitted to DOC. This would have allowed for submitters, stakeholders and technical experts to review and comment on the LMP with the collective view to improve outcomes for lizards.

68. In my opinion, providing the LMP as part of the applicant's resource consent application would better serve to reduce any administrative duplication by allowing complete transparency to all stakeholders on how effects are proposed to be managed under both the Wildlife Act (1953) and the RMA (1991). This view is supported by one submitter who agreed with the need to have them upfront as part of the consenting process.[47]

69. What is more appropriate and commonplace in practice is the formulation of a site-specific LMP that serves the dual purpose of satisfying the requirements of the RMA (1991) whilst providing information in sufficient detail to support a WLA to DOC. The DOC LMP template provides for dual purpose LMPs.[48]

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[43] Page 38 of the EcIA (Appendix G of AEE).

[44] s92 response to WDC, page 6.

[45] Page 6 Section 2.4 'Wildlife Act 1953' of the application, and Section 5.6.2 of the application (page 47).

[46] Section 5.6 of the Application, page 47.

[47] SUB034870.

[48] https://www.doc.govt.nz/globalassets/documents/about-doc/concessions-and-permits/wildlife-research-permits/lizard-management-plan-template.pdf

Effects Management: Application of Mitigation Hierarchy

70. I note that one submitter referred to the need to protect significant biodiversity including lizards now and for future generations.[49] Section 6c of the RMA (1991) highlights the duty of practitioners to "…*recognise and provide for the …. protection of significant habitats of indigenous fauna*". As I understand it, implicit in this provision is the need to exhaustively avoid, remedy and mitigate adverse effects on 'significant fauna habitat', regardless of magnitude or significance of effects on such habitats. This is generally acknowledged by the applicant.[50]

71. I could find no legitimate actions described in the EcIA and/or application that relate to avoiding lizard habitat.[51] The exceptions to this is reference to avoiding the SNA[52] and avoiding the winter months when developing areas of the site that have an exotic grass cover that could harbour grass skinks (May-August inclusive)[53].

72. In my view, avoiding the SNA is not a legitimate avoidance action as the SNA is already protected by policies/rules in the WDC plan and NPS-IB. Also, I have doubts that the applicant will be able to, in a business sense, cease work over the winter months to avoid rank exotic grassland habitat of grass skinks.[54]

73. As well, there are aspirational references to avoiding areas of exotic rank grass "if practicable" and "should occur if possible" and then statements inferring that all this will be managed under the LMP that has not been provided[55]. I would have found it very helpful to see on a map, at the very least, where lizard habitats will be avoided or alternatively a clear statement that no lizard habitats can be avoided due to the nature of the development/business.

74. As it stands, I can give no weight to stated avoidance actions and cannot determine if all avoidance options have been exhausted.

75. For remediation of lizard habitats, again, no detail is provided of what the applicant proposes over the longer term at landfill closure. Instead, reference is made to managing lizard habitat remediation in the LMP or the LCP (assumed to be Landfill Closure & Aftercare Plan),[56] the latter also not provided. The VMP is also referenced as a plan that may manage lizard habitats of the riparian areas.[57]

76. I note that a single lizard-related submission referred to a desire to see remediation of the quarry for biodiversity purposes.[58]

77. The applicant states that the LMP will outline habitat creation that supersedes habitat lost,[59] which I support. The applicant does not, however, take the next logical step to provide the necessary information to back this claim.

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[49] SUB034380.

[50] Supported by the applicant in Section 3.3.3.3. 'Management of Effects' at page 20 of the EcIA (Appendix G of AEE).

[51] As noted elsewhere, I suspect this is because lizard habitat areas have not been mapped, but I note that wetland areas are mapped and included in project maps in Appendix H rev1; I expected a similar level of detail for lizard habitats, but this was absent.

[52] EcIA Section 4.3.3. Effects management hierarchy, page 37 (Appendix G of AEE).

[53] EcIA Section 4.3.3. page 37 (Appendix G of AEE).

[54] See Figure 43 of the EcIA, page 51 (Appendix G of AEE).

[55] s92 response to WDC issue 5 a) i.

[56] EcIA Section 4.3.3. page 37 (Appendix G of AEE). I note that Section 15 Landfill Closure and Aftercare in the SMP (draft Rev B, page 64) makes to "*light grazing or natural state vegetation*".

[57] Section 14.1 of SMP draft Rev B (Appendix L).

[58] SUB034380.

[59] s92 response to WDC on issue 5 a) vii.

78. As it stands, therefore, I can give no weight to stated remediation actions and cannot determine if all remediation options have been or will be exhausted.

79. For mitigation, the applicant proposes to move lizards to an area adjacent to the SNA[60] or to within the SNA itself.[61] I note that the release site is not confirmed to be the SNA, but I assume the release site is identified and confirmed in the LMP.

80. In terms of release into the SNA, it is very much a case of the 'devil is in the detail' so to speak. For example, removing stock from the SNA although touted as a positive effect of the proposal[62] may instead cause seasonal rodent eruptions in response to exotic grasses seeding that could in turn result in perverse outcomes (in terms of elevated predation) for both the existing lizards of the SNA, and the newcomers released via salvage. Rodent monitoring will be key at managing this effect and the LMP will need to provide a rodent control/suppression response action if rodent tracking goes above *ca*. 5 % tracking.[63]

81. Also, science has shown that releasing lizards into existing lizard populations does not result in good outcomes for released/salvaged lizards especially where mice are present.[64]

82. Potential rodent eruptions and relatively high mortality in salvaged lizards are just two of multiple problems I can see with the proposal and for these reasons, I am unable to assess whether salvage is the best option for lizards of the site but accept that it maybe.

83. As it stands, therefore, and without the detail contained within the submitted LMP, I can give no weight to stated mitigation actions and cannot determine if all mitigation options have been exhausted.

84. Lastly, although I accept that the applicant believes lizard values will be appropriately managed in the LMP, I cannot agree to this without sighting the LMP.

Compensation for Residual Adverse Effects

85. Based on information supplied I have formed the opinion that significant residual effects will likely ensue with the avoidance, remediation and mitigation actions proposed by the applicant. There really is no way to say for sure without sighting the LMP.

86. I note that the applicant forms a different view on level of residual effect and assesses the level as 'net gain'[65] whilst providing no supporting evidence for how this assessment was made. I am not convinced that a net gain will eventuate.

87. I hold the view that compensation is the most suitable path to address any residual effects on lizard values and that compensation actions are required to adhere as far as technically feasible to principles in Appendix 4 of the NPS-IB.[66]

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[60] Tables 1 & 2 'Assessment' of the s92 response to WDC (Page 6) & Biodiversity and Landscape Enhancement Plan (Appendix Y rev1).
[61] Page 44 of the EcIA (Appendix G of the AEE).
[62] EcIA page 17 (Appendix G of the AEE).
[63] A recommended tracking rate to generate a positive effect on lizards. See Norbury, G., Wilson, D.J., Clarke, D. et al. Density-impact functions for invasive house mouse (*Mus musculus*) effects on indigenous lizards and invertebrates. Biol Invasions 25, 801–815 (2023). https://doi.org/10.1007/s10530-022-02946-9
[64] Norbury, G., van den Munckhof, M., Neitzel, S., Hutcheon, A., Reardon, J., & Ludwig, K. (2014). Impacts of invasive house mice on post-release survival of translocated lizards. *New Zealand Journal of Ecology*, 322-327.
[65] Table 6, page 38 of the EcIA.
[66] [2023] NZEnvC 103 Friends of Conical Hill Incorporated v Hurunui District Council and Hanmer Springs Thermal Pools and Spa [PDF, 223 KB]

88. Also, compensation actions need to be lizard-centric and additional to actions proposed to balance other effects on biodiversity, i.e., 'double-dipping' is not appropriate where a single action is proposed to offset multiple effects across a range of ecological values.

Consideration of Submissions

89. Twenty-two submissions referred directly to indigenous lizards, skinks or geckos. [67]

90. I have divided these submissions into two topic areas:

    a. Effects of the proposal on lizard values, and

    b. Proposed effects management: Lizard translocation.

91. Each will now be addressed in turn.

Effects of the proposal on Lizard values

92. Of the twenty-two lizard-related submissions, twenty specifically raised concerns regarding potential effects and all of these 'oppose' the application. No lizard-related submissions supported the applicant's approach to assessing effects nor the proposed effects management.

93. Effects identified by submitters were general and referred to 'disruption', 'impact', 'contamination', 'potential threat', 'health', 'short and long-term effects' of and to indigenous lizards. One submitter[68] shared my concern that effects may have been underestimated by the applicant and others seem to infer this. A single submitter[69] questioned the quality of technical reports which I take to include the lizard effects assessment.

94. As noted over paragraphs 56-62 above, I too have concerns about lizard effects and the inability of the applicant to robustly ascertain the scale and magnitude of effects from the lizard survey carried out. That said, I assume a comprehensive effects assessment has been provided to DOC within the submitted LMP as the DOC LMP template requires this.

95. Four submitters[70] while not expressly referring to lizards, had concerns regarding the impact of the proposal on wetland habitats and their biodiversity (fauna and flora). As noted in paragraph 46, wetland habitats were not surveyed for lizards, despite their potential as significant fauna habitat. For this reason, I share submitters concerns and note again my recommendation that further surveys are required to ascertain the degree with which onsite wetlands support indigenous lizards (see paragraphs 45-50).

96. Seven submitters[71] had concerns relating to the potential impact of the proposal on the WDC SNA (176 Quarry Road). These submissions are highly relevant to lizards because the SNA forms part of the applicant's proposal, and the SNA was not surveyed for lizards. I too have concerns regarding the impact on the SNA but my concerns are very specific to the applicant's proposal to relocate lizards there (or to an adjacent area; see paragraphs 97-100 below).

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[67] SUB034326,SUB034361,SUB034380,SUB034383,SUB034384,SUB034396,SUB034413, SUB034415,SUB034497,SUB034518,SUB034529,SUB034566,SUB034571,SUB034623, SUB034627,SUB034631,SUB034668,SUB034767,SUB034806,SUB034807,SUB034848, SUB034837.

[68] SUB034741.

[69] SUB034741.

[70] SUB034741, SUB034405, SUB034529, SUB034380.

[71] SUB034383, SUB034384, SUB034413, SUB034627, SUB034668, SUB034806, SUB034807.

Proposed Effects Management: Lizard Translocation

97. Four submitters[72] questioned the likely success and/or the appropriateness of the proposed lizard relocation from the works footprint to the nearby SNA (or adjacent area). A related issue was raised by a single submitter regarding the fate, in terms of adverse effects of a landfill, to lizards that evade capture and are not relocated, i.e., those that are left behind.[73]

98. Without having the opportunity to view the LMP submitted to DOC, it is hard to form a view on the likely outcome of a salvage but I note that key information is missing from the application that DOC consider necessary for a successful salvage.[74] I refer to information such as (but not limited to):

    a. The lizard species to be relocated and some idea of numbers likely to be involved.

    b. Lizard species and numbers at the proposed release site (the WDC SNA/adjacent area).

    c. The likely carrying capacity of lizards at the proposed release site.

99. Based solely on information provided by the applicant, I have formed the view that the planned relocation of skinks from the footprint to the nearby WDC SNA (or adjacent area) has only casually been considered by the applicant and submitters concerns have merit. In support of the submitters, I note that scientific research has shown that lizard relocation is often unsuccessful.[75]

100. Lastly, I am far from convinced that relevant DOC salvage principles have been adhered to in the design of the salvage/translocation proposal, which could also compromise the success of any planned relocation.

Conclusions and Recommendations

101. Lizard survey did not cover the entire project area and has failed to generate key information necessary to understand the scale and magnitude of effects of the applicant's proposal on lizard values. For example, the number of lizard species onsite, the extent of their habitat uses, and the population levels affected remains largely unknown. A flawed effects assessment is a concern also raised by multiple submitters.

102. Without an effects assessment based on appropriate survey, the quantum of mitigation required to balance effects is unable to be determined. This is particularly concerning given much of the lizard habitat onsite is 'significant fauna habitat'.

103. Moreover, I believe withholding the LMP that has been submitted to DOC is inappropriate as it may contain a level of detail of effects and mitigation that is absent from the application. Also, stakeholders have been unable to effectively engage in the consent process as it pertains to lizards as key and essential information has been unreasonably withheld.

104. For the reasons stated above, I recommend processing of the WDC consents are stalled until a lizard survey is completed that addresses information gaps, and a DOC-approved

[72] SUB034396, SUB034571, SUB034415, SUB034518.
[73] SUB034767.
[74] DOC TAG, 2019. Key principles for lizard salvage and transfer in New Zealand. Department of Conservation. 19 pages.
[75] Griffith B, Scott JM, Carpenter JW, Reed C 1989.Translocation as a species conservation tool:status and strategy. Science 245: 477-480

LMP is supplied that at the very least assists with aligning consent conditions with any conditions imposed by DOC.

105. If, however, the decision makers are of a mind to grant the application ahead of new survey, I recommend that conditions of consent are imposed that cover the following matters.

    a. A requirement to carry out an additional lizard survey. This survey must include all areas affected by proposed activities (including the SNA & wetlands) and must:

        i. Identify lizard species affected.

        ii. Provide an estimate of population/individuals affected for each lizard species and

        iii. Quantify the extent of lizard habitats affected for each lizard species.

    b. A requirement to provide a Lizard Management Plan upfront and ahead of consenting that:

        i. Disregards the EIANZ guidelines and opts instead for clear & precise expert commentary of values, magnitude, level and significance of effects.

        ii. Conforms to the DOC LMP template[76] that caters for dual-purpose RMA/Wildlife Act LMPs.

        iii. Applies the mitigation hierarchy to actual and potential adverse effects and compensates for any residual effects that are deemed significant.

        iv. Adheres as far as technically feasible to principles in Appendix 4 of the NPS-IB, if compensation is required.[77]

        v. Describes a best practice lizard salvage regime that conforms to relevant principles in the DOC salvage principles guidance document.[78]

106. Should conditions be imposed that cover these matters, I will be confident any adverse effects of the proposal on lizard values will be appropriately avoided, remedied or mitigated, and/or compensated for.

[76] https://www.doc.govt.nz/globalassets/documents/about-doc/concessions-and-permits/wildlife-research-permits/lizard-management-plan-template.pdf

[77] [2023] NZEnvC 103 Friends of Conical Hill Incorporated v Hurunui District Council and Hanmer Springs Thermal Pools and Spa [PDF, 223 KB]

[78] DOC TAG, 2019. Key principles for lizard salvage and transfer in New Zealand. Department of Conservation. 19 pages.

Appendix 2- Avifauna- Section 42A report prepared by Hamish Dean, SLR Consulting.

Before the Independent Hearing Panel appointed by the Canterbury Regional Council

IN THE MATTER OF The Resource Management Act 1991

AND

IN THE MATTER OF Application CRC243699 by Protranz International Limited application for earthworks, quarrying and landfilling at Whiterock Quarry, 150 and 174 Quarry Road, Loburn, North Canterbury.

Section 42A Officer's Report

Report of Hamish Dean

26 January 2025

Introduction

Background

1. This report forms part of the Environment Canterbury's audit of the assessment of environmental effects (AEE) provided by Protranz International Limited (the applicant) in support of resource consent applications CRC243699.
2. This report will provide the decision-maker with information and advice related to:
    a. The actual and potential effects of the proposed activities on avifauna and;
    b. The management of pest animals.

Qualifications

3. My full name is Hamish Alston Dean.
4. I hold the qualifications of Bachelor of Science (Ecology and Zoology) from Victoria University of Wellington, and Master of Science in Biological Sciences (Ecology) from the University of Waikato.
5. I have worked in the fields of ecology and natural resource management for 21 years, working in consultancy, not for profit organisations and at Bay of Plenty Regional Council (**BOPRC**). I am currently a Principal Ecologist at SLR Consulting (**SLR**). I have held this position since June 2021. Prior to joining SLR (then 4Sight Consulting) I was a Consents Team Leader at BOPRC.
6. I am a generalist terrestrial ecologist with a broad range of experience in vegetation ecology, wetlands, avifauna, pest animal control, and ecological restoration. This experience includes survey, monitoring, assessment and management of a range of ecosystem types. Some examples of my recent experience are summarised below.
7. I have designed and undertaken bird monitoring programmes, including at Aongatete Forest (2022) and Ohope Scenic Reserve (2023). These projects involved avifauna monitoring in Aongatete Forest in the Kaimai Range, and at Ohope Scenic Reserve, and Matata Scenic Reserve in the Eastern Bay of Plenty. Over 100 5-minute bird count

stations were measured and data was used to assess the effectiveness of pest animal control by measuring change in bird populations over time and against control sites.

8. I was field lead for a team that undertook comprehensive surveys of vegetation, wetlands, fauna, and fish passage for the reconsenting of an existing mineral extraction operation at Taharoa in the North Island. This survey across a 940 ha site included cryptic bird survey, shorebird survey and point counts. I wrote the terrestrial vegetation and wetlands technical report and prepared and presented expert evidence for the resource consent hearing.

9. I have undertaken or managed numerous Ecological Impact Assessments which have generally included site assessments of vegetation, wetlands, fauna, pests and aquatic values and subsequent reporting and impact assessment. Recent examples have included solar farms at Opunake, Carterton, Marton and in the Tasman District.

10. I managed the expansion of the pest animal control operation at the Aongatete Forest Restoration project. This involved design and implementation of a new multi-species control network across more than 100 ha, along with monitoring. I have also been involved with pest animal control operations for other community groups, including the Otanewainuku Kiwi Trust and was part of the kiwi management and kokako translocation teams.

11. I have read and am familiar with the Environment Court's Code of Conduct for Expert Witnesses, contained in the Environment Court Practice Note 2023, and agree to comply with it. My qualifications as an expert are set out above. Other than where I state that I am relying on the advice of another person, I confirm that the issues addressed in this report are within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

Scope of Report

12. This report is prepared under the provisions of Section 42A of the Resource Management Act 1991 (RMA). This section allows a council officer or consultant to provide a report to the decision-maker(s) on a resource consent application made to the council and allows the decision-maker(s) to consider the report at the hearing. Section 41(4) of the RMA allows the decision-maker(s) to request and receive from any person who makes a report under Section 42A "*any information or advice that is relevant and reasonably necessary to determine the application*".

13. This report is supplementary to the Section 42A Report prepared by the Environment Canterbury for the above resource consent applications. Full details of the consent applications are provided in that report.

14. To carry out this audit of the consent applications, I have:

    a. Considered the relevant sections of the assessment of effects on the environment (AEE) submitted by the applicant, including its technical appendices.

    b. Reviewed Revision 1 of the proposed consent conditions dated 23 August 2024 supplied by the applicant.

    c. Taken into account relevant issues raised by submitters in relation to the effects I have considered in this report.

    d. Visited the site on January 24th 2025.

15. Finally, this report provides conclusions on the scale and significance of adverse and positive effects.

16. If the decision makers are of a mind to grant the application, this report provides recommendations on conditions of consent, and management plan that are required to ensure adverse effects can be adequately avoided, remedied or mitigated.

Description of the Affected Environment

17. The application provides a comprehensive description of the existing environment, including the history of the site, cultural, ecological, geological and landscape context.

18. The site lies within the Oxford Ecological District and is described as 28 ha in size and on a west facing slope with the Karetu River to the west, farmland to the north and east and exotic forestry to the south. The northern part of the site (176 Quarry Road) comprises a 14 ha parcel of land containing a Waimakariri District Significant Natural Area, while the southern part of the site has been quarried for limestone since the early 1950s.

19. The Karetu River catchment in which the site is located comprises 3,119 ha on the southern slopes of the Okuku Range and Mount Karetu flowing south to the Grey and then Okuku Rivers. The catchment is entirely rural with landcover of predominantly high producing exotic grassland (45%) and exotic forest (24.3%), with only 13.5% remaining in indigenous habitats which is mostly in the upper catchment[1].

Avifauna methodology and values

20. The EcIA included a desktop assessment to ascertain the likely avifauna of the area using the eBird database[2]. This is a typical first step in a fauna assessment and is appropriate. In addition to the desktop assessment, avifauna was surveyed on nine occasions between September 2022 and June 2023, with three surveys in spring, three in summer (January), two in autumn and the final one in winter. The number of surveys and the spread across the year was commensurate with the likely level of effect and could be expected to provide adequate detail on the bird species using the site.

21. However, no detail on how surveys were undertaken or whether the whole site was covered on each occasion were supplied. It is assumed that walk-through surveys were undertaken but it would have been good to have the route taken and the method used explicitly stated. Although more detail on the methodology should have been provided, I do not consider that this would have fundamentally affected the outcomes of the ecological values assessment or the assessment of effects.

22. The approach taken to assess ecological value and effects is consistent with the EIANZ guidelines (Roper-Lindsay *et. al.* 2018). These guidelines have been criticised for potentially downplaying values and effects and being used to justify loss. However, they provide a solid framework for assessing ecological impact provided they are used with care and ecologists sense check the results using expert judgment. The author of the EcIA mentions the need to apply judgment and in the case of avifauna has done so.

23. Through desktop and field surveys the Ecological Impact Assessment (EcIA) identified 36 bird species known or likely to occur on the site or in the Zone of Influence (ZOI), including two Threatened and two At Risk species[3]. Fifteen species were directly observed on the site. A pair of kārearea (New Zealand falcon, Threatened – Nationally Vulnerable) were recorded travelling through the site, and little shag (At-Risk – Relict)

[1] Analysis derived from the New Zealand Landcover Database v5. Landcare Research.
[2] Sullivan, B.L., C.L. Wood, M.J. Iliff, R.E. Bonney, D. Fink, and S. Kelling. 2009. eBird: a citizen-based bird observation network in the biological sciences. Biological Conservation 142: 2282-2292.
[3] Robertson HA, Baird KA, Elliott GP, Hitchmough RA, McArthur NJ, Makan TD, Miskelly CM, O'Donnell CFJ, Sagar PM, Scofield RP, Taylor GA, Michel P. 2021: Conservation status of birds in Aotearoa New Zealand, 2021 . New Zealand Threat Classification Series 36. Department of Conservation, Wellington. 43 p.

was detected through eDNA sampling in the Karetu River. The other two threatened or At-Risk species (black-fronted tern and South Island pied oystercatcher) were thought unlikely to occur on the site. Other birds observed on the site were common native species or exotics typical of open and partially forested rural areas. For birds not observed through field survey an indication of the likelihood of them occurring on the site was included in the EcIA.

24. The survey methodology used, including the desktop assessment, is generally appropriate for the site and the project and it is unlikely that any rare, threatened or unusual species would have been missed. After email correspondence with Grant Davey of the Ashley Rakahuri Rivercare Group I consider it very unlikely that threatened braided river birds such as black-fronted tern or banded dotterel regularly utilise the Karetu River or the site.

25. When I visited the site in January 2025, I observed three kārearea which were actively hunting within the quarry. These may have been a pair and a juvenile, but I cannot confirm this. They were utilising tall pine trees around the site and the bluffs at the southern end of the SNA as perches from which to hunt prey. I observed them hunting across the quarry site for the two hours I was there. Although the applicant's ecologists recorded falcon traversing and resting in the site the value of the site to these birds is not well covered.

26. The ecological value of the avifauna on the site was assessed using the EIANZ criteria and the criteria in the Canterbury Regional Policy Statement (**CRPS**) to give an overall Moderate value, which I agree with. The presence of kārearea traversing the site and little shag detected through eDNA may not be enough to warrant a Very High score for rarity and distinctiveness but under the EIANZ system the overall score would still be Moderate even if the rarity and distinctiveness criterion was High or Moderate. The wider site was rightly classified as significant under the CRPS because of the presence of kārearea.

27. However, after considering the Moderate score assigned to avifauna, the author of the EcIA applied professional judgment to lower the score to Low. This was based on the fact that the surveys covered the whole property owned by the applicant (including the SNA area), but the impact area covered a much smaller area at the southern end of the site. This is a slightly confusing way to undertake the assessment because in this case a large part of the area surveyed and included in 'the site' is outside of the ZOI, which was defined as within 50 m of works or disturbance areas. All the species found in the wider site (that includes the SNA) could also utilise parts of the ZOI, although I acknowledge that the habitat is less suitable, so lowering the score from Moderate to Low is difficult to justify.

28. Given my own observations of kārearea at the site, including the way they were utilising the site, I think it is difficult to justify the observation that these birds were only 'traversing the site' and more information would be needed on their site use to support the drop from Moderate to Low value.

29. In my opinion, a more appropriate way to undertake the assessment is to retain the Moderate value and reduce the magnitude of effect of the works on avifauna (if appropriate to do so) because any effect would be only on a small number of individuals or on low quality avifauna habitat.

Pest animal methodology and prevalence

30. A pest animal survey was undertaken as part of the EcIA. This included site walkovers and incidental observations of pest sign such as tracks, scat and browse, as well as a dedicated survey of small mammals using tracking tunnels.

31. Surveys targeted only hedgehogs, rodents and mustelids and no specific survey was carried out for possums, rabbits or hares. Nevertheless, nine pest species were confirmed to be using the site.

32. The survey effort was appropriate and although detailed methods were only provided for the tracking tunnel survey, the approach was adequate, and most of the pest species likely to be on the site were identified. The exceptions are mustelids, and particularly ferrets and stoats which are highly likely to utilise this site as part of a wider hunting territory.

Assessment of Effects on the Environment

Actual and Potential Effects on Avifauna

33. Relevant works and activities under the proposal include extraction and processing of lime and overburden during the operation of the quarry, construction of roads, ponds, and sediment controls during the construction phase, regular heavy vehicle movements, and vegetation clearance.

34. It is important to note that the Significant Natural Area to the north of the site will be completely avoided, except for the construction of a stock proof fence around the perimeter which will have no impact on avifauna.

35. The potential adverse effects of the proposal on avifauna are discussed in the EcIA and include noise, dust, and vibration disturbance as well as destruction of bird habitat. A more quantitative assessment of the amount of habitat being lost and which species are likely to be affected would have been beneficial, especially as it relates to absolutely protected indigenous species.

36. The magnitude of unmitigated effect on avifauna was assessed as negligible which I think is understated given that habitat for indigenous bird species is being destroyed and there is potential for nests to be destroyed. Overall, the level of unmitigated effect on avifauna was assessed in the EcIA as Very Low.

37. The assessment of effects on kārearea may also be slightly understated because there is at least potential for a greater level of effect than has been assessed. Although there is plentiful habitat for kārearea to the north in the SNA area, falcon are known to breed in cutover exotic pine plantation[4] and on bluffs and they could utilise part of the impact area for nesting. Given the existing level of disturbance this seems unlikely, but they appear to be breeding in close proximity to the quarry, and the proposed activities could result in destroyed nests or breeding failure. As kārearea are a Threatened species the National Policy Statement for Indigenous Biodiversity (**NPS-IB**) policy of applying the effects management hierarchy applies.

38. On that basis, the overall level of unmitigated effect of the works on avifauna, assigned as Very Low in the EcIA, may better be assigned as Moderate. The implications of this are that avoidance measures, specifically relating to kārearea, are recommended to be included in consent conditions. These are discussed in paragraph 42 below.

39. In my opinion impacts from the proposal on all avifauna apart from kārearea will be minimal and limited to short-duration disturbance events not dissimilar to the status quo, and minor loss of low-quality habitat for indigenous species. There is potential for disturbance or destruction of nests of indigenous avifauna which are absolutely protected by the Wildlife Act 1953, but I do not consider that this constitutes any more

[4] Seaton, R.; Hyde, N. 2013 [updated 2022]. New Zealand falcon | kārearea. In Miskelly, C.M. (ed.) New Zealand Birds Online. www.nzbirdsonline.org.nz

than a Low level of effect in the RMA sense and remains a Wildlife Act compliance matter.

40. To comply with the objectives and policies of the NPS-IB, the EcIA has adopted a precautionary approach and recommends several measures to manage what effects there are on avifauna. These include:

    a. Development and implementation of a Bird Management Plan (BMP), to include:

        i. Restrictions on work during bird nesting and fledging periods.

        ii. Details on management of effects.

        iii. Procedures for discovery of active nests.

        iv. Development of an Accidental Discovery Protocol for threatened and At-Risk species.

    b. Development of a Vegetation Management Plan which will detail plantings to enhance habitat for birds.

    c. Mammalian pest control as part of a Site Management Plan.

41. The development of a BMP has not been carried through to the applicant's proposed condition set.

42. In the absence of kārearea I would not recommend a BMP or specific conditions relating to birds. However, as there is a risk that kārearea could be using the ZOI and could be impacted by the proposal, a condition requiring a suitably qualified and experienced ecologist to undertake a search for kārearea nests prior to any expansion of earthworks or vegetation clearance during their peak breeding season (September to March) is recommended. If nests are found, the area should be avoided, and an appropriate buffer set up until the chicks have fledged. The applicant's ecologist should be required to provide a brief report to the consenting authority on the findings of any such nest search and the management measures to be undertaken. An advice note on compliance with the Wildlife Act 1953 should also be included.

Pest animal management

43. Although not required to manage the effects of the proposal, the applicant is proposing to fence the SNA to the north of the site to exclude livestock. This will protect the high-value indigenous flora and fauna in the SNA from browsing ungulates and represents a positive effect.

44. Pest animal control is also recommended in the EcIA to protect the proposed indigenous plantings within the site and to protect lizard populations. This level of pest animal management is appropriate, although I defer to Dr Tocher on the efficacy of the proposed control for lizard protection.

45. A condition requiring pest animal control has been included in the proposed District and Regional land use consents. This condition should include a purpose of the pest animal control to reduce the risk that non-targeted, ineffective pest control will be done. It should also include a timeframe and should include control of mustelids.

Off-setting of, or Compensation for, Actual and Potential Adverse Effects to Ensure Positive Effects on the Environment

46. Although not required to offset any residual adverse effects on avifauna, two proposed consent conditions may contribute to a net gain in avifauna values at the site:

a. The Development of a Vegetation Management Plan which will detail plantings to enhance habitat for birds; and

b. The establishment of pest control as part of a Site Management Plan.

47. Provided conditions requiring avoidance of kārearea nests are also included, these two conditions will result in a positive effect on avifauna.

Consideration of Submissions

48. At least five hundred submissions were made on the application from individuals, community organisations, and companies. All submissions were summarised and key word searches were done to find submissions relevant to avifauna and pest animals. These were then read in full.

49. In paragraphs 50 to 60 below, I discuss the main topics raised by submitters.

Avifauna

50. A large number of submissions mentioned effects on birds or wildlife in general. These varied in the level of specificity but were generally relating to the following potential or perceived effects on birds:

a. Adverse effects on birds resulting from contaminants entering the environment via dust or discharge of leachate. This included concern about impacts on the bird habitats of the Ashley River downstream of the site;

b. Disturbance of birds by increased levels of noise from traffic and other activity associated with the site;

c. Non-specific effects on flora and fauna from the activity as a whole; and

d. An increase in scavenger birds.

Contaminants

51. Several submissions mention the potential for contaminants to enter the Karetu River, particularly from leachate, and the effect this could have on water quality, the aquatic ecosystem and on threatened and significant river birds which utilise the braided river system. Although this potential issue has not been addressed by the applicant in relation to avifauna, the potential effects on aquatic ecosystems and water quality, on which some birds rely, have been addressed.

52. The applicant has detailed a series of controls to prevent leachate entering the river or the groundwater, along with monitoring of water and the aquatic ecosystem, and assessed the level of effect from potential pollution on aquatic fauna as Low prior to management, and as a net gain with the proposed management.

53. The likelihood of the proposed activity polluting the Karetu River and the vectors through which that might happen are outside my area of expertise and I leave others to comment on these issues and the adequacy of the proposed controls. However, it is my understanding from the evidence of Ms Tiernan[5] that there is the possibility that leachate could enter the river and groundwater under several scenarios. Should this happen, there may be adverse effects on avifauna along with other components of the ecosystem.

54. A range of potentially toxic substances have been identified as possibly occurring in the landfill leachate, including ammonium, arsenic, chromium and boron. I understand from

[5] s42a report of Fleur Tiernan.

the evidence of Dr Silver[6] that per- and poly-fluoroalkyl substances (**PFAS**) are also likely to be present in leachate despite known sources of these substances being banned from the landfill. Some PFAS (e.g. PFOS) are known to adversely affect breeding success of avifauna[7,8]. These chemicals also bioaccumulate, meaning levels in animals higher up the food chain become much higher than in those lower down, and they pass readily from mother to offspring[9]. In aquatic ecosystems PFAS can be ingested by invertebrates which are prey for river birds as well as for fish, which is turn may be preyed upon by birds.

55. The Ashley Rakahuri River is a braided river system which provides regionally or nationally significant breeding habitat for river birds including the Nationally Endangered[10] black-fronted tern (*Chlidonias albostriatus*), Threatened wrybill (*Anarhynchus frontalis*), and At Risk – Declining, black-billed gull (*Chroicocephalus bulleri*). Any potential threat to these species and the habitat they rely on needs to be carefully considered and properly characterised and quantified. In the application material this has been done for aquatic ecosystems but not for the avifauna that rely on them for food.

56. A draft guideline value (DGV) for PFOS in freshwaters was published in May 2023[11] and guideline values for avifauna food and eggs derived from Canadian data were published in 2019 by MfE[12]. The freshwater DGV does not account for bioaccumulation and it is recommended that the 99% species protection value is used for slightly-to-moderately disturbed ecosystems.

57. I support the monitoring recommendations made by Ms Tiernan in paragraphs 107 to 110 of her reporting evidence as a means by which to gauge risk on downstream avifauna, but I note that once PFAS are in the waterway, removing them would be extremely expensive, if it is even possible. While monitoring water quality closer to the high value avifauna habitat in the Ashley Rakahuri River and monitoring concentrations of PFAS in aquatic invertebrates or in eggs may give better information on the effects on avifauna, preventing contaminants from entering the waterway in the first place is the only way to guarantee their protection.

Disturbance of birds

58. Several submissions raised concerns over disturbance of birds by increased levels of machinery movement and activity at the site, and some submissions, including that of Mr Mackintosh[13], talk about kārearea regularly nesting along the limestone ridge on which the quarry is situated and express concern for their wellbeing.

59. I have discussed potential disturbance of kārearea in paragraphs 36 to 42 above and I do not have any major concerns for other bird species, given the activities will be of a similar nature as the status quo, albeit more regular. In my opinion the only concern is

[6] s42a report of Dr Matthew Silver.
[7] Odegard, A., E. Pavlovic, A. Pesano, AND M. Etterson. Exposure and Effects of PFAS on Birds. Twin Ports Freshwater Folk Meeting, Duluth, MN, February 01, 2023. https://doi.org/10.23645/epacomptox.22587274
[8] Custer CM, Custer TW, Dummer PM, Etterson MA, Thogmartin WE, Wu Q, et al. 2014. Exposure and effects of perfluoroalkyl substances in tree swallows nesting in Minnesota and Wisconsin, USA. Arch Environ Contam Toxicol 66:120-138
[9] Ricolfi L, Taylor MD, Yang Y, Lagisz M, Nakagawa S. Maternal transfer of per- and polyfluoroalkyl substances (PFAS) in wild birds: A systematic review and meta-analysis. Chemosphere. 2024 Aug;361:142346. doi: 10.1016/j.chemosphere.2024.142346. Epub 2024 May 15. PMID: 38759804.
[10] Robertson HA, Baird KA, Elliott GP, Hitchmough RA, McArthur NJ, Makan TD, Miskelly CM, O'Donnell CFJ, Sagar PM, Scofield RP, Taylor GA, Michel P. 2021: Conservation status of birds in Aotearoa New Zealand, 2021. New Zealand Threat Classification Series 36. Department of Conservation, Wellington. 43 p.
[11] ANZG 2023, Toxicant default guideline values for aquatic ecosystem protection: Perfluorooctane sulfonate (PFOS) in freshwater. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. CC BY 4.0. Australian and New Zealand Governments and Australian state and territory governments, Canberra, ACT, Australia.
[12] Ministry for the Environment. 2019. PFAS investigation, response and funding guidance. Wellington: Ministry for the Environment.
[13] Submission of Duncan Stuart Mackintosh dated 9 October 2024.

disturbance of nesting kārearea and I have recommended in paragraph 42 that a condition be included to manage this risk.

Scavenger Bird Issues

60. At least one submission[14] raises concern that scavenger birds and rodents will be an issue. In my opinion, given that no household or food waste is to be allowed at the landfill, this concern is not justified.

Conclusions and Recommendations

61. Overall, I consider that the proposal is likely to have only a Low level of effect on avifauna with two exceptions:

    a. Potential adverse effects on kārearea could be of a Moderate level and need to be managed;

    b. Potential downstream adverse effects on threatened avifauna in the Okuku and Ashley/Rakahuri rivers resulting from contaminants entering the Karetu river need to be carefully considered.

62. To manage potential effects on kārearea, I recommend including a condition requiring a suitably qualified and experienced ecologist to undertake a search for kārearea nests prior to any expansion of earthworks or vegetation clearance during their peak breeding season (September to March). If nests are found, the area should be avoided, and an appropriate buffer set up until the chicks have fledged. The applicant's ecologist should be required to provide a brief report to the consenting authority on the findings of any such nest search and the management measures to be undertaken. In addition, an advice note on compliance with the Wildlife Act 1953 should also be included.

63. The likelihood of river contamination occurring and the pathways by which this may occur are outside my area of expertise, but I support the monitoring recommendations made by Ms Tiernan, including the addition of PFAS/PFOS monitoring as a means of assessing potential risk on downstream avifauna.

[14] Submission of Dave Sewell. Dated 25 September 2024.

Appendix 3- Vegetation and Wetland Section 42A report, prepared by Dr Stephen Rate, SLR Consulting.

Before the Independent Hearing Panel appointed by the Canterbury Regional Council

IN THE MATTER OF The Resource Management Act 1991

AND

IN THE MATTER OF Application CRC243699 by Protranz International Ltd for operation of a quarry and landfill at 150 and 174 Quarry Road, Whiterock (Loburn)

Section 42A Officer's Report

Report of Stephen Ronald Rate

Introduction

Background

1. This report forms part of the Environment Canterbury's audit of the assessment of environmental effects (AEE) provided by ProTranz (the applicant) in support of resource consent application CRC243699.
2. This report will provide the decision-maker with information and advice related to:
    a. the actual and potential effects of the proposed activities on terrestrial vegetation and wetlands.

Qualifications

3. My full name is Stephen Ronald Rate. I hold a PhD in Ecology, obtained from the University of Otago in 2005. I have worked as an ecological consultant for the last 19 years, focusing on terrestrial and wetland systems throughout New Zealand. I have been based in Dunedin since 2007, joining SLR Consulting in 2022, where I am currently a Senior Ecologist.
4. My relevant experience includes undertaking assessments of ecological effects and significance assessments for a range of activities including airports, residential subdivisions, irrigation schemes, wind and hydroelectric energy schemes, afforestation, ski field expansions, and industrial and quarry developments.
5. I regularly undertake natural wetland assessments as required under the National Policy Statement for Freshwater Management (NPS-FM) (Ministry for the Environment 2024).
6. I have read and am familiar with the Environment Court's Code of Conduct for Expert Witnesses, contained in the Environment Court Practice Note 2023, and agree to comply with it. My qualifications as an expert are set out above. Other than where I state that I am relying on the advice of another person, I confirm that the issues addressed in this report are within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

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8. This report is supplementary to the Section 42A Report prepared by the Environment Canterbury for the above resource consent applications. Full details of the consent applications are provided in that report.

9. To carry out this audit of the consent applications, I have:

    a. Considered the relevant sections of the assessment of effects on the environment (AEE) submitted by the applicant, including its technical appendices.

    b. Reviewed further information that was provided by the applicant: 1-E0087.00 Whiterock Landfill Post Lodgement Response to ECan RFI Section 4 – WET dated August 2024, wetland aspects of the Groundwater and Surface Water Effects Assessment dated15 May 2024, Revision 1 of the proposed consent conditions dated 23 August 2024 supplied by the applicant, revision B of the Monitoring Programme and Triggers and Action Response Plan (TARP), and the responses to s92 information requests (Wetland Ecology).

    c. Taken into account relevant issues raised by submitters in relation to the effects I have considered in this report.

10. This report provides conclusions on the scale and significance of adverse and positive effects.

11. In addition, a site visit was undertaken on 27 May 2024 which entailed a site walkover and discussion with the applicant's ecologist.

Description of the Affected Environment

12. The application and accompanying Ecological Impact Assessment (EcIA) provides a very broad overview of the site, describing the site's location within the Oxford Ecological District, adjacent to the Karetu River, the Waimakariri District Significant Natural Area (SNA 039), the limestone escarpment, and the site's setting within largely agricultural land[1].

13. The application outlines the proposed works, zones of influence, and duration, and provides a summary list of actual and potential impacts on ecological values. In relation to terrestrial vegetation and wetlands the proposed works will include vegetation removal within the proposed quarry footprint and modification to groundwater and surface water hydrology near wetlands within the site.

Vegetation Assessments

14. The EcIA included a desktop assessment to review former vegetation cover of the site and surrounding area, and GIS layers of current vegetation mapping before onsite surveys of vegetation types were undertaken.

1.

[1] Appendix G Ecological Impact Assessment, Section 1.2 Site location, Description, and Ecological Context

15. The walk-through assessments that were undertaken to describe and map the vegetation and habitats present are an appropriate survey technique[2]. The assessment methodology was generally adequate although somewhat lacking in detail. For example, during the site visit, several plant species not listed in the species lists were observed. Due to the omission of many plant species, it is unclear whether any important species may have been overlooked. Nevertheless, due to high levels of modification at the site, the probability of important plant species being present outside the SNA is likely to be low.

Wetland Delineation and Description

16. The wetland delineation assessment[3] was undertaken in line with the requirements under the National Policy Statement for Freshwater Management (Ministry for the Environment 2024) and the wetland delineation protocols (Ministry for the Environment 2022). The findings generally concur with observations undertaken in the wetlands during the site visit.

17. Wetland extent is accurately demarcated at these sites. Mapping of wetland boundaries based on the vegetation community, hydrological features, topography and professional judgement[4] is considered appropriate.

18. The descriptions of the wetlands are generally sufficient, and include hydrology, plant species composition, and levels of modification.

19. I concur with the Ecological Impact Assessment (Appendix G) that both the upper and lower wetlands meet the definition of a natural inland wetland under the National Policy Statement for Freshwater Management.

Significance assessments

20. The significance assessments undertaken for wetlands are problematic.

21. In Tables 21 and 23 of the EcIA, the outcome of the significance assessments for wetlands is greatly influenced by the determination that no indigenous vegetation is present and therefore criteria 1-8 and 10 from the CRPS (Environment Canterbury Regional Council 2021) do not apply[5].

22. The determination of whether indigenous vegetation is present is mostly based on the cover of indigenous species in two wetland delineation plots in each wetland which are then averaged for each wetland, with a mean of <50% indicating the presence of exotic vegetation[6].

23. However, what constitutes indigenous vegetation is not defined in the CRPS. Second, two of the plots (one in each wetland) have greater than 50% cover of indigenous species indicating the presence of indigenous vegetation. Third, mosaics of indigenous and exotic vegetation are typically observed in wetlands and the entire wetland does not need to contain indigenous vegetation for indigenous vegetation to be present.

24. Based on the wetland delineation plot data and my own observations on site, it is my opinion that indigenous vegetation is present in both of the wetlands identified at the site, along with areas of exotic vegetation.

25. If indigenous vegetation is present in both wetlands, then the criteria in the CRPS have not been assessed correctly. The EIANZ guidelines (Roper-Lindsay *et al*. 2018) used in the assessment state that attributes to be considered for the Rarity/Distinctiveness

1.

[2] Appendix G Ecological Impact Assessment, Section 4.5 Flora and Vegetation
[3] Appendix G Ecological Impact Assessment: Appendix C – Wetland Delineation data
[4] s92 response, WET-001 (WSP 2024e)
[5] s92 response Section 004 Wetland Ecology, responses WET-002 and WET-005 (WSP 2024e)
[6] s92 response, Section 004 Wetland Ecology, response WET-002 (WSP 2024e)

criterion include whether the habitat type is naturally uncommon or has induced scarcity. Freshwater wetlands are much reduced at a national scale with <10% of their original extent remaining (Cromarty and Scott 1995). Freshwater wetlands are also rare in Oxford Ecological District (where the quarry is located) where it is estimated that they originally covered and still cover <1% of the district (Harding 2009).

26. It is my opinion that the wetlands at the site meet Rarity/Distinctiveness criterion 3 of the CRPS as they contain indigenous vegetation in a habitat type which has been reduced to less than 20% of its former extent in the region, or relevant land environment, ecological district, or freshwater environment. This assessment concurs with the examples of habitat types (including lowland wetlands) which meet criterion 3 in the guidelines for application of the CRPS ecological significance criteria (Wildland Consultants 2013).

27. In addition, Table 10 of the EcIA appears to show that SNA 039 also does not meet the significance criteria. This is clearly incorrect, as the Rarity criterion alone would be easily met due to the presence of a range of Threatened and At Risk plant species (Hutcheson & Reinders 2024). At least two of these species are located near the southern boundary of the SNA where it abuts the quarry area (personal observation).

28. It may have been more appropriate to assess the significance of areas within the quarry and the SNA separately, for clarity.

29. Nevertheless, the conclusions reached in the EcIA are considered accurate – that the highest values lie in the SNA (not adversely affected by the proposal) and the wetlands and watercourses.

Assessment of Effects on the Environment

Actual and Potential Effects on the Environment

30. The assessment of effects on terrestrial vegetation and wetlands provided in the EcIA is considered to be generally accurate.

31. The EcIA identifies that the highest value vegetation and habitats are present in the SNA and these will be avoided by the proposed activity. Effects of the landfill on terrestrial vegetation are largely limited to exotic vegetation.

32. The extent of works will avoid directly encroaching into the site wetlands and the associated eastern boundary watercourse, with the intent that surface flows to the wetlands remain unaffected. A minimum 10m setback from the upper wetland is proposed.

33. Works are expected to result in changes to groundwater discharge that will have some effect on the lower wetland through a reduction in groundwater recharge. Such changes could ultimately impact vegetation composition and the extent of the wetland[7]. The hydrology report indicates that mitigation in the form of redirecting intercepted groundwater to the wetland is proposed.

34. The pre-mitigation potential reduction in the area of a wetland may be relevant to rules regarding wetlands in the Canterbury Land and Water Regional Plan 2023.

35. The proposed Water Permit conditions (Condition 5) specifies that the ground water take must not cause a permanent reduction of extent of the lower wetland. There appears to be a disconnect between the anticipated effects outlined in both the ecology and hydrology reports and this requirement. The hydrology report indicates that mitigation in

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1. [7] Potential effects on wetland extent are mentioned, for example, in Appendix G Ecological Impact Assessment, Section 4.9.7.

the form of redirecting intercepted groundwater to the wetland is proposed. That report also notes the removal of the plantation pine trees is likely to have increased baseflows that would previously have been intercepted by these trees. The ecology report notes that selective plant choice for the lower wetland could be undertaken to help retain surface water.

36. There is no disagreement that without mitigation there will be an adverse effect on the wetland hydrology, and it is appropriate to manage this effect through consent conditions to provide surety that impacts on the wetland are avoided or minimised.

37. The level of adverse effects on the lower wetland are considered by the applicant to be low[8], based on low wetland values and a moderate magnitude of effect of long-term groundwater drawdown of up to 0.2 m at the wetland and up to 0.4 m up gradient of the wetland[9]).

38. However, if the lower wetland is considered to be ecologically significant due to the Rarity criterion being met, and assigned a Moderate ecological value on that basis (see paragraphs 20-25 above), while the magnitude of effect remains Moderate, then the level of adverse effects would be Moderate (based on Tables 6, 8, and 10 of the EIANZ guidelines for Ecological impact assessments (Roper-Lindsay *et al*. 2018)), which has implications for the level of mitigation required.

39. However, the EIANZ process does not fully account for the requirements of the NES-F, including working through the effects management hierarchy.

Off-setting of, or Compensation for, Actual and Potential Adverse Effects to Ensure Positive Effects on the Environment

40. The proposed mitigation for potential effects on terrestrial vegetation is considered appropriate. The mitigation measures proposed by the applicant include remediation of the landfill site following closure, hydroseeding, stock exclusion fencing on both sides of the eastern watercourse, and planting of eco-sourced indigenous species alongside the watercourse[10]. Monitoring of planting success and weed control is also proposed (e.g. CRC243700 proposed condition 46).

41. However, there is uncertainty with what is considered required as mitigation and what is being offered up by the applicant. For example, in Table 11 the Ecological Impact Assessment includes a proposed mitigation approach to “remediate the loss of any indigenous vegetation by replacing with indigenous eco-sourced vegetation”. It is unclear what area of vegetation loss this refers to or at what ratio vegetation loss should be replaced at. It would be useful to specify which areas of indigenous vegetation will be affected and mitigated.

42. Adverse effects on the lower wetland are proposed to be mitigated by enhancing seepage flows, providing additional surface water flows, and planting of indigenous species to retain surface water. These actions would better be considered remediation, not minimisation (as stated in the EcIA[11]), as they will be implemented after the effect on wetland hydrology has occurred.

43. The National Environmental Standards for Freshwater (NES-F) require that any effect on natural inland wetlands must be managed using the effects management hierarchy. I disagree with the s92 response that effects on wetlands are avoided, and therefore that the NES-F is not relevant, given that the justification provided includes examples of

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[8] Appendix G Ecological Impact Assessment, Section 4.9.6
[9] Groundwater and surface water effects assessment. Rev 0, Figure 5-3
[10] Appendix G Ecological Impact Assessment, Section 4.9
[11] Appendix G Sections 4.9.7 and 6.6

remediation (enhancing seepage flows, planting indigenous species to retain surface water) to address adverse effects.

44. From my understanding of the application, I have assessed adverse effects on wetlands using the effects management hierarchy in Table 1.

Table 1. Effects management hierarchy for effects on wetlands (National Environmental Standards for Freshwater)

Effects management hierarchy	Assessment
effects management hierarchy means an approach to managing the adverse effects of an activity on indigenous biodiversity that requires that:	
(a) adverse effects are avoided where practicable; then	Some effects on wetlands are avoided, such as direct damage to wetlands through earthworks, by the use of a protective buffer Groundwater modelling predicts adverse effects on the lower wetland (lowered groundwater discharge) which may result in changes to wetland extent and vegetation composition
(b) where adverse effects cannot be avoided, they are minimised where practicable; then	Minimisation is not proposed [presumably because it would require significant changes to the application]
(c) where adverse effects cannot be minimised, they are remedied where practicable; then	Proposed remediation includes enhancing seepage flows and planting of indigenous species to retain surface water
(d) where more than minor residual adverse effects cannot be avoided, minimised, or remedied, biodiversity offsetting is provided where possible; then	Biodiversity offsetting is not proposed as it is considered that adverse effects will be remedied
(e) where biodiversity offsetting of more than minor residual adverse effects is not possible, biodiversity compensation is provided; then	Biodiversity compensation is not proposed [although fencing and planting of riparian areas is planned to enhance wetlands above the baseline level]
(f) if biodiversity compensation is not appropriate, the activity itself is avoided	Not applicable

45. The updated monitoring programme for wetlands (Appendix M Monitoring Programme and TARP RevB), is proposed to include additional baseline monitoring before work commences, twice yearly monitoring, monitoring of groundwater levels at proposed shallow monitoring wells GW4-1, GW5-1 and GW6-1, monitoring of wetland extent, and inclusion of a Triggers and Action Response Plan (TARP). These measures are supported and will help ensure that any adverse effects are identified and addressed through review and adjustment of mitigation actions.

46. However, there is much uncertainty in the likelihood of the proposed mitigation method for the lower wetland being successful and that as a result, effects cannot be properly assessed. For example, mitigation options will be governed by space constraints and land stability[12] and therefore the most effective solution may not be available when required. In addition, it is not known whether taking water upgradient of the wetland to supplement flows to the wetland will itself have a negative effect on the wetland by reducing residual groundwater flows, or indeed whether baseflow supplementation will be successful at all. Planting of wetland margins with indigenous species could also reduce water flow to the wetland[14] increasing the level of required mitigation. While planting to retain surface water/formation of an artificial wetland is proposed as mitigation for adverse effects on the lower wetland in the Ecological Impact Assessment[13], it is not mentioned in the Monitoring Programme and TARP[14], and it is therefore uncertain when this action may be undertaken or modified as a result of monitoring. No options are provided should the proposed mitigation actions prove unsuccessful.

Management Plans

47. It is proposed that a Vegetation Management Plan (VMP) is prepared within 6 months of commencement of the consent[15].

48. There are brief descriptions of the requirements of a VMP[16]. It will be important that he VMP includes all works required to meet the proposed mitigation goals, including details on planting, fencing, and weed control.

49. A Wetland Management Plan (WMP) is also proposed, which intends to ensure no loss of value is caused to the lower wetland, although no detail on the content of the WMP is presented.

Appendix Y Proposed Conditions Rev1

50. CRC243699 Proposed condition 2. A 10 m setback from wetlands meets the requirements for earthworks under the Resource Management (National Environmental Standards for Freshwater) Regulations 2020. This condition could be improved by requiring the 10 m buffer to be clearly delineated and/or temporarily fenced prior to works commencing to avoid accidental encroachment of machinery or spoil into the wetland.

51. CRC243700 Proposed condition 47, Pg 18. In my opinion, the timescale specified is inappropriate and requirements for infill planting following original planting should be based on monitoring. This condition would be improved by deleting ‘years two to three’ and adding that infill planting should be undertaken yearly to satisfy the requirements of condition 48.

52. The requirement for development and implementation of a WMP has not been included in the proposed conditions of consent. The s92 response for further information stated that this was not required as it is not part of mitigation and wetland monitoring (and actions and responses) are covered by the Monitoring Programme and TARP. It is unclear whether the proposed supplementation of water flows to the lower wetland is also covered by the WMP. Planting of indigenous species to retain surface water within the lower wetland is covered by VMP. Nevertheless, I believe any proposed plan should be included in the conditions of consent.

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2. [12] Whiterock Limestone Quarry and Managed Fill Landfill Resource Consent Applications and Assessment of Effects on the Environment 28 March 2024 (page 47)
3. [13] e.g. in Section 4.9.7 and Section 6.6.
4. [14] Appendix M Monitoring Programme and TARP (Draft Rev B) Table G. Lower Wetland Extent.
   [15] Appendix Y Proposed Conditions Rev1, RC245076 Land Use consent, condition 31
   [16] Appendix G Ecological Impact Assessment, Section 6.4

53. CRC243700 Proposed condition 48, Pg 18. The 75% survival rate is low, with best practice typically being 80-90%. Justification for this low figure is warranted.

54. Proposed Conditions (Rev1), Schedule 1, Wetland Margin Enhancement. It is recommended that the objectives for each proposed activity regarding wetlands be included in this schedule, e.g. planting for hydrological retention, to help retain surface water in the lower wetland.

55. Proposed Conditions (Rev1), Schedule 1. It is recommended that the proposed conditions or goals included in Schedule 1 should include requirements for woody weed control over the entire part of the SNA within the property. This control would align with the priorities outlined in Hutcheson & Reinders (2024) for enhancement of the SNA. This is important because the proposed fencing of the SNA will reduce grazing pressure, and therefore weeds may increase in abundance.

Consideration of Submissions

56. A key word search (supplied by CRC) was used to determine relevant submissions, which were read along with a search of a further selection of submissions (299 submissions).

57. It was noted that the predominant concerns relating to ecological matters were regarding contamination of water, particularly in the Karetu River. Relatively few submissions mentioned terrestrial vegetation or wetlands.

58. Many submitters used general terms to express concern for potential effects on terrestrial values, including “flora”, “local ecosystem”, “biodiversity”, and “environmental” (e.g. submission of R. van der Bos). These submissions could not be assessed in detail.

59. The key word search identified three submissions relating to “vegetation”. C. Onellion is “concerned about the proposed vegetation clearance and earthworks near waterways”. D. Gibbs is concerned about “Excavations & vegetation clearance outside of river bed”. B. De Goldi is concerned about spread of contaminated soil to vegetation and waterways. These concerns are addressed by the applicant (e.g. dampening down dust, earthworks set-backs from wetlands, undertaking indigenous plantings on riparian margins).

60. The key word search identified nine submissions referencing ‘wetland’. One additional submission mentioning wetlands was also identified. Several of these submissions were generalist in nature. For example, the submission of S. Fitzjohn is in opposition to the consent “because is carries environmental risks in the forms of…the alteration of wetlands…” and J. McCaleb states in his submission that he is “concerned that the applicant has little consideration for … the wetlands within its own property”. While noted, these submissions could not be assessed in detail.

61. Some submissions are more detailed in their concerns regarding wetlands. For example the submission from White Rock Community Incorporated raises several points including:

    - vegetation types in each wetland are not adequately described.
    - loss of wetland vegetation and extent due to earthworks and reduction in groundwater recharge/dewatering.
    - the ecological value of the wetland is not “low”.
    - the WMP should be submitted as part of the application.
    - works will require consent under the NES-F.

    These issues have been addressed by the applicant and in this evidence.

62. The submission of R. Conelly raised further issues regarding wetlands including contamination of wetlands, rarity of wetlands, and water take within 100m of wetlands. These issues have been addressed by the applicant or in this evidence.

63. The submission of Rangiora Ashley Community Board asked “How can they guarantee the effects on water quality would be less than minor when it is not known whether the groundwater monitor sites are useable in the lower wetlands?”. This question was answered by the applicant following the s92 request for information regarding the use of monitoring stations GW4-1, GW5-1 and GW6-1 to monitor water levels affecting wetlands.

64. The submission summary identifies nine submissions with concerns relating to the nearby Significant Natural Area (e.g. submissions of Z. Brock, L. Munroe, and M. Stanton). The application proposes to avoid the SNA, and concerns relating to proposed enhancement of the SNA have been outlined in this evidence.

Conclusions and Recommendations

65. The description of the environment is generally accurate, and the wetland delineation assessment appears to have been undertaken correctly.

66. In my opinion the ecological significance assessment for wetlands does not consider the rarity of wetlands, both at a natural scale and within Oxford Ecological District. On that basis, it is considered that the site wetlands are likely to meet the rarity criterion and would be significant under the Canterbury Regional Policy Statement criteria. Nevertheless, the conclusions reached in the EcIA are considered accurate – that the highest values lie in the SNA (not adversely affected by the proposal) and the wetlands and watercourses.

67. The assessment of effects for terrestrial vegetation is generally accurate, and the proposed mitigation is considered appropriate.

68. The assessment of effects for wetlands is affected by the outcome of the significance assessment. It is considered that effects on the lower wetland are Moderate, not Low as assessed in the EcIA. However, both wetlands should be protected, as the proposed consent conditions[17] specify that no reduction in the extent of the lower wetland is permitted, and no earthworks are permitted within 10 m of wetlands. In addition, the proposed monitoring and Triggers and Action Response Plan (TARP) will help ensure that any adverse effects are identified and addressed through review and adjustment of mitigation actions.

69. There is much uncertainty in the likelihood of the proposed mitigation method for the lower wetland being successful. As a result, effects cannot be properly assessed.

70. An independent assessment (Hutcheson & Reinders 2024) identified weed control as the priority action to be undertaken in and adjacent to SNA 039 to protect the habitats of threatened plant species. The proposed fencing of the SNA, while supported, is likely to reduce browsing pressure, which may lead to an increase in weed abundance. Targeted weed control within the SNA for the duration of the consent would therefore be a good way to compensate for any adverse effects on ecological values that could result from the proposed landfill, and should be part of the consent conditions.

71. Several other relatively minor adjustments to the proposed consent conditions (paragraphs 48-53) would also provide more certainty that the proposed mitigation actions are successful.

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[17] Appendix Y Proposed Conditions Rev1, CRC243703 Condition 5, page 35

72. The concerns of submitters regarding potential adverse effects on terrestrial vegetation and wetlands have been addressed by the applicant or in this evidence.

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86. WSP 2024d. Whiterock Lime Quarry and Landfill. Groundwater and surface water effects assessment. Rev 0. 15 May 2024.
87. WSP 2024e. 1-E0087.00 Whiterock Landfill Post Lodgement Response to ECan RFI Section 4 – WET. August 2024

Appendix 4- Geotechnical Section 42A report, prepared by Clive Anderson, Tonkin + Taylor.

Before the Independent Hearing Panel appointed by the Canterbury Regional Council

IN THE MATTER OF The Resource Management Act 1991

AND

IN THE MATTER OF Application CRC 243699 to 243706

Section 42A Officer's report

Report of: Clive Kenneth Anderson (Tonkin & Taylor Ltd)

1 Introduction

1.1 Background

1 Protranz International Limited (Protranz) proposes to operate a limestone quarry and processing plant, and to establish a Class 3 Managed Fill (landfill), that will also accept contaminated soils that will meet the Class 1 landfill leaching criteria, at the existing Whiterock Quarry in Loburn, North Canterbury. Protranz has applied to both Waimakariri District Council (WDC) and Canterbury Regional Council (known colloquially as ECan) for a range of resource consents required for the establishment and operation of the proposed hybrid Class 1/Class 3 Managed Fill (landfill).

2 Tonkin & Taylor Ltd (T+T) has been engaged by WDC to undertake a technical review of the geotechnical and slope stability assessments lodged by Protranz in support of its resource consent applications.

3 The purpose of this Report is to set out the findings of our Technical Review of Protranz's geotechnical and slope stability assessments to support a Section 42A report and inform a decision by WDC and ECan on the resource consent applications.

4 The following documents have been considered as part of this technical review:

- **Appendix E – Geotechnical Assessment:** Prepared by WSP, Revision 3, dated 19 March 2024 (referred to as the Geotechnical Assessment).
- **Appendix F – Groundwater and Surface Water Effects Assessment:** Prepared by WSP, Revision 0, dated 26 March 2024.
- **Appendix H – Design Drawing Set (Rev1):** Prepared by WSP, Revision 0, dated 18 March 2024. Updated to Revision 1, dated 6 August 2024 (referred to as the Drawings).
- **Appendix J – Landfill Design Report, Section 6: Geotechnical:** Prepared by WSP, Revision 0, dated 25 March 2024 (referred to as the Landfill Design Report).

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- **Appendix Q – Slope Stability Assessment:** Prepared by WSP, Revision 1, dated 20 February 2024 (referred to as the Slope Stability Assessment).
- **Section 2 – Geotechnical Engineering: Response to ECan RFI:** Letter prepared by WSP, dated 16 August 2024.
- **RC245076 – 150 Quarry Road Section 92 Response, Section 3 – Geotechnical Engineering:** Letter prepared by WSP, dated 23 August 2024.
- **Those submissions received by CRC and WDC** that mention concerns about geotechnical aspects of the project.

5 This technical review has been undertaken by me, a Senior Principal Geotechnical Engineer at T+T. I have reviewed the aspects of the application relating to the geotechnical and slope stability assessments. This report has been prepared in accordance with T+T's letter of engagement with WDC, dated 22 May 2024.

6 The geotechnical assessment (Appendix E) focusses on identifying the key geological features external to the landfill body in the surrounding rocks and soil. Other than the landfill capping it does not discuss specifics of the landfill body design. That is reported elsewhere in the applicant's proposal.

7 The content of this report focuses on the key geotechnical issues, pertaining to the project consenting process arising from the applicant's geotechnical assessment. Where specific aspects of the geotechnical assessment have not been discussed it can be taken that I did not have any particular concern or disagreement with the applicant's geotechnical assessment and/or design.

8 I have considered the submissions that raise concerns about the geological conditions at the White Rock Quarry site. Several common concerns about the geological conditions have been raised by submitters. These are dealt with by responding to the specific issue raised rather than addressing each submission.

9 I visited the site and carried out a walkover of the quarry and its immediate surroundings on 25th June 2024.

1.2 Qualifications

10 I am a Principal Geotechnical Engineer with Tonkin & Taylor Ltd with 41 years of post-graduate experience working as a geotechnical engineer. My specific qualifications are:

1) NZ Certificate of Engineering (Civil);
2) Batchelor of Engineering (Civil) (Honours) from the University of Canterbury;
3) Master of Science in Soil Mechanics and Engineering Seismology (with Distinction) from the Imperial College, London University;
4) Diploma of Imperial College;
5) Diploma of Technology Management from Deakin University;
6) Chartered Professional Engineer (NZ);
7) Fellow of Engineering NZ.

11 My relevant experience encompasses a wide range of geotechnical projects within NZ, Australia, Singapore and Indonesia. Specific experience that is relevant to this project includes:

1) Assessment of a new museum that Whale Watch proposed for the Kaikoura Peninsula which required the assessment of the karstic limestone that is part of the local geology.

2) Assessment of the risk posed by karstic limestone to a sub-sea tunnelling project in Singapore. This assessment included engagement of a subject matter expert on karstic limestone from the University of Malaysia. I commissioned a sea based geophysical survey

of the seabed limestone searching for evidence of karstic features that may have developed prior to submergence following the most recent ice age and the subsequent sea level rise.

3) Provision of expert geotechnical evidence to changes to the Christchurch District Plan.

4) Review of Resource and Building consent applications for both Christchurch City and Whangarei District Councils. In Christchurch many of the building consent applications required review of future earthquake effects on land. In Whangarei District my consenting work has included providing advice on the risk of underground coal mine collapse to existing and new houses built above the disused mines.

5) Following the Kaikoura Earthquake in 2016 I was peer reviewer of the designs of the rockfall mitigation works above the railway and highway north and south of Kaikoura. NZTA was reliant on my design and report sign-off for the assurance that the works on the steep rock slopes had been designed to the required standard and defined risk criteria.

6) Design of the proposed 100 m high Cypress Coal mine highwall at Stockton, West Coast of New Zealand. This highwall design was impacted by high groundwater levels that required drainage and the regional scale Mt William Fault that intersected the highwall. Mining of coal was to take place at the base of the steep highwall.

7) Provision of expert geotechnical evidence in numerous legal disputes which has included mediation hearings and trials in the High Court.

8) I have carried out or supervised the investigations and analysis of the stability of numerous slopes in rock and soils. Notable projects include the investigation and stabilisation of the very large landslides adjacent to Lake Dunstan behind the Clyde Dam, analysis of a large-scale slope failure in rock on the Paiton Power Project in Indonesia plus numerous smaller slopes ranging residential sites impacted by storms to rock slopes routinely encountered along NZ's highways. My role on the Paiton Power project included service as an expert geotechnical witness in the International Court of Arbitration in London.

9) Assessment and design of the light industrial development sited on top of the landfill at Musgrove Close, Christchurch. The landfill comprised 5 – 6 m depth of uncontrolled building demolition waste from buildings demolished in Christchurch in the 1960's then dumped into a disused gravel pit. Groundwater rose and fell within the debris seasonally. A low permeability soil cap was placed on top of the debris to minimise surface water entry. Testing of the contaminants within the landfill material was carried out as part of the Council requirements for approval of the new industrial estate. Surcharging was placed on the cap to accelerate settlement of the landfill material. Dynamic compaction was used to consolidate the landfill below the access road. Settlement of the soil cap was monitored and the results served as inputs to the design of the sewage and stormwater systems and the access road. Lightweight industrial buildings capable of dealing with settlement were then built over the landfill. One heavy building, with a landfill gas control system, was piled through the landfill to the underlying gravels. All buildings and the services have performed satisfactorily to date.

10) I am currently both an author and reviewer of the Slope Stability Geotechnical Guidance Series being developed for use on NZ projects by the New Zealand Geotechnical Society.

1.3 Code of Conduct and Conflict of Interest declaration

12 I have read the Environment Court's Code of Conduct for Expert Witnesses contained in the Court's Practice Note of 2023. I have complied with that code in preparing this report and agree to comply with it in providing information or opinion to the Hearing Panel in relation to this matter. The aspects of the application addressed in my report are within my area of expertise and I have considered and stated all material facts known to me which might alter or qualify the opinions I express.

13 I have no commercial relationship with the applicant.

1.4 Scope of the Report

14 This report is prepared under the provisions of Section 42A of the Resource Management Act 1991 (RMA). This section allows a council officer or consultant to provide a report to the decision-maker(s) on a resource consent application made to the council and allows the decision-maker(s) to consider the report at the hearing. Section 41(4) of the RMA allows the decision-maker(s) to request and receive from any person who makes a report under Section 42A "*any information or advice that is relevant and reasonably necessary to determine the application*".

15 This report is supplementary to the Section 42A Report prepared by Environment Canterbury (ECan) for the above resource consent applications. Full details of the consent applications are provided in that report.

16 To carry out this audit of the consent applications, I have:

- Considered the relevant sections of the assessment of effects on the environment (AEE) submitted by the applicant, including its technical appendices.
- Reviewed further information that was provided by the applicant on 16 August 2024 in response to Section 92 questions.
- Taken into account relevant issues raised by submitters in relation to the effects I have considered in this report.
- Read the Section 42A reports prepared by Ms Sally Lochhead (Hydrogeology) and Mr Tony Kortegast (Landfill Engineering and Waste Containment).
- Read the Section 42A report of Matthew Silver of Canterbury Regional Council focused on groundwater and leachate issues.

2 Description of the Proposal

17 The proposed Whiterock Landfill will be formed within the void left by extraction of limestone for lime production which has been occurring since the 1950's. Limestone extraction is set to continue. The quarry has produced significant quantities of soil overburden which is proposed to be reused within the proposed landfill operation.

18 The application is for a Class 3 Landfill (Technical Guidelines for Disposal to Land, WasteMINZ 2023) to receive construction and demolition (C&D) waste, contaminated soils, controlled fill and clean fill. The fill material will include asbestos containing materials (ACM). It is understood that degradable organic materials will be prohibited. The applicant proposes contaminated soils with TCLP[1] limits for Class 1 Landfills (WasteMINZ 2023) be accepted at the landfill.

[1] Toxicity Characteristic Leaching Procedure: a standard test developed by the US Environment protection Agency to determine the levels of leachable organic and inorganic chemical species in leachates at landfills.

19 I understand from Mr Kortegast's Section 42A report (Section 2.1) that given the proposed mix of materials to be disposed at White Rock Quarry that the landfill (if consent is granted) is better termed a hybrid Class 1/Class 3 Managed Landfill.

20 The total landfill footprint is about 4 ha. The completed landfill volumes is about 500,000 m^3.

21 The design drawings (Appendix H) and report (Appendix J) show the landfill will have a Class 1 landfill engineered liner based on the proposed acceptance of contaminated soils with TCLP limits for Class 1. The purpose of the Class 1 liner is to minimise the risk of leachate leakage through the liner. The design requires the collection of leachates above the Class 1 liner which then flows into a leachate collection pond prior to removal off-site to a waste water treatment plant most of the time. Recirculation of the collected leachate within the waste is proposed if climatic conditions allow.

22 The landfill will be constructed in two stages, each stage with similar phases comprising earthworks, installation of the underdrainage system, landfill bottom liner, and a leachate collection system. The construction of the leachate pond forms part of Stage 1.

23 Before the landfill body is constructed the WSP Preliminary design drawings show that prior to building the engineered lining system the quarry void will be shaped so that the drainage of leachates at the base of the future landfill flows along the top of the liner towards a leachate pond to be built immediately beyond the southern end of the landfill body. The intended gradient of the liner is 1 V to 50 H or 2 % toward the leachate sump.

24 The landfill lining system itself comprises, amongst other elements, a 600 mm thick low permeability cohesive soil (i.e. clay) layer plus a 1.5 mm thick HDPE liner immediately on top of the soil layer. These two elements form the long-term primary containment system to prevent the loss of leachate out through the fill base into the wider environment. Leachate that reaches the landfill base will flow along the top of the HDPE liner through a 300 mm thick aggregate layer or one of the perforated leachate collection pipes placed at up to 25 m centres within the aggregate. From there it will flow into the leachate storage pond for collection.

25 An underdrainage system will be installed below the lining which is designed to intercept groundwater in natural ground below the landfill body and divert it away to either the Karetu River or into the leachate storage pond (if the water is contaminated). One of the design criteria for this system is to maintain natural groundwater levels to no higher than 1 m below the lining base.

26 The applicant has undertaken a field investigation program which has included a site walkover by experienced engineering geologists and a program of subsurface exploration by two test pits and nine boreholes. The investigation locations were the overburden spoil piles, the groundwater system(s), the quarry itself and the river crossing. Rock and soil samples gathered from the test pits and boreholes were tested in the laboratory.

27 The scope of geotechnical investigations is considered appropriate for the consenting phase of the project to define the potential long-term environmental effects of the landfill.

28 The geotechnical report contains recommendations at Appendix E Section 6.1 for the end of quarrying final "pit slopes". I endorse the proposed bench heights of 15 m maximum coupled with benches of 8 m minimum width from both stability and safety perspectives.

3 Key Aspects of the Geotechnical Environment

29 The quarry geology comprises a sequence of Tertiary age sandstones/limestone/siltstone rocks. This sequence forms a south plunging syncline with mining of the exposed limestone taking place on the western limb of the syncline. Bedding within the limestone dips down from west to east. No active faults have been mapped within the site and the nearest known major regional scale faults are 2 to 4 km away.

30 Subvertical joints perpendicular to the quarry highwall are spaced at about 30 to 40 m intervals along the highwall and may be a series of small, localised, normal and reverse faults with up to 5 m movement on them. Joints in the quarry face that run sub-parallel with the face have led to wedge failure mechanisms where they intersect with other joints and the small faults.

31 The local faults within the quarry have uplifted the limestone 30 to 50 m but the lack of any faulting through the surface loess soil layer indicates an absence of fault movement since the loess was deposited by westerly winds 10,000 to 20,000 years ago.

32 Signs of highwall/quarry face movement, in response to the quarrying process, have been recorded. These include tension cracks subparallel to benches in the highwall and batter instability where unfavourably oriented faults or joints occur. Water erosion of the fine sandstone of the Tokama Siltstone as runnels down the face has occurred.

33 Excavated overburden soils above the limestone resource have been stockpiled in a loose condition nearby with side batter slopes of about 30°. Some areas of instability of these slopes have occurred possibly triggered by local seepage.

34 Site groundwater observations are not presented in detail within the applicant's geotechnical report (Appendix E). This is presented in Appendix F (Groundwater and Surface Water Effects Assessment) and has been addressed in ECan's Section 42A report, and in T+T's Hydrogeology Technical review report[2] by Sally Lochhead. Consequently, I do not present any detailed assessment of the groundwater system in this report.

35 My examination of Figure 4-4 and Table 4-2 in the Appendix F report indicates that a simple model of the groundwater flow could be as follows:

- 1) Groundwater heads in the Whiterock limestone and underlying Berrydale Greensand are at about 225 m (NZVD).
- 2) The topographical RL of the Karetu River alongside and below the existing quarry void is about 210 m (NZVD).
- 3) Therefore the shortest flowpath (about 200 m long based on Figure 4-4) for fugitive leachate would be directly through the limestone and greensand rocks directly into the Karetu River if a suitable flow path through the rock mass is available. This would be the most conservative assumption for assessing the impact of any leachate discharge into the wider environment beyond the landfill.

36 There are existing shallow landslides external to the quarry, one of which is about 30 m wide and 100 m east of the quarry. This may have moved toward the quarry in the period 2010-13 based on the applicant's assessment of Google Earth images.

4 Environmental Effects arising from the Geotechnical Assessment

37 Movement on the observed small-scale faults within the quarry is unlikely during the life of the landfill. There is no evidence of movement on these faults since the overlying loess soils were deposited following the end of the last ice- age about 12,000 years ago (Ref Appendix E Section 5.1.2). Therefore, a loss of contaminants caused by short fault rupture of any containment structure is unlikely during the life of the landfill.

38 I consider now the concerns expressed by submitters about faults in the area:

- Some submitters expressed concern about the potential for nearby large fault movement to damage the landfill. If local movement did occur on a fault that passed through the landfill, then damage could occur to the containment liner but as I state

[2] Tonkin & Taylor Ltd (2025). *Section 42A Officer's Report of Sally Elizabeth Lochhead*, March 2025, T+T Ref. 1094013.0001.

above I agree with the applicant that the available evidence indicates that this is very unlikely.

- The normal response to the potential for large scale fault movement within the quarry walls is to ensure that the likelihood (or probability) of movement on these faults is acceptably low.
- However, in Section 5.1.2 (Discontinuities) of the WSP Geotechnical Report March 2024 it states that the expected return period of movement on the known active faults in the region is believed to be "*in the order of hundreds of thousands of years*". This statement appears to be in error as the Mt Lawry Fault 2km from the quarry is mapped as a fault offset and monocline fold offsetting the Q2 glacial outwash surface which is bracketed at 10,000 to 25,000 years old. The Mt Lawry Fault is defined as a definite fault awareness zone on Canterbury Maps and described as offsetting an estimated 18,000-year-old landform in GNS Science report 2012/236 (General distribution and characteristics of active faults and folds in the Waimakariri District North Canterbury).
- These long-estimated time periods since fault movement on nearby active faults and small-scale faulting in the quarry indicate an acceptably low probability of direct fault rupture during the expected life of the landfill which I acknowledge will be in perpetuity.

Therefore, based on the above long time periods between fault movements, I conclude that the likelihood of any nearby fault damaging the proposed landfill is acceptably low.

39 The impact of the wedge failure mechanisms on the landfill design was queried during my initial review of the application. The applicant's response states that the wedge failures are "*relatively uncommon*", of "*small volume and do not significantly affect the overall stability of the slopes. The wall liner detail can accommodate any small-scale wedge failures that occur following slope cutting*". I observed these potential failure mechanisms during my site visit on 25 June 2024 and ***based on my geotechnical experience and engineering judgement I concur with the applicant***.

- Some submitters are concerned that "unstable" limestone rock could damage the containment liner. The unstable areas of the limestone rock mass noted in the geotechnical assessment by WSP, if not removed by trimming and excavation of the rock batter, can be stabilised directly by using rock bolts and shotcrete, or similar stabilising technique designed to prevent post construction movement of the rock and damage to the containment liner.

40 The applicant proposes to cap the landfill using currently stockpiled overburden soils. The WSP Landfill Design Report states that subsoil drainage may be included within the cap soil lining. The long-term capped landfill slope angles were queried under Section 92 and the applicant has responded stating that the final, long-term landfill slopes will be *"up to 3H:1V (approximately 18°)*". Despite a request for stability analysis results for the landfill cap, in terms of the factor of safety a response to this part of the question was not provided. However, using an infinite slope failure mechanism for the landfill cap, sloping at no more than 18°, I assess that the factor of safety for a dry slope (i.e. landfill cap) should be about 1.8 and for a fully saturated slope I assess the factor of safety could drop to about 0.7. ***Consequently, it will be important for the design of the final landfill cap to ensure that seepage water pressures are kept to a low level to prevent cap failures that could expose the underlying landfill materials***. ***This will require consideration of the ability of the low permeability spoil proposed as the landfill cap to retain and hold water within it along with the consequent implications for instability. This will necessitate incorporating specific drainage into the cap lining design. I note that this is proposed on the design drawings (Drawing C301) but with a cap thickness 1.5 m thick careful design of the drainage system will be required to preserve long term cap stability. I also note that Section 12.3.2 Cap***

subsoil drainage in the Appendix J Landfill Design Report may not be provided in final design. If that is the case, then the applicant will need to provide adequate geotechnical assessment to confirm that this drainage element is not required given my simple stability assessment results provided above.

41 Review of Appendix Q – Slope Stability Assessment sets out the stability analyses for the landfill body along with the chosen seismic ground motions. The landfill is assigned a nominal life of 100 years for the stability analyses and an Importance level 3 is assigned. This level requires the use of ground motion parameters of equivalent to a return period of 1000 years to be used in assessing stability. The stability analyses indicate that acceptable factors of safety are present for moderate shaking levels but that movement of the landfill body of up to 180 mm may occur along leachate containment system for the 1000-year design earthquake ground motions. If that movement occurred cracking of the containment system may occur. Subsequent observations of the leachate and under lining drainage system for any changes in leachate flows would be required to check for evidence of containment damage.

42 A Section 92 query was raised about the potential for existing landslides to move further and enter the quarry area (Appendix E Section 5.5). The applicant's response states that they believe the likelihood of that occurring to be low on the basis that the slope between the landslide and quarry is "*considerably flatter*" than the slope that the landslide has previously moved on. The applicant further states that the quality of the Google Earth images is sufficient to identify other landslide features such as tension cracks and hummocky ground. No evidence was found in those images of large-scale deep-seated landslides affecting the site***. I have examined the same Google images, visited the site and I concur with the applicant's assessment of local landslide risk to the proposed landfill area.***

43 The applicant proposes to reuse the site won materials during landfill operations and for landfill capping. Laboratory testing of two samples of the stockpiled soils indicate a low recompacted permeability of less than 10^{-9} m/s. A trial fill of these material is proposed. I note that the Appendix I (Vehicle Movement Calculations and Materials Balance Summary) indicates that of the 174,000 m^3 of site won materials about 164,000 m^3 will be reused on site with 6,200 m^3 of topsoil either reused from onsite or imported for a total soil requirement of 170,000 m^3. Consequently, there will only be a margin of 4000 m^3 (or 2 %) of surplus soils currently available. Therefore, should the available volume of soil for reuse within the quarry limits not eventuate then additional vehicle movements associated with importing the shortfall will be required. ***This is an issue that warrants further discussions regarding the applicant's proposal for refining what the impacts of that situation might be and how likely it is to occur. A contingency source for capping materials may need to be identified in case there is a shortage.***

5 Other Geological Issues Raised by Submitters

44 This section sets out my response to other geological issues raised by submitters but not explicitly dealt with in previous sections.

45 ***Earthquake Shaking Risk*** The landfill will have a design life of 100 years with an importance level of 3 which means it needs to resist the effects of earthquake ground motions with an average return period of 1000 years. The probability of the design ground motions occurring during the 100-year life of the landfill is about 10 %, or 1 in 10. Consequently, steep interfaces around the old quarry rock walls and over lying landfill could experience downward movement i.e. settlement or lateral movement of the landfill materials which may damage the containment liner. ***Therefore, the design of the liner will need to ensure that damage from downward movement on the steep quarry walls cannot occur and that any movement of the landfill body along the core.***

46 ***Karstic Limestone*** is formed when slightly acidic freshwater dissolves limestone over long time periods (1000's of years), to develop surface and subsurface features that form by the exploitation of existing rock defects such as bedding, joints and faults to provide open, locally high permeability pathways for fluid flow. Cave systems are the ultimate expression of this process. This is a concern to some submitters.

47 Geological study of the limestone rock (Appendix E Sections 5) and indicates that weathering led to development of minor (i.e. surface erosion features and not passages and caverns) forms of paleo karst topography on the upper limestone surface before deposition of the overlying Tokama Siltstone about 23 Million years ago. There is no indication of further karstic features developing in the limestone rock around the current White Rock Quarry since it was tectonically uplifted from a shallow sea floor over the past approximately 2 Million years. Observations by professional geotechnical engineers and engineering geologists have not found any such features. I did not see any such features on my site visit. Neither is there any evidence of collapse features on the ground surface around the quarry. Collapse features, often termed tomos, are commonly associated with the collapse of passages and caverns within karstic limestone.

48 However, I acknowledge that some submitters (O Meijer and Duncan Mackintosh) have pointed out that they are aware of evidence of karst features that have been found during the quarry life. It appears that these features were small in scale. ***It is my opinion, based on my reading of their submissions, that the features they observed were more likely than not to be small in scale and able to be rectified, if they are found, with good engineering design to preserve the integrity of the lining system. Therefore, the applicant's design should contain a contingency detail to fill/seal/drain any small karst features that are discovered. The landfill design report (Appendix J) acknowledges the potential for karst features to be found. If unexpectedly large karstic features were found on subsequent quarrying, then a reassessment of the containment design would be required.***

49 ***Porous Limestone*** Some submitters expressed concern about the limestone being porous and/or able to be eroded by acidic leachate that escapes from the landfill containment system.

Limestone can indeed be a porous rock due to its nature as a sedimentary rock formed from the deposition and cementation of the remains of marine organisms like coral and shells.

50 The porosity of limestone is determined by both primary and secondary porosity. Primary porosity is related to the depositional characteristics of the rock itself, such as the spaces between grains in a sedimentary rock. Secondary porosity is related to the post-depositional changes to the rock, typically connected with dissolution processes, fracturing or weathering over time, resulting in features like vugs (small cavities), joints, or fissures.

51 The limestone observed in the White Rock Quarry walls is a relatively massive muddy (micritic) limestone with poorly developed bedding and widely spaced persistent defects (20 to 30 m spaced small scale faults). The paleo karst features in the top of the limestone may result in higher secondary porosity than the main mass of the limestone. As such the overall porosity is relatively low compared to the range for the overlying Kowai Conglomerates and the underlying Karetu Silica Sands. I understand that this is reflected in the groundwater modelling that has been undertaken and reviewed in the evidence of S. Lochhead.

52 As noted in T+T's Landfill Technical review report[3], the landfill assessment indicates that large volumes of leachate are considered unlikely, and that leachate is unlikely to be acidic. Refer to the Section 42A report of A.P. Kortegast for more information.

53 For the proposed landfill there are two features which will counteract the natural porosity of the limestone and any concerns of submitters of an attack by acidic leachate.

[3] Tonkin & Taylor Ltd (2025). *Section 42A Officer's Report of Anthony Paul Kortegast*, March 2025, T+T Ref. 1094013.0001.

54 The first is the containment system which I understand will be robustly designed to reduce the risk of leakage of any leachate from the landfill encountering the underlying limestone. I summarised the water barrier features of this system in Section 2 above. If that system were to fail in a catastrophic manner and, if large, ongoing quantities of acidic leachate were able to encounter the limestone, then it would be possible for the limestone rock to chemically weather by a process known as dissolution. In this process the acid leachate would react and dissolve the alkaline calcium carbonate limestone increasing both the rocks porosity and permeability.

55 The second feature is that the leachate is unlikely to be acidic as set out by my colleague in Mr Kortegast's Section 42 A report.

56 ***Large Scale Landsliding*** One submitter expressed concern that landsliding on the scale seen along the Kaikoura Coast following the Kaikoura Earthquake in November 2016 might occur at White Rock Quarry. Strong locally centred earthquake shaking is likely to cause instability of some slopes in the White Rock Quarry area and possibly of the Quarry highwalls themselves.

57 However, the scale of catastrophic instability leading to large rockfalls on the Kaikoura Coast cannot be repeated at White Rock for the following reasons:

- The rock mass around the Quarry is not as intensely fractured nor standing as high as the slopes along the Kaikoura Coast so similar volumes of failure material into the quarry following strong shaking cannot develop. The rock slopes along the Kaikoura Coast are up to 300 m high whereas the highwalls around the White Rock Quarry are in the order of 40 to 50 m high.
- Failures around White Rock Quarry are more likely to be discrete rock blocks from the highwall. Small scale instability features are noted in the geotechnical assessment such as wedge and bench failures. In Section 4 on Environmental effects, I have noted the need for the landfill designer to consider stabilising these features to prevent damage to the containment system. If that is done properly then that process should reduce the likelihood of earthquake induced failure of the remnant quarry highwalls.
- As the landfill develops, its mass, resting against the supporting slopes, should increasingly create a stabilising effect against highwall failures. As a consequence the likelihood of a large-scale highwall failure, triggered by strong earthquake shaking, should progressively decrease with time as the landfill volume increases.
- Seismically generated movement of the landfill itself will be limited by its containment within the quarry void at the end of quarrying. I commented on the landfill body assessment above.

58 ***Leakage of Leachate into the wider Environment***

Many submitters have expressed concern about the potential for leachate to flow through the base of the landfill if the containment lining leaked for any reason. Some of the potential causes of leaks that concerned submitters included earthquake faulting (addressed above), the limestone being potentially karstic (addressed above) and aging of the HDPE lining.

The HDPE lining reaching the end of its life and starting to leak concerns many people. I've examined the design of the landfill base lining system and concluded that even if the HDPE lining eventually deteriorated and started to leak the leakage rate through the underlying clay soil lining 600 mm thick would be extremely slow. Properly constructed, this lining is required to have a maximum permeability of less than 1×10^{-9} m/s. What this would mean is that if leachate was ponded on top of the clay liner to the maximum design depth of 300 mm it would take 38 years for leachate to flow from the top to the base of the lining and into the wider environment.

The clay soil of the 600 mm thick liner is not subject to the same time related deterioration processes as the HDPE. The critical issue with the clay liner is to ensure that the correct

material type is selected and that the liner is properly constructed so that cracks cannot form in it due to post-construction shrinkage due to loss of moisture. Any such cracks would totally compromise the permeability of the lining system and leave only the HDPE lining to prevent loss of leachate into the environment. If the HDPE lining became degraded for any reason, then leachate is likely to escape from the landfill with the potential to flow down gradient through the limestone toward and into the Karetu River.

Therefore, it is essential to the long-term functioning of the leachate containment system that the 600 mm thick clay lining is built to stringent quality control requirements which includes sign-off by the landfill designer at the end of construction to verify that the clay lining system has achieved the required permeability without cracks forming.

6 Conclusion

I conclude that if the proposed landfill design is properly executed in the detailed design and then construction, then there is no geotechnical impediment to developing the proposed landfill.

However, this conclusion is totally dependent on the proposed containment system being properly constructed. This is because the local geology and topography would not provide effective long-term containment of fugitive leachate.

The critical element of the proposed containment system in my opinion is the 600 mm thick clay lining as that should have an unlimited effective life over which it continues to perform its function. If due to poor construction cracks formed through the clay and if the HDPE layer is damaged during construction and not repaired, then any leachate that escaped the underlying drainage system is likely to reach the adjacent Karetu River. This serves as the ultimate discharge point into the wider environment. The short distance from the quarry void to the river (about 200 m) and the nature of limestone would not prevent this occurring in the long run. This opinion is consistent with Sally Lochead's Section 42A report.

Consequently, in my opinion, constructing a high-quality containment system is the key to the ability to use the quarry void for the proposed hybrid Class1/Class 3 landfill.

Report prepared by:

Clive Anderson

Principal Geotechnical Engineer

Tonkin & Taylor Ltd

March 2025

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Appendix 5- Transportation Section 42A report prepared by Alan Gregory, Tonkin + Taylor.

Before the Independent Hearing Panel appointed by the Canterbury Regional Council

IN THE MATTER OF The Resource Management Act 1991

AND

IN THE MATTER OF Application CRC 243699 to 243706

Section 42A Officer's report

Report of: Alan Gregory (Tonkin & Taylor Ltd)

1 Introduction

1.1 Background

1 Protranz International Limited (Protranz, the Applicant) proposes to operate a limestone quarry and processing plant, and to establish a Class 3 Managed Fill (landfill) at the existing Whiterock Quarry in Loburn, North Canterbury (the site). Protranz has applied to Waimakariri District Council (WDC) for a range of resource consents required for the establishment and operation of the proposed landfill.

2 Tonkin & Taylor Ltd (T+T) has been engaged by WDC to undertake a technical review of the transport assessment and vehicle calculations lodged by Protranz in support of its resource consent applications.

3 The purpose of this Technical Report is to set out the findings of my update of the Technical Review, conducted by T+T Senior Principal Transport Planner Sam Wilkie, of the Protranz transport assessment and vehicle movement calculations to support a Section 42A report and inform a decision by WDC on the resource consent applications.

4 The following documents have been considered as part of this technical review:

- **Appendix H – Design Drawing Set (Rev1):** Prepared by WSP, Revision 0, dated 18 March 2024. Updated to Revision 1, dated 6 August 2024 (referred to as the Drawings).
- **Appendix I – Vehicle Movement Calculations and Materials Balance Summary:** Prepared by WSP, no date (referred to as Vehicle Calculations).
- **Appendix U – High Level Transport Assessment:** Prepared by WSP, Revision 0, dated 9 August 2023 (referred to as Transport Assessment).
- **RC245076 – 150 Quarry Road Section 92 Response, Section 4 – Transport:** Letter prepared by WSP, dated 23 August 2024.

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5 I have been involved in Mr Wilkie's earlier assessment as technical reviewer and agree with the conclusions drawn.

6 I visited the site on 19 March 2025 and reviewed the road corridor between Rangiora and the end of Quarry Road to assess the road environment and observe road user behaviours.

1.2 Code of Conduct and Conflict of Interest declaration

7 While not required for a Council hearing for a resource consent application, I have read the Environment Court's Code of Conduct for Expert Witnesses contained in the Court's Practice Note of 2023. I agree to comply with that code when giving evidence to the Hearing Panel in this matter. All my evidence is within my expertise, and I have considered and stated all material facts known to me which might alter or qualify the opinions I express.

8 I confirm that the issues addressed in this brief of evidence are within my area of expertise, except where I state I am relying on what I have been told by another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

9 I have no commercial relationship with the Applicant, save in my role as an expert in relation to this application or other concurrent work for the Applicant as an independent expert.

1.3 Qualifications

10 I hold the qualification of MSc in traffic and transportation. I am a Chartered Professional Engineer (CPEng), a Chartered Member of Engineering NZ (CMEngNZ) and a Member of the Institution of Civil Engineers (MICE).

11 I am Principal Transport Planner with Tonkin & Taylor Ltd (T+T) in Hamilton and have been for five years. Prior to that I was Transport Team Leader with MWH for 3 years and Principal Transportation Engineer with Opus International Consultants for 8 years. I was National Chair of the Engineering NZ Transportation Group between 2016 and 2019. Before 2006 I worked in the UK in the civil engineering and transport industry.

12 I have 30 years of experience in traffic transportation and roading engineering in New Zealand, the Pacific Islands, and the UK. I have extensive knowledge and experience of the New Zealand transportation network. I have 18 years' experience in the evaluation and assessment of transportation effects of development throughout the country including landfills at Tirohia, Redvale and Whitford, and have acted as an independent expert witness for NZTA, local authorities, and the private sector over that time.

1.4 Scope of this report

13 This report is prepared under the provisions of Section 42A of the Resource Management Act 1991 (RMA). This section allows a council officer or consultant to provide a report to the decision-maker(s) on a resource consent application made to the council and allows the decision-maker(s) to consider the report at the hearing. Section 41(4) of the RMA allows the decision-maker(s) to request and receive from any person who makes a report under Section 42A "*any information or advice that is relevant and reasonably necessary to determine the application*".

14 This report is supplementary to the Section 42A Report prepared by Waimakariri District Council (WDC) for the above resource consent applications. Full details of the consent applications are provided in that report.

15 To complete this report of the consent applications, I have:

- Considered the relevant sections of the Assessment of Effects on the Environment (AEE) submitted by the Applicant, including its technical appendices.
- Reviewed further information that was provided by the Applicant on 16 August 2024 in response to Section 92 questions.
- Taken into account relevant issues raised by submitters in relation to the effects I have considered in this report.

2 Description of the Proposal

16 The proposed Whiterock Landfill is at the location of an existing lime quarry at 150 Quarry Road, Loburn in the Waimakariri District. The Site is approximately 1.5km North of the intersection with Loburn Whiterock Road and Taaffes Glen Road.

17 The Applicant has identified a low increase in traffic movements associated with the proposal and has undertaken a transport assessment identifying the effects of this increase in traffic movements. The estimate of traffic movements was identified based on the expected landfill waste arriving to site, the landfill construction, as well as the movements associated with transporting lime and excess overburden off site. The calculation of the estimate is included in Appendix I of the AEE.

18 I consider that the scope of the transport assessment is appropriate for the consenting phase of the project to define the potential effects, and I generally agree with the Applicant's statements of the transport effects of the proposal.

3 Key Aspects of the Transport Environment

19 Quarry Road is administered by the Waimakariri District Council. The Applicant notes that Quarry Road is classified as a Rural Road according to the One Network Framework (ONF), the surrounding network area has an unposted speed limit of 100 km/h and has an estimated traffic volume of 149 vehicles per day, of which around 40 are estimated to be heavy vehicles (27% heavy vehicles). The Applicant has indicated that the current quarry activities generate between four and six truck, and on average six light vehicle movements per day. I have reviewed these matters and agree with the Applicant's assessment.

20 Quarry Road provides access to approximately 15 properties which are zoned as Rural General in the District Plan and connects to a network of other roads that provide access to forestry blocks which appear to be at different stages of harvest. While the Applicant estimates that the traffic volume on Quarry Road could grow by around 2% per year based on general historical trends, I anticipate that the traffic volumes will also fluctuate with harvesting operations within the forestry blocks further north along Quarry Road.

21 I am not aware of any other land use changes proposed around the site that may influence the traffic volume. However, as also noted by the Applicant, activities beyond what is anticipated for the zone by the Operative and Proposed Waimakariri District Plans would likely be subject to a resource consent process where considerations of traffic effects can be made.

22 The Applicant notes the presence of recreational cyclists and walkers on Quarry Road, but suggests there will be relatively few, given the low number of properties accessed by the road, and that the sealed width of 5.9m is wide enough for a vehicle to safely pass the occasional cyclist or pedestrian, given the infrequent nature of vehicular traffic on this section of road. The Applicant further notes that typical truck speeds on this section of road will be on average 60km/h due to the road alignment and relatively short distance from a low-speed corner and the quarry entrance. There are existing mountain bike trails nearby around Ashley Forest that may lead to cyclists riding along Quarry Road. However, I agree with the Applicant and note

that as traffic volumes are low the actual risk of conflict is low, although, due to operating speeds, any crash could result in a high severity.

23 I note that Quarry Road is not on a school bus or other bus route, the closest school being North Loburn School, about 8 km from the site located on Loburn Whiterock Road.

24 The site is accessed through an access with Quarry Road. The accessway is sealed and there are unsealed areas of the road either side of the access near Quarry Road and there is evidence of heavy vehicles tracking over this surface, causing ruts and the potential for loose material to track over the sealed surface potentially leading to vehicles losing grip, and running off the road (see Figure 1 and Figure 2 below).

25 There is adequate sight distance to the site access as demonstrated by the Applicant's assessment based on industry standard guidelines (Austroads Safe Intersection Sight Distance). The posted speed limit is 100 km/h which requires a minimum sight distance of 250 m, the Applicant has estimated the available sight distance to be greater than 250 m, which meets the minimum requirement. Based on observations by the Applicant and by Mr Wilkie in his site visit, the actual operating speed is somewhere between 60km/h and 80km/h, requiring SISD of between 115m and 200m. I agree with the estimate of available sight distance based on site investigations by Mr Wilke.

26 Based on the Applicant's report, there were no recorded crashes near the site access over the past 10 years. The crash history for the 20km route from the Ashley River to the quarry entrance over the same period included no crashes involving heavy vehicles. However, there were five reported serious injury crashes involving light vehicles. The predominant crash type is single vehicle loss of control during the hours of darkness. In noting this trend, the Applicant has recommended that the site operator include the consideration of the risk of driving on rural roads in their Health and Safety Plan and implements mitigation and monitoring measures if deemed appropriate, this would likely include site induction training to highlight risks on the road network, a level of expectation on driving behaviour, and a method of feedback to reinforce these principles. I recommend that this initiative is explored further by the Applicant. I note that the quarry operating hours (7am to 7pm) will largely be in daylight and therefore unlikely to contribute to the trend of crashes during hours of darkness, a Health and Safety Plan with measures such as these contributes to a safe working site.

27 The Applicant has noted that the site layout should be reviewed by a suitably qualified person. Having visited the site, Mr Wilkie confirms that improvements can be made, and I agree with this conclusion.

4 Assessment of Transport Effects

28 The Applicant indicates that the total traffic generated by the site is 36 vehicle movements per day, 24 heavy vehicle movements and 12 light vehicle movements, relating to the various operations on site as summarised in Table 1 below:

Table 1: Summary of traffic generation.

Operation	Peak daily vehicle movements (2 way)
Haulage of processed lime*	2
Removal of overburden*	2
Leachate removal	6

Landfill	14
Light vehicles (typical)	12
Total daily truck movements	**24**
Total daily light vehicle movements	**12**

** Average trip rate is less than 1 vehicle per day.*

Based on the calculation provided by the Applicant, I consider this to be an appropriate evaluation of traffic generation for the proposed activities including: quarry operation, landfill construction and operation.

29 I estimate there are currently 38 heavy vehicle movements per day on Quarry Road, obtained from published WDC data retrieved from the 'Mobileroad' website[1]. This is the equivalent of 19 trucks per day in each direction. The Applicant estimates that between four and six of these are associated with the existing quarry. Therefore, the proposal has the effect of increasing the existing heavy vehicle movements on Quarry Road to 24, a net increase of 18 to 20 truck movements, or 10 trucks in each direction. This represents a 50% increase in average daily heavy vehicle movements on Quarry Road, or an overall increase in average daily traffic (ADT) of approximately 12%. As the total traffic is likely to remain between 150 and 200 vehicles per day, I do not consider this to be a significant change.

30 As a sensitivity test, if the landfill waste to site were to double to 1,000,000 m^3 per year, based on WSP's calculations, the average daily truck movements associated with the site would increase to 40, resulting in a total truck volume on Quarry Road of 72, or an increase of 80%. However, this volume spread over a typical 10-to-12-hour operational period would represent at most 7 movements per hour which I do not consider excessive in this low traffic environment.

31 The Applicant has highlighted that the traffic generated through the landfill operation on the site is below the District Plan thresholds for restricted activities. The District Plan thresholds are 250 motorised vehicle movements per day, either entering or exiting the site, and the District Plan defines high traffic generation thresholds in a rural zone of 200 vehicle movements per day (average), or 50 heavy vehicle movements per day (average). I have reviewed the assessment against the requirements of the Operative Waimakariri District Plan and agree that the traffic generation of the proposed activity does not meet the significance threshold.

32 A Section 92 query was raised about the potential impact the proposed activity has on the existing high crash rate on the route to the site. The Applicant's response stated most of the crashes occurred at night and none involved heavy vehicles and concluded that as the proposed activity would generally result in traffic generated in day light that there was no reason to consider that there would be an identifiable increase in crashes resulting from the proposed activity. I agree with the Applicant's assessment of risk.

33 The Applicant has noted that the existing site access should be reviewed for deficiencies to improve safety for users of the site. As noted in paragraph 24, there is potential for loose material to track over the sealed surface of the access potentially leading to vehicles losing grip and running off the road. The Applicant notes that trucks are unlikely to track over the unsealed areas particularly the northern area as trucks are unlikely to arrive or depart to or from the north. On his 25 June 2024 site visit, Mr Wilkie noted substantial evidence to indicate that this tracking is occurring, as demonstrated by the photos below taken during that site

[1] www.mobileroad.org – this website is run by Auckland Motorway Alliance and carries the most recent data captured from road controlling authority maintenance databases (RAMM)

visit (see below). Whilst there are minor safety risks associated with this, there are likely to be ongoing maintenance liabilities for Council as continued overrunning will result in edge break on the seal of Quarry Road.

34 The current seal within the site access has insufficient width for vehicles travelling in opposing directions, which means that a vehicle will either need to wait on Quarry Road until an existing vehicle has left or as suggested by the vehicle track evidence, vehicles entering the site will turn wide to afford space to vehicles leaving site. I recommend that a width, sufficient to accommodate two vehicles, is sealed within the entrance to the site.



Figure 1: Quarry entrance looking south along Quarry Road, note evidence of wheel tracking from north.



Figure 2: Quarry access looking north along Quarry Road, note evidence of high frequency heavy vehicle movement into the site. (note: the rocks have been removed since this photograph was taken).

5 Consideration of submissions

35 549 submissions have been received of which 243 directly relate to traffic and transportation issues.

36 I have reviewed these submissions which primarily highlight the issue of an increase in truck traffic associated with the proposed activity, with specific concerns raised over:

- Increase in heavy traffic (243 submissions 100%).

- The routing of vehicles through the rural road network, particularly past the North Loburn school (100 submissions 41%).
- The increase in safety risk to vulnerable road users (182 submissions 75%).
- Increased maintenance liability for local road network (56 submissions 23%).

A smaller number of submissions were received relating to wider impact of traffic and intersection safety which are reviewed in section 5.5 below.

Which I have addressed in the following paragraphs.

5.1 Increase in heavy traffic

37 This is a generic submission which objects to any increase in traffic within the local area. There are some misconceptions stated in the submissions regarding the volume and frequency of vehicles, with the suggestion that the significance threshold in the district plan of 200 vpd is the actual increase in vehicles from the site.

38 The predicted increase in traffic to and from the site is anticipated to be on average 24 trips per day, consisting of 18 heavy vehicle and 6 light vehicle movements. The Resource Consent application (Appendix Y) has a proposed condition which limits truck movements to 18 per day as a rolling annual average. This is not a finite limit to vehicle movements, and it is possible that the peak truck movements could be up to double this on occasions.

39 The sensitivity test carried out referred to in paragraph 30 above, examines the scenario of doubling the landfill volume and I anticipate that an infrequent intensification of daily traffic to 40 truck movements is unlikely to have a significant detrimental effect. I recommend that the Consent Conditions reflect this volume as a maximum on any single day and included in my review of the proposed Consent conditions in section 6 below.

5.2 Routing of vehicles

40 One hundred of the submissions raise the issue of increase in heavy vehicles on Loburn Whiterock Road. The key issues raised are:

- The width of the road with single lane bridges and winding alignment.
- The increase in heavy traffic passing through the village.

41 Loburn Whiterock Road is approximately 14.5 km long and links Dixon Road (Arterial road) with Quarry Road (Collector road), passing through the villages of Loburn and North Loburn and is detailed in Table 2 below:

Table 2: Loburn Whiterock Road sections.

Length (km) from Dixon Rd	From	To	Road Hierarchy DP/ONF[2]	Seal Width (m)	Posted speed (km/h)	ADT[3] (vpd)	HCV (vpd)[4]
0 – 2.1	Barkers Road	Hodgsons Road	Local/Rural Connector	7.5	80	2,863	272

[2] Road hierarchy is a function of traffic volume and environment and guides the design and use of a road, DP relates to the District Plan and ONF is the NZTA One Network Framework which supersedes previous categorisations

[3] ADT is average daily traffic

[4] Vpd is vehicles per day

2.1 – 5.6	Hodgsons Road	Station Road	Local/Rural Connector	6.5	100	1009	142
5.6 – 8.5[5]	Station Road	Thompsons Road	Collector/Rural Connector	6.5	100	759	102
8.5 – 14.5[6]	Thompsons Road	Taafles Glen Road	Collector/Rural	6.1	100	320	40

42 The average daily increase in trucks in the section adjacent to the school is 18 trucks per day (based on proposed Consent Condition), or around 18% increase in truck movements over a 24-hour period. To determine the level of relative risk, I have considered the peak traffic movements. Peak traffic on the road will generally be for an hour in the morning and for an hour in the afternoon, equivalent to 10% of the ADT. In this section of road this would be approximately 76 trips of which 10 would be trucks. Peak times[7] will generally be consistent with commuter times, between 7 and 9am and between 4 and 6pm, although in this rural location this may alter by up to 20 minutes earlier in the mornings and 20 minutes later in the evenings.

43 School hours are generally between 8:30 am and 3pm.

44 The proposed site operating hours are 7am to 7pm. In my experience of landfill operations the peak arrivals tend to coincide with truck operators work hours[8], with a trip to the landfill either being the first trip or the last trip of the day, given the location, based on other clean fill operations, I estimate this to be between 9:30am and 10:30am and between 3:30pm and 5pm.

45 I consider it likely that trucks will be at their highest concentration between these times, which are likely to coincide with the trip to and from school, at least in part.

46 The current truck volume is 102 per day, this indicates that the peak will be approximately 10 return trips or 5 trips in each direction. Assuming a normal distribution, it is possible that during the "school run" (the 30-minute period prior to school start, or 30 minutes after school finishes) up to 5 trucks could pass the school gate, i.e. on average one every 6 minutes. The average increase in trucks is 2 movements per day, the peak would therefore be 2. This means that in the peak 30 minutes coincident with school travel periods the increase in truck volume would be 1, increasing the overall truck frequency to one every 5 minutes. I do not consider this to be a significant increase in truck movements.

5.3 Increased safety risk

47 This submission generally focuses on two elements of roads safety:

- The increase in trucks will pose a risk to general traffic through likelihood of head on crash at corners and single lane bridges or the likelihood of a crash at an intersection.
- The increase in trucks will pose a risk to vulnerable road users (pedestrian, cyclist, equestrian) who are regular users of the road.

48 The recorded crash history detailed in paragraph 26 above, does not indicate that truck movements pose a specific risk to other road users. Based on the crash history and site

[5] *This section is where North Loburn School is located (8.2km)*
[6] *Single lane bridges – Karetu River (14.1 km), Grey River (10.8km)*
[7] Derived from SH71 telemetry data
[8] Derived from weighbridge data at Tirohia

observations, I consider the current risks along the corridor to be a narrow road width, with several low-speed corners and narrow single lane bridges.

49 The current carriageway width varies between 7.5m and 6.1m from south to north along Loburn Whiterock Road, on Quarry Road it is 5.9m. I note that the road width decreases proportionally to the traffic volume. Throughout the corridor there are generally wide berms which allow for a good field of vision and recoverable area for motorised road users, as well as a safe area for people to walk, cycle[9] or ride horses. Appropriate road markings and hazard warning signs are present along the corridor although adding a W18-4 "truck operating" warning sign in advance of the site entrance may enhance risk awareness for unfamiliar road users.

50 Given the relatively low traffic volumes in the vicinity of low radius curves and single lane bridges, the likelihood of meeting another vehicle is relatively low which is why the majority of loss of control crashes are single vehicle.

51 A high-level assessment of the corridor suggests that whilst nighttime hazard delineation meets minimum standards it may require additional maintenance where marker posts have been knocked over. However, considering the predominant traffic movements associated with the site will be during daylight hours, I do not consider any improvement or upgrade to be the responsibility of the Applicant.

52 I have conducted a review of the speed environment as recorded in the NZTA Mega Maps website[10] which indicates the mean speeds along the corridor; between Dixon Road and Thompsons Road is on average 84 km/h; between Station Road and Grey River bridge it is 78 km/h; between Grey River bridge and Fords Road it is 53 km/h; and from Fords Road to Quarry Road it is 64km/h. Quarry Road has a mean speed of 60 km/h which reinforces the Applicant's assessment of vehicle speeds.

53 The school has flashing warning signs on its approaches to warn drivers of the presence of activity at the school gate during key times together with a number of statutory and informal warning signs and markings. With a mean speed of 78 km/h it is unclear if these warnings have the desired calming effect on traffic.

54 I note that the 2023 Waimakariri Draft Speed Management Plan, North Loburn School has a proposed 60 km/h speed limit, and I consider this to be an important safety enhancement which should be progressed. Again this is not a responsibility of the Applicant.

55 I anticipate that there is likely to be a demand for pedestrians and cyclists along the corridor, although outside of school hours, this is likely to be predominantly recreational and outside of peak travel times.

56 Outside peak hours as described in paragraph 44 above, typical hourly truck demand would be spread across the working day which I estimate to be between one and two trucks per hour. The increase in truck traffic of less than two vehicles per hour in the off peak is unlikely to increase the level of risk to vulnerable road users.

57 The North Loburn School is predominantly rural and has facilities for school bus and evidence of high demand for private vehicle drop off and pick up, I understand that a number of students cycle to and from school here and to the Loburn School off Hodgsons Road. The length of Loburn Whiterock Road between Loburn and the school and approximately 6.5m in width and has a posted speed limit of 100km/h. Whilst traffic volumes are modest, there is potentially an increased risk to children cycling to and from school. However, the risk is existing with the 100 or so vehicles already on the road within the peak hour, and as described

[9] This would generally be restricted to cycles with an off-road capability, or as an escape route in an emergency situation
[10] https://spatial.nzta.govt.nz/apps/megamaps/

in paragraph 46 above, the peak hour increase in trucks associated with the proposal is less than 2% and unlikely to pose a significant increase in risk.

58 Extending the 80km/h speed limit from its current location at Hodgsons Road to Thompsons Road would reduce the risk to vulnerable road users, particularly since the mean speed in this section is already around 84 km/h. However this is not the responsibility of the Applicant as it is a pre-existing risk which will not be significantly increased through traffic generation associated with the stated activities in the AEE.

5.4 Increased maintenance liability

59 These submissions suggest that the increase in truck volume will have a detrimental effect on the road structure, leading to premature failure and increased maintenance liability.

60 A high-level assessment of the corridor indicates that Loburn Whiterock Road and Quarry Road are in a reasonable condition with only minor defects such as occasional potholes and limited surface flushing.

61 I consider it unlikely that the proposed truck volume increase would have a material impact on maintenance demands over the lifespan of the pavement. However, further analysis from an appropriately qualified and experienced pavement design engineer should be sought to determine the actual impact of pavement residual life.

5.5 Other issues

62 A small number of submitters have raised specific comments regarding the wider impact of truck volume increase within the main routes through Rangiora. As detailed in paragraph 38 above, the average increase in truck movements will be 18 per day. Considering the current truck volume is approximately 620 per day, I do not consider that an increase of 18 (or 3% of the total truck volume) is significant and will not result in a traffic efficiency or safety risk within Rangiora.

63 One submitter has highlighted concerns over an increase in truck volume and the risks faced by drivers waiting to turn right from Loburn Whiterock Road into Glenbrae Place within the village of Loburn. At this location the road is straight with good visibility, and 7.5m wide with approximately 0.5m sealed shoulder either side. According to Austroads[11], the hourly traffic volumes present at this location of 290 vph on Loburn Whiterock Road, and less than 10 vph on Glenbrae Place, do not warrant a right turn bay. Furthermore, the ADT on this section of Loburn Whiterock Road is currently 2,863 vehicles per day including 272 trucks. The additional truck traffic represents an increase in heavy vehicles of less than 1% which does not change the design threshold for a right turn treatment. I do not anticipate any safety or efficiency issues for vehicles turning into and out of the side road.

6 Applicant's proposed conditions

64 In the Appendix Y, the Applicant has offered the following consent conditions relating to traffic:

[11] Austroads Guide to Traffic Management Part 6 - Intersections, Interchanges and Crossings Management (April 2020)

Table 3: Proposed Consent conditions relevant to traffic.

Ref	Condition
18	The hours of operation for the quarry and managed fill must only be Monday to Saturday (excluding public holidays): 7am until 7pm.
57	On commencement of landfilling the heavy vehicle movements must not exceed as an average more than 18 movements per day, over any consecutive 12 month period. For the avoidance of doubt; a. This means 9 trucks entering the site each day and 9 trucks exiting each day; and b. A truck with a trailer is also only one heavy vehicle.
58	Records of heavy vehicles movement must be kept and a summary report provided annually after commencement of landfilling on the previous 12 month periods number of heavy vehicle movements must be submitted to the Waimakariri District Council, Attention Planning Manager: Plan Implementation Unit.

65 I consider that proposed conditions place an appropriate limitation on operating hours and traffic generation and include a check mechanism. However, I consider that the following improvements can be made to reduce traffic risks:

- Condition 57, a finite upper limit of daily trucks should be added so that it states:

  On commencement of landfilling the heavy vehicle movements must not exceed as an average more than 18 movements per day, over any consecutive 12 month period. ***With a maximum number of truck movements on any single day not to exceed 40.*** *For the avoidance of doubt;*

  a. This means 9 trucks entering the site each day and 9 trucks exiting each day,

  b. A truck with a trailer is also only one heavy vehicle,

  c. Truck movements not to exceed 40 on any one day.

- A condition should be included with the effect that the entrance to the site will be sealed to a sufficient width to allow for two-way traffic. This should include the turning radii into and out of the site to a distance of 20m into the site.
- Provide a W18-4 “trucks operating” sign in advance of the site entrance to enhance awareness of an increase in truck movements on Quarry Road.

66 To accurately address the risk of premature pavement failure highlighted by a number of submitters, I recommend that a baseline condition assessment is carried out for Loburn Whiterock Road and that a condition is placed on the Applicant to undertake or contribute to repairs, to the satisfaction of the road controlling authority (WDC), which are a direct result of the increase in heavy vehicle movements relating to the activity.

7 Conclusions

67 Protranz (the Applicant) has applied for Resource Consent to operate a quarry and landfill at Whiterock Quarry in Loburn, North Canterbury.

68 I have reviewed the AEE, S92 response and submissions and have addressed the issues highlighted.

69 I consider that the traffic generation through the proposed activity, being a lime quarry and landfill operation, will not present any significant detriment to the safety and efficiency of the

existing transport network if the aforementioned changes to the conditions and mitigating measures are enacted.

8 Recommendations

70 I recommend the following amendments to condition 57

On commencement of landfilling the heavy vehicle movements must not exceed as an average more than 18 movements per day, over any consecutive 12-month period. ***With a maximum number of truck movements on any single day not to exceed 40.*** *For the avoidance of doubt;*

a. This means 9 trucks entering the site each day and 9 trucks exiting each day,

b. A truck with a trailer is also only one heavy vehicle,

c. Truck movements not to exceed 40 on any one day.

71 I recommend the following additional conditions:

- A condition should be included with the effect that the entrance to the site will be sealed to a sufficient width for a length of 20m to allow for two-way traffic.
- Provide a W18-4 “trucks operating” sign in advance of the site entrance.
- Carry out a baseline assessment of Loburn Whiterock Road and include an appropriate review and repair clause to the satisfaction of the road controlling authority.

Report Prepared by:

Alan Gregory

Principal Transport Planner

Tonkin & Taylor Ltd

March 2025

21-Mar-25

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Before the Independent Hearing Panel
appointed by the Canterbury Regional Council
and Waimakariri District Council

Under	the Resource Management Act 1991
In the matter of	Resource consent Application by Protranz International Limited for Whiterock Limestone Quarry and Managed Fill Landfill (CRC243699, CRC243707, RC245079)

Statement of Evidence of Naomi Louise Crawford

24th March 2025

Appendix 6- Landscape and Natural Character Section 42A report prepared by Naomi Crawford, Glasson Huxtable.

Qualifications and Experience

1 My full name is Naomi Louise Crawford.

2 I hold the qualification of a Bachelor of Design in Landscape Architecture with Honours from Victoria University of Wellington. I am also a registered member of the Tuio Pito Ora, New Zealand Institute of Landscape Architects (**NZILA**) and a member of Te Kahui Ture Taiao, Resource Management Law Association (**RMLA**).

3 I am a Director at Glasson Huxtable Landscape Architects in Christchurch, having held this position since September 2023. Previously I was a Senior Landscape Architect within the same company.

4 I have practiced as a Landscape Architect for approximately 14 years. For the past eight years, I have also taught into the Landscape Architecture degree programmes at Lincoln University. Previously, I have worked within small landscape firms, a large multi-disciplinary consultancy and in the public sector.

5 My experience spans across the full spectrum of Landscape Architecture and Landscape Planning. I am regularly called upon as a Landscape and Visual expert for complex projects involving multi-disciplinary approaches across Aotearoa.

6 For extractive landuse and managed fill landfill activity, this has included Aylesbury and Frew's Quarries (Canterbury), Nine Mile and Brownlee Mineral Sands (Buller), Wakamarina Mine (Marlborough), Barrytown Mine(s) (Grey), Mananui Mineral Sands (Westland), and Kakaramea and Ngāruawāhia Sand Extraction Sites (Waikato).

My Role

7 I have been involved with the Protranz International Limited, Whiterock Limestone Quarry and Managed Fill Landfill Application at 150, 154, 174 and 176 Quarry Road, Loburn, **(Application and Application Site)** since May 2024. My role has been to provide advice in relation to landscape and visual effects to the Waimakariri District Council **(WDC)**.

8 This has included:

(a) Visiting the site and surrounding area along with the Applicant, and representatives from WDC and Environment Canterbury (30 May 2024).

(b) Undertaking a high-level review of the existing landscape character and visual amenity. In turn, understanding the potential landscape and visual effects arising from the Application.

(c) Preparing a Memo on Landscape Matters (10 June 2024) to outline my observations, highlight omissions with the Application (in particular, the absence of a Landscape and Visual Assessment (**LVA**)), and to make recommendations. This was guided by Te Tangi a te Manu: Aotearoa Landscape Assessment Guidelines (**TTatM**), NZILA (July 2022).

9 In preparing this statement of evidence I have considered the following documents:

(a) The Assessment of Environmental Effects (**AEE**) accompanying the Application (28 March 2024) including (but not limited to) the Design Drawings Set (Appendix H, Rev1), Site Management Plan (Appendix L, RevB) and Proposed Conditions (Appendix Y, Rev1).

(b) The response to the Request for More Information **(RFI)** provided by the Applicant (23 August 2024) which included amendments to the Application and the provision of a LVA plus Graphic Appendix.

(c) Planning provisions relevant to my area of expertise.

(d) Submissions relevant to my area of expertise.

(e) The concepts and principles outlined within TTatM.

10 As part of preparing this evidence, I revisited the Application area for a second time on the 20 March 2024. This subsequent visit assisted with understanding the surrounding context in further detail and informed this landscape evidence.

Code of Conduct for Expert Witnesses

11 While this is not a hearing before the Environment Court, I can confirm that I have read the Code of Conduct for expert witnesses contained in the Environment Court of New Zealand Practice Note 2023 and that I have complied with it when preparing my evidence. Other than when I state I am relying on the advice of another person, this evidence is within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

Executive Summary

12 My statement of evidence considers the potential landscape and visual effects that could arise from Protranz International Limited's Limestone Quarry and Managed Fill Landfill Application at 150, 154, 174 and 176 Quarry Road Loburn.

13 Overall, I consider the quarry expansion, and the addition of a managed fill landfill will result in:

(a) Further modification to a site which has already been heavily modified by quarry and processing activities.

(b) Adverse effects on the amenity of local residents because of increased traffic movement to and from the Site.

(c) Protection of the SNA by way of a fence.

(d) Enhancement through planting along the Karetu River, eastern watercourse and within two wetlands.

(e) In the future, the recontouring and landscaping of the site following closure to assist with merging the final landform character into the surrounding hillscape.

14 Generally, I believe my views and those of Ms. Back (Landscape Architect for the Applicant) are well aligned, with her assessment being fair and justified, minus a few areas which have been further discussed within my evidence.

Scope of Evidence

15 I have prepared evidence in relation to:

(a) The existing environment of the Application Site as it relates to landscape matters including landscape character, visual amenity, the Significant Natural Area (**SNA**), and natural character.

(b) The applicable statutory provisions relevant to my area of expertise.

(c) The Applicant's original AEE plus the LVA included with their s.92 Response.

(d) Matters raised by submitters to the Application.

(e) The proposed landscape mitigation measures.

(f) The proposed conditions of consent.

Proposed Activity

16 My evidence is based upon the description of the Application attached to the Applicant's AEE. Key aspects related to the managed landfill development include:

(a) Continuing existing limestone quarrying activities to assist with shaping the landfill floor and sides for approximately the next ten years.[1]

(b) Constructing a minimum 2.2-metre-high perimeter fence around the landfill footprint and the SNA area prior to commencement of the landfill activity.

(c) Constructing and operating a Class 3 Managed Fill Landfill by filling the existing quarry pit for a period of approximately twenty years.[2]

(d) Continuing to access the Site via the gravel access road off Quarry Road. The crossing over the Karetu River will be upgraded with a single span bridge (and the existing ford and footbridge will be disestablished).

(e) Providing riparian enhancement through planting near the Karetu River, eastern watercourse and gully wetland areas.

(f) Remediating the Application Site at the conclusion of the landfill activity by capping and grassing the filled landfill area.

(g) Removing infrastructure such as the site office, weigh bridge, lime processing plant, kiln, maintenance workshops and bulk storage sheds as well as infrastructure associated with the landfill that is no longer required.

The Site and Existing Environment

17 To ensure that modifications can be integrated with acceptable effects, one must first understand the existing environment of the Whiterock area. This includes interpreting the existing landscape character and values to understand the effects of the Application on those values. The key landscape character and values of the environment include:

[1] Quarrying activity will occur in the upper portion of the site, with processing infrastructure located on the lower terrace.
[2] Material received will include inert and sorted constructed and demolition waste including contaminated material.

Physical Values

18 The Application Site is situated at the junction of the Canterbury Plains and the foothills of the Southern Alps, where the plains transition into the ranges of Mt Oxford and Mt Thomas.

19 The local environment features a diverse patchwork of rural land uses and property types including large farms and equestrian facilities, lifestyle blocks and smaller residential lots, and even temporary dwellings. Some residences are located near roadside boundaries, whereas others are located well inside land parcels. A mixture of properties are positioned on the flat, closer to the Karetu River, or on raised escarpments. In the distance, large pine plantations follow the rolling topography of the surrounding hillsides towards the Mt Thomas Conservation Area.

20 The local environment has been extensively modified, with fences, powerlines, roads, signage, farm homesteads, outbuildings, and the existing Whiterock Quarry. Large amounts of pasture, shelterbelts, tree plantations, clusters of vegetation, willows, exotic weeds, and grass berms are all found in the local area.

21 Whiterock Quarry itself is accessed off Quarry Road. Access is via a ford (or a footbridge) crossing the Karetu River. This river (a tributary of the downstream Ōkūkū River), defines the western boundary of the Application Site, while an eastern waterway and two wetlands are situated within the Site itself.

22 Existing quarrying operations have focused on extracting limestone from a west-facing escarpment, which is part of a larger undulating hillside. Extraction has resulted in a large quarry pit with benched quarry faces of varying heights.

23 Processing occurs on a lower terrace not far from the river. Nearby there is an existing weighbridge, staff amenities building, site office, processing facility (featuring a furnace and rotary kiln), crusher, lime and urea silos, conveyor belt, storage sheds, and coal bunkers.

Associative Values

24 The rolling hills within the local area showcase limestone scarps and in certain locations visually reflect the geology of the landform. The Site has operated as a lime quarry since the 1950's, extracting material from the distinctive limestone cliffs.

Perceptual Values

25 Perceptual values include a sense of remoteness and containment due to the Site's location between the foothills of the ranges, surrounding shelterbelts, and the rolling hills of the Site. Longer views are afforded where there are breaks in vegetation or from elevated viewpoints, such as above the quarry itself or from raised escarpments.

Statutory Context

26 The statutory provisions are covered in Appendix X of the Applicant's AEE and Attachment 2 of their WDC Section 92 response. Matters relating to landscape are outlined below.

27 Under the Operative Waimakariri District Plan (**OWDP**) the Application Site is zoned **Rural**. The applicable objectives seek to maintain and enhance both rural production and rural character. The rural zone is described as being characterised by the dominant effect of paddocks, trees, natural features, and agricultural, pastoral or horticultural activities (Objective 14.11).

28 Under the Proposed Waimakariri District Plan (**PWDP**) the Application Site is zoned **General Rural** (GRUZ) and is classified as being within the Oxford Ecological District. The rural objectives and policies of the PWDP place importance on providing for primary production activities (including quarrying activities). However, industrial activity in rural zones is to be limited to circumstances where (among other things) amenity values and the character of the zone can be maintained (RURZ-01, RURZ-P2, RURZ-P6 and GRUZ–P1).

29 The existing quarry is located adjacent to a SNA, which is mapped as 'PWDP SNA039 – Whiterock Limestone Vegetation' and has immediate effect.[3] This area has highly valued shrub and grasslands located on cliffs and rocky outcrops. It is likely to be representative of the original vegetation cover and landform.

30 Also, of relevance to this assessment, are PWDP policies related to natural character (which have immediate effect) and require that wetlands, rivers and their margins are managed to preserve natural character. Figure 1 below illustrates the natural character provisions relevant to this Application. Natural Character is also assessed under paragraphs 61 to 78 of this evidence.

[3] Whiterock Limestone Vegetation contains indigenous grassland, shrubland, and indigenous limestone rock outcrop vegetation. Notable flora on site includes at risk-declining species such as speargrass, matagouri, and New Zealand linen flax. It also contains threatened-nationally endangered species such as Gingidia enysii var. enysii and sun hebe, kanuka, and Waipara gentian. (PWDP ECO-SCHED1)

Figure 1: PWDP Natural Character Objectives and Policies[4]

NATC-03 Natural character	*The use of wetlands, and lakes and rivers and their margins are managed to preserve their natural character.*
NATC-P1 Recognising natural character	*Recognise the following natural elements, patterns, processes and experiential qualities which contribute to the natural character values of freshwater bodies:* *1. Freshwater bodies and their margins in their natural state or close to their natural state.* *2. Freshwater landforms and landscapes, biophysical, geologic and morphological aspects.* *3. …* *4. Indigenous biodiversity, habitats and ecosystems.* *5. Water flow and levels, colour and clarity, and water quality.* *6. …* *7. The experience of the above elements, patterns and processes.*
NATC-P4 Preservation of natural character values	*Preserve the natural character values of wetlands, and lakes and rivers and their margins, and protect those values by:* *1. Ensuring that the location, intensity, scale and form of subdivision, use and development of land takes into account the natural character values of the surface freshwater bodies.* *2. Minimising indigenous vegetation clearance and modification, including where associated with ground disturbance and the location of structures, near wetlands, and lakes and rivers and their margins.* *3. Requiring setbacks of activities from wetlands, and lakes and rivers and their margins, including buildings, structures, impervious surfaces, plantation forestry, woodlots and shelterbelts.* *4. Promoting opportunities to restore and rehabilitate the natural character of surface freshwater bodies and their margins, such as the removal of plant and animal pests, and supporting initiatives for the regeneration of indigenous biodiversity values, and spiritual, cultural and heritage values.*
NATC-P5 Structures within freshwater…	*Enable activities that have a functional need or operational need to be located within the freshwater body setbacks, provided that adverse effects on natural character values are avoided, remedied or mitigated.*
NATC-P6 New and existing structures within and over freshwater bodies	*Provide for new structures, and upgrades to existing structures, on the surface of freshwater where:* *1. Public access to, and along, the freshwater body is maintained.* *2. The structure has a functional need or operational need to be located on the surface of freshwater.* *3. The structure does not compromise the use of the surface of the freshwater for existing users.* *4. …* *5. …* *6. Any adverse effects to the natural character and cultural values, associated with freshwater bodies are avoided, remedied or mitigated in order to preserve those values.*

[4] It should be noted that natural character objectives and policies which relate to hydrology, geology, ecology and/or cultural values of the river fall outside the author's landscape and visual expertise. The obvious objectives and policies which fall outside of the realm of landscape and visual matters have been excluded.

Comments on the Original AEE

31 At the request of WDC, I completed a landscape review to evaluate the AEE prepared by WSP for the Applicant. My work involved reviewing the AEE (and relevant appendices) and then visiting the site alongside the Applicant and their experts and Council representatives. I undertook a high-level review of the existing landscape character and amenity to understand the potential landscape and visual effects arising from the Application and whether these were able to be sufficiently managed.

32 In response, I produced a memo (10 June 2024) outlining my observations, highlighting omissions, and making recommendations in relation to landscape and visual matters. I recommended that the Applicant provide an LVA prepared by a suitably qualified Landscape Architect, following the methodology, concepts and principles outlined in TTatM. The request was processed as part of the WDC s92 RFI.

Landscape and Visual Assessment

33 The purpose of this section of my evidence is to comment on the LVA prepared by Ms. Back of WSP (22 August 2024). This is the first opportunity I have had to respond to the contents of the LVA.

34 Generally, the LVA follows the guidance outlined in TTatM. The Application is adequately described, key aspects of the statutory context are discussed, the landscape context and character are covered appropriately, potentially affected neighbours are correctly identified, and an assessment of effects is undertaken using the prescribed 7-point scale. The assessment is supported by helpful graphics including site location maps, plans, character images, a viewpoint location map and supporting panoramas.

35 However, it is unclear whether Ms. Back contributed to or reviewed the proposed **Conditions of Consent** as there is no reference to these within her evidence. Likewise, the proposed landscape mitigation measures, objectives to be achieved, and timeframes described in the **Biodiversity and Landscape Enhancement Plan and Accompanying Schedule** (20 August 2024) are not referred to either.[5] It would be helpful to understand how Ms. Back considers the proposed landscape conditions and enhancement measures will work to achieve the necessary mitigation.

[5] Schedule 1 of Appendix Y of the AEE.

36 This aside, I believe the conclusions reached by Ms. Back in her LVA are fair and justified, minus a few areas that would benefit from further discussion. These points are discussed under subject headings below.

Matters Raised by Submitters

37 Five hundred and seventy-three submissions were received. Landscape matters raised fall broadly into six main themes, which are summarised below:

Figure 2: Summary of Landscape Related Submissions

Rural Character and Amenity	Submitters believe the Application may affect: • Amenity generally. • The area's visual, peaceful, tranquil character. • The area's rural amenity and rural setting. • The beauty and attractiveness of the area. In addition, some submitters believe that the Application will: • Harm the peaceful communities of Whiterock, Okuku and Loburn. • Threaten tranquillity, peace, quiet and their quality of life. • Change the area from serene place to busier/industrial place. • Mean that this special place will 'lose its magic' – exploring nature, building dams etc.
Traffic Related Effects on Amenity	Submitters believe the Application may result in the following traffic related effects on amenity: • Increased trucks/traffic on roads with effects on amenity, quality of life and enjoyment of scenic views. • Increased heavy vehicles on roads disrupting/diminishing rural tranquillity, peacefulness and the communities' quiet character. • Effects of increased trucks/traffic with an effect on activities such as cycling, horse riding, walking and running.
Recreation	Submitters believe the Application may affect: • Recreational opportunities and the recreational value of the area. • Visitors who come to the area for sports. • The scarcity of water for recreation. • The ability to swim in the river and/or algae blooms. • The safety of recreational activities in and around river. • The Ashley River/Rakahuri which is used recreationally (and which the Application Site is upstream of). There is some support for the creation of a space for the public to enjoy long term.
Landuse	Many submitters are concerned that the Application: • Is inconsistent with the rural character of the community. • Will bring about a change from rural landuse to industrial. • Will detrimentally change the feel of the community. • Is in close proximity to residential zoned land. • Will have an effect on agricultural landuse. • Will have an industrial landuse that will significantly alter the communities' character, identity and values.
Landcover	Many submitters are concerned that the Application: • Will cause disruption to and/or effects on flora and fauna. • May impact plans for community native planting, bush regeneration/ protection and organic gardens/orchards. • Will have effects on wetlands.

	One submitter advocates for maintaining the quarry for mineral extraction and eventual reforestation to preserve biodiversity.
SNA	Some submitters believe that the Application: • Threatens the SNA.
Natural Character	Some submitters believe that the Application may affect natural character through: • Vegetation clearance and earthworks near the waterway. • Diminishing the mauri of Karetu River. • Modifications to the river. • Effects with contaminants (such as water clarity). In addition, it is requested that: • Natural geological features including limestone springs and underwater caves are protected. • The land is kept natural and not 'ruined' by landfill.
Associative Aspects	Some submitters believe the Application may bring: • A loss of local identity, history, fossils and archaeological finds. • Harm to the areas 'clean and green' reputation and vision. • Concerns for the maunga. • Effects on māhinga kai.

38 Each of the main landscape themes from the submissions have been addressed below.

Visual Amenity

39 The Application Site is screened by topography to the north and east. The area is also quite visually contained in places by the hills, as well as river and roadside vegetation. Some residences are located near the road, whereas others are located well inside land parcels. A mixture of properties are positioned on the flat, closer to the Karetu River, or on raised escarpments.

40 It was observed on the second visit to the local area, that the higher the quarrying moves up the hillside in future, the more obvious it will become, particularly from properties further afield. Currently when viewed from the northern end of Quarry Road and midway along Taaffe's Glen Road, the top of the quarry is aligned fairly close to the top of the trees in the midground. This may not be the case when the quarry is expanded.

41 Due to the varying size of private lots, as well as intervening vegetation and topography, it was sometimes difficult to assess the effect of the Application on individual residences when they could not easily be seen from the road.

42 Ms. Back assessed the effects of the Application when viewed from ten private properties. She determined that the visual effect on the residents of 144 and 179 Quarry Road will be **low** during the works and **very low** following disestablishment

of the landfill (presumably adverse). Visual effects at all other locations were determined to be **very low**.[6]

43 I agree with the above findings. However, I would also include numbers 62 and 12 Quarry Road within the above property cluster. Number 62 Quarry Road (which is a dwelling located close to the roadside, plus a secondary dwelling immediately next door) was not accessed by Ms. Black as part of her LVA. This property is located closer to the quarry than some of the properties previously assessed. Again, the visual effect on the residents of this address are likely to be **low** due to the approximate 835 metre distance from the quarry.

44 Number 12 Quarry Road is also located next to the road but at a distance of 1.3km. Adverse visual effects are likely to be **very low**.

Rural Amenity

45 The area is valued for its paddocks, trees, and agricultural, pastoral or horticultural activities as well as dispersed buildings and structures, which give it a rural character. Also appreciated is the rural outlook, spaciousness, privacy, limited traffic, clean air, and quietness.

46 When assessing effects, it should be noted that a change in a rural area or landscape does not, of itself, necessary generate an adverse effect. All landscapes are dynamic and constantly changing over time, in both subtle and transformational ways, and through both natural and human activity.

47 Many submitters raised concerns about changes to the area's peaceful, tranquil character, rural setting, beauty and attractiveness. There was also concern relating to increased traffic and trucks on the roads and the effect on recreationalists using the local area.

48 The proposal is anticipated to result in an average of 36 vehicle movements per day, 18 vehicles coming and going, some of which will be heavy vehicles.[7] Residents and road users will experience an increase in traffic over and above the existing level both visually and through increased disturbance.

49 As mentioned previously, some dwellings are located close to the road, and some are setback further within their property parcels. Those located closer to the road (and located prior to the Site entrance) are likely to experience a greater adverse

[6] 26, 33, 49 and 179 (cluster) Quarry Road, 1, 105, 125 and 260 Taaffe's Glen Road, Quarry Road corridor, Karetu River corridor, and surrounding recreational areas.
[7] I understand that the number of vehicle trips between what the Applicant has proposed and what WDC may propose may differ. As such, I have focused on the fact that the amenity of local residents will be affected and tried to explain how. The greater the amount of vehicle trips, the greater the resulting adverse effect will be.

effect on amenity as a result of an increase in traffic relating to the Application. This disturbance will be experienced briefly as vehicles (trucks and trailers, service vehicles and staff vehicles) transition past private properties on their way to and from the Application Site.

Recreation

50 Submitters raised concerns about the effects of the Application on recreation and the recreational value of the area. Visually, the landfill is likely to have little effect on the user experience from DoC tracks and reserve land, which are located at least 6 kilometres away. An increase in traffic may be noticed by transient recreationalists such as cyclists, horse riders and river users. The effects of traffic safety, dust, noise and effects on water quality have been addressed by other experts.

Landscape Character

Landuse

51 Rural areas consist of a diverse mix of activities, some of which may be incompatible with each other and/or need to be mitigated. Many submitters comment that the Application will result in a change in landuse from a rural to industrial activity. This comment is made irrespective of the fact that there has been an existing large scale quarry in operation on site since 1950.

52 This existing quarry activity has provided the opportunity for the landfill activity to take place, to practically fill the hole in the ground. As such, the Application proposes a gradual change in landuse from a limestone extraction and processing activity to a managed fill landfill. At the completion of the activity, the site will be rehabilitated into a pastoral landuse, much like the surrounding hillscape.

Landform

53 Observations from visiting the site and local area include that the site is screened by topography to the north and east. The landform of the Application Site has been highly modified by quarry activity cutting into the surrounding hillside.

54 As a result of the Application, further modification will occur associated with extraction activity and landfill formation. As the landfill is progressed the site will begin to merge with the surrounding topography. An example of what this final landform may look like has been helpfully illustrated by the visual simulation prepared by WSP.

55 Submitters concerns in relation to landform centre around the modification of the river and the possibly of earthworks within the waterway. The Applicant has confirmed that there will be no central pier used in the new bridge crossing the

Karetu River. However, further information (such as a plan and cross sections) are needed to understand the location of the existing bunds, their dimensions, and the location of the proposed fencing and how these elements will work in relation to the proposed planting near the Karetu River. It is also not clear whether the existing bunds beside the river are being modified and stabilised. Without this information, it is difficult to quantify the effect of the Application on landform.

Landcover

56 Many submitters are concerned that the Application could cause disruption to and/or effects on flora and fauna. In contrast, one submitter advocates for maintaining the quarry due to the opportunity it provides for eventual reforestation to preserve biodiversity.

57 It is my understanding that the Application will result in no vegetation removal but instead a number of areas where planting will be added. These areas include riparian planting around the Karetu River, eastern watercourse and wetlands (Refer to the discussion on Proposed Landscape Mitigation Measures under paragraphs 79 to 80). Again, more detail is needed on the location, width, planting arrangement and species proposed, to provide reassurance around the enhancement of these areas proposed by the Applicant. (Refer to comments made alongside Conditions 30 and 31 later in this evidence).

58 As mentioned previously, upon completion of the quarry and landfill activity, the site will be rehabilitated into a pastoral landuse, much like the surrounding hillscape. The addition of the aforementioned further planting areas and the rehabilitation of the disturbed areas of the site will likely result in long-term **positive effects on landcover**.

Significant Natural Area (SNA)

59 The Statutory Context (paragraphs 26 to 30) included a definition for the SNA which is mapped as PWDP SNA039 – Whiterock Limestone Vegetation. This area is located immediately north of the proposed quarry and landfill activity. The SNA is important as it has highly valued shrub and grasslands located on cliffs and rocky outcrops. The area is likely to be representative of the original vegetation cover as well as the landform of rolling hills with limestone scarps.

60 It is my understanding that the SNA will be avoided by the Application and will be protected by fencing it off from the rest of the Application Site. If appropriate, the Applicant may also like to consider further rehabilitation or enhancement of this area.

Natural Character

61 Ms. Back addressed the effects of the Application on natural character in her LVA. However, she did not outline the methodology used to carry out her assessment of natural character.[8] As concerns about natural character were raised by submitters, I have assessed the effect of the Application upon natural character by using the methodology outlined in TTatM.

62 The purpose of assessing natural character is to inform its management. That is, to preserve the natural character of the environment, and of wetlands, rivers and their margins, and protect the natural character of those places from inappropriate use and development. That purpose applies to all such areas and not just those with a high degree of naturalness. An area's remnant character may be important even though it is highly modified.

63 For proposal driven assessments like this one, TTatM provides an example of a step by step approach for assessing natural character, which is methodically worked through below under each of the underlined headings.

64 It should be noted that aspects of natural character which relate to hydrology, geology, ecology and/or cultural values of the river fall outside the author's landscape and visual expertise. Other experts will provide comment on the freshwater margins of the river and/or the values of the water itself.

Defining Natural Character

65 Section 6(a) of the RMA refers to the preservation and protection of natural character but does not provide a definition for what it is. This assessment defines natural character as: *'The naturalness or degree of modification of an area'*[9] and *'an area's distinct combination of natural characteristics and qualities'*.

66 The former is a quantitative attribute - a condition.[10] The latter is a character specific to each area and adopts the interpretation that natural character is an area's distinctive combination of natural characteristics and qualities, including degree of naturalness. It is this second definition that this evidence focuses on.

Identifying the Relevant Area

67 For this Application, natural character relates to the Karetu River and its local environment, the eastern boundary watercourse and its riparian margins, and the

8 There are different views within the profession (and in other disciplines and organisations) on what natural character is and how it should be assessed. Refer to TTatM, page 206.
9 The extent to which the natural elements, patterns and processes occur.
10 Generally, the degree of natural character is highest where there is least modification.

upper and lower wetlands within the site. This evidence also considers the broader context within which all these waterbodies sit.

Assessing Natural Characteristics and Qualities

68 The key natural characteristics and qualities of the rivers, riparian areas and wetlands include the physical and biotic natural elements and how they are perceived and experienced. These are summarised in below:

Figure 3: Natural Characteristics and Qualities of the Waterbodies

Physical	• The Karetu River and its local environment, the eastern boundary watercourse and its margins, and the upper and lower wetlands. • The influence of heavy rainfall in times of flood and low water levels in times of drought. • Ecological values in terms of flora and fauna, habitats, and connectivity (e.g. presence of eels, watercress growth etc.).[11] • Movement of water and sediment (patterns and processes). • The SNA located near the river and contributing to the catchment. • The degradation of natural character (e.g. increasing sedimentation and decreasing water quality).
Perceived and Experienced	• Recreational use and enjoyment of the river. • Ability to see and hear the water (when flowing). • Sound and movement of aquatic life and birds. • Clarity of the river when undisturbed by vehicles using the ford. • The feel of the water when crossing the river or swimming. • The darkness of the night sky. • In places, a high level of modification has occurred to the waterbodies due to the existing quarry activity, presence of informal earth bunds, proximity of quarry buildings, compacted laydown areas, roads and the ford across the Karetu River.

Effects of the Application on Natural Character

69 Having understood the above characteristics and qualities of the site, the focus is on how these aspects come together as a collective expression of natural character. Effects on natural character by an Application can be both positive and adverse. TTatM promotes improvement of natural character values rather than simply managing the status quo or mitigating adverse.

70 Regard should also be given to the relevant statutory provisions for natural character. The applicable Natural Character Objectives and Policies from the PWDP are included under paragraph 30 and figure 1 of this evidence.

11 Refer to Appendix G Ecological Impact Assessment of the AEE which attributes the following ecological values to the site: Negligible vegetation values within the Project boundary; Very High ecological value of freshwater fauna on site within the Karetu River, Low ecological value for freshwater fauna of the eastern watercourse; and, Low overall ecological value of the upper and lower connected wetlands.

Karetu River

71 A ford intersects the Karetu River providing vehicular access along with a single person footbridge. This access will be replaced with a new 23 metre long single span bridge. During the removal of the rock armoured weir there will be a **short-term adverse effect** on natural character because of elevated sediment affecting water clarity. However, following completion, there will be a **positive effect** with less disturbance to the riverbed due to traffic no longer moving through it.

72 Stormwater infrastructure will be located within and alongside the Karetu River. These elements do not require the removal of any vegetation and require only small changes to the landform, much of which has been highly modified already.

73 At this stage, it is unclear how the proposed security fencing intersects with the bunding along the Karetu River. It is advisable that the fencing is not installed close to the waterbody. As previously mentioned, more information is needed in terms of existing bunds and whether these are being strengthened or replaced and how the proposed riparian planting works with these.

The Eastern Boundary Watercourse and Wetlands

74 This ephemeral eastern boundary watercourse connects with the upper and lower wetlands. The proposed activity is located at least 20 metres away from these features. The general area has already been highly modified by pasture, vegetation removal, slash and informal stockpiles.

<u>Overall Effects on Natural Character</u>

75 Preserving and protecting natural character does not necessarily mean maintaining the status quo or avoiding activities or development. Restoration and rehabilitation can also occur as part of activities proposed.

76 From a landscape and visual perspective, the Application will result in **positive effects** on natural character due to:

(a) Less disturbance to the riverbed due to traffic no longer moving through it.

(b) Additional riparian planting of the Karetu River, eastern watercourse and onsite wetland areas.

(c) Longterm removal of buildings and infrastructure near the river.

77 It can be concluded that the natural character of the area is generally highly degraded due to the existing quarry activity and associated changes to the landform and landcover. Most of the proposed activity will be located within areas of the Site that have already been subject to a high degree of modification.

Recommending Measures to Manage Effects on Natural Character

78 Having completed the above process, I generally agree with Ms. Back's findings that the effect on natural character (at completion of the quarrying and landfill activity) will be positive. However, there is some uncertainty around the net effect because of the vagueness about what is proposed in terms of fencing and bunds along the Karetu River and the reliance on conditions to secure the landscape enhancements. I have made further recommendations under the Proposed Consent Conditions section of this evidence to assist with managing effects on natural character.

Proposed Landscape Mitigation

79 The proposed landscape mitigation measures, objectives to be achieved, and timeframes are described in Schedule 1 of Appendix Y of the AEE and shown on the accompanying plan RC245076C[12] and summarised as follows:

Figure 4: Proposed Mitigation Measures Provided by the Applicant

Vegetation Management Plan	a) The consent holder will prepare a Vegetation Management Plan (VMP) including, among other things, detailed planting plans and a work programme. This will be certified by a suitably qualified and experience Ecologist or Landscape Architect.
Karetu River Margin Enhancement	a) 'Upstream' (Identified as 'Area C' on plan RC245076C) - Planting of a 10m riparian margin on the true left bank with indigenous species including the gradual removal of pest willow tree species as indigenous species mature. b) 'Onsite - Interim' (Identified as 'Area D' on plan RC245076C) – Planting of a 2 -3m wide riparian margin (average width) along the true left bank with indigenous species where practicable. c) 'Onsite - Long-term' (Identified as 'Area E' on plan RC245076C) – Planting of a 10m wide riparian margin in indigenous species on the true left bank.
Eastern Watercourse Enhancement	a) Planting of a 10m riparian margin in indigenous species on both margins identified as 'Area F' on plan RC245076C.
Wetlands	a) Planting of a 10m wide riparian margin of indigenous species identified as 'Area G' on plan RC245076C.
SNA	a) Registration of the SNA within 176 Quarry Road identified as 'Area A' on plan RC245076C as a Conservation Covenant with the Department of Conservation. b) Installation of stock proof fencing around the perimeter of the SNA as indicated on plan RC245076C.
Rehabilitation	a) A Landfill Closure and Aftercare Plan will be required covering, among other things, site restoration including the final landform, landscaping and planting, ground cover and land use. b) The recontouring and landscaping of the site following closure to ensure that it is in keeping with the character of the surrounding landscape.

12 Biodiversity and Landscape Enhancement Plan, produced by Ecologist, Mike Hansen (20 August 2024).

80 The effectiveness of the proposed mitigation measure is discussed under the Proposed Conditions of Consent section that follows.

Proposed Conditions of Consent

81 The proposed Conditions of Consent relating to mitigation of landscape and visual effects are included in Appendix Y (Rev 1) of the AEE under RC245076, Conditions 29 to 39: Biodiversity and Landscape Enhancement and 75 to 79: Landfill Closure and Aftercare.

82 Figure 5 below lists the landscape conditions. Where appropriate, I have provided comment and made recommendations to ensure that they will achieve the desired outcomes.

Figure 5: Landscape and Visual Related Conditions of Consent

RC245076 Conditions 29 to 39 Biodiversity and Landscape Enhancement	**Landscape Peer Review Comment on Conditions**
Condition 29: *"The Consent Holder, for the purposes of achieving biodiversity and landscape enhancement across the site, must complete the requirements set out in Schedule 1 in the areas identified on Plan RC245076C which are both attached to and form part of this consent. The requirements must be completed within the stated timeframes, unless otherwise specified by a condition of this consent."*	i. Schedule 1 clearly outlines what is required, the objectives to be achieved and the timeframe. This is supported by a helpful plan (RC245076C). ii. The fence for the eastern watercourse, wetlands and stream should be added to a detailed plan.
Condition 30: *"Within 3 months of exercising the consent, the Consent Holder must register the area of land referred to in Column 1 of Schedule 1 with the Department of Conservation as a conservation covenant."*	i. The VMP must be produced in accordance with the Waimakariri District Council Engineering Code of Practice. ii. The detailed planting plans must include the following: - Proposed planting areas. - Width of planting beds. - Planting arrangement (staggered, double rows or otherwise). - Species type. - Dimensions and annotations. iii. A Landscape Schedule of Species must be produced including species name, grade, spacing and quantity. iv. Refer to comments under Condition 35.
Condition 31: *"Within 6 months of commencement of the consent and prior to landfill development works commencing a Vegetation Management Plan (VMP) must be prepared, that provides for the requirements in Schedule 1. At a minimum, the VMP must provide for:* *a) The consent holders approach to completing the requirements outlined within Column 1 of the Schedule.* *b) Detailed planting plan(s) of the Column 1 requirements that will achieve the Column 3 objectives within each corresponding Area (Column 2); and* *c) Provide a work program for achieving the requirements within the timeframe in Column 4 including any contingency for plant unavailability (as referred to in Condition 35)."*	
Condition 32: *"Within one month after the completion of the VMP the consent holder must submit to the Waimakariri District*	

Council, Attention: Planning Manager: Plan Implementation Unit: *a) The VMP to achieve compliance with Condition 31 of this consent.* *b) b. A certificate signed by the suitably qualified and experienced ecologist or landscape architect to certify that the VMP has been prepared to comply with Condition 31 of the consent. This suitably qualified and experienced ecologist or landscape architect must also sign a statement confirming that they are competent to certify the VMP work."*	
Condition 33: *"The planting plan required as part of the VMP referred to in Condition 31.b must:* *a) Utilise indigenous plant species appropriate for the ecological district for the site; and* *b) Achieve a minimum average planting density of two plants per square meter."*	i. Plant spacing of two plants per square metre will work well.
Condition 34: *"Alternative plant species and/or planting density to the requirements in Condition 33 must be informed by a Suitably Qualified and Experienced ecologist or landscape architect in the field of botany and be approved in writing by Waimakariri District Council."*	i. The requirement for the Landscape Architect to be in the field of botany should be removed as this is not necessary. ii. The Landscape Architect and Ecologist should work together as both bring different experience and expertise.
Condition 35: *"Should there be a delay to the planting timeframe required in Column 4 of Schedule 1 due to the unavailability of suitable seedlings, the Consent Holder shall provide the Waimakariri District Council with an amended timeframe within which the planting shall occur. The total timeframe shall not exceed four planting seasons, and the Consent Holder shall complete the planting as soon as is reasonably practical within the four year timeframe and shall inform the Waimakariri District Council when planting is complete."*	i. A timeframe of four planting seasons (four years) is too long. If plant species are unavailable alternative species should be considered and approved by WDC. ii. A condition should be added requiring that a supply of plants of an appropriate size needs to be secured prior to the exercising of the Resource Consent (minimum 1L grade or equivalent). Note that this condition also needs to work with the timeframes specified by Condition 31 and may require some rework of timeframes. iii. A condition should be added making sure that planting occurs during the planting season from April to September to ensure the best chance of success. iv. A condition should be added ensuring that each plant is of nursery stock and of good form that is true to species. Plants must be healthy, vigorous and free of disease, injury, parasites or insects and not pot bound.
Condition 36: *"To verify that the requirements of Condition 31 have been completed, to the required standard and achieve*	i. The requirement for the Landscape Architect to be in the field of botany should be

the objectives in Column 3 of Schedule 1, the following must occur: *a) Within one month after completing a Schedule 1 requirement, the Consent Holder must submit to the Waimakariri District Council, Attention: Planning Manager: Plan Implementation Unit a certificate signed by a Suitably Qualified and Experienced ecologist or landscape architect in the field of botany to verify the requirements have been completed.* *b) All planting required by Condition 31 and Schedule 1 must be supervised by a Suitably Qualified and Experienced ecologist or landscape architect in the field of botany or person nominated on their behalf."*	removed as this is not necessary. ii. The Landscape Architect and Ecologist should work together as both bring different experience and expertise.
Condition 37: *"All plantings required by Schedule 1 must be regularly inspected during the first five years from planting to identify any management that may be required. Including the following minimum regime:* *a) In the first 12 months following a planting requirement, plant condition and weed competition must be assessed every three months, undertaking hand weeding or spraying with selective herbicides as necessary.* *b) Year Two following a planting requirement, the assessment and maintenance must be a minimum of three times per year.* *c) Years Three to Five, the assessment and maintenance must be a minimum of twice per year."* *Advice Note: Application and use of herbicides should comply with relevant regulations of the Waimakariri District Council and Canterbury Regional Council and follow label prescriptions."*	i. Add a requirement that after the first five years the plants are to be inspected annually to identify any management or maintenance required and to infill any gaps. ii. Specify that 'maintenance' includes weeding, spraying, staking, watering, fertilising, trimming, pest removal and replacement of plants where necessary. The aim is to achieve vigorous and thriving plants.
Condition 38: *"Infill planting to replace plants that have died must be undertaken as necessary in Years Two and Three after the original planting."*	i. This must occur throughout the life of the consent. Refer to comment 'i' under Condition 37.
Condition 39: *"The Consent Holder must undertake ongoing maintenance of the planted areas once a year after the five years until a minimum plant survival rate of 75% across the entire planting areas has been achieved. A report from a suitably qualified ecologist or landscape architect in the field of botany detailing the 75% survival rate must be provided to Waimakariri District Council, Attention: Planning Manager: Plan Implementation Unit to satisfy that no further maintenance and works is required."*	i. A 75% survival rate is very low and means ¼ of the plants could fail. This should be changed to 90% ii. Refer also to comment 'i' under Condition 37. iii. The requirement for the Landscape Architect to be in the field of botany should be removed as this is not necessary.
RC245076 Conditions 75 to 79 Landfill Closure and Aftercare	**Landscape Peer Review Comment on Conditions**
Conditions 75- 79 cover (paraphrased): a) Post care aftercare period. b) Closure and Aftercare Plan. *c)* A peer review of the Landfill Closure and Aftercare Plan.	i. From a landscape and visual effects perspective, the adjacent conditions are sufficient to ensure that the site is appropriately landscaped and contoured after closure.

83 From a landscape perspective, I agree with conditions 60-61 on fencing and conditions 81-82 on early closure. Condition 95 provides some reassurance that the Application Site will be remediated, and conditions adhered to.

84 Provided that my comments on conditions are incorporated into the conditions, I am satisfied that the proposed conditions can satisfactorily avoid, remedy and mitigate the adverse landscape and visual effects of the Application.

Conclusion

85 Within this Statement of Evidence, I have considered the landscape and visual effects that could arise from Protranz International Limited's Limestone Quarry and Managed Fill Landfill Application at 150, 154, 175 and 176 Quarry Road Loburn.

86 Overall, I consider the quarry expansion, and the addition of a managed fill landfill will result in:

(a) Further modification to a site which has already been heavily modified by quarry and processing activities.

(b) Adverse effects on the amenity of local residents because of increased traffic movement to and from the Site.

(c) Protection of the SNA by way of a fence.

(d) Enhancement through planting along the Karetu River, eastern watercourse and within two wetlands.

(e) In the future, the recontouring and landscaping of the site following closure to assist with merging the final landform character into the surrounding hillscape.

87 Generally, I believe my views and those of Ms. Back (Landscape Architect for the Applicant) are well aligned, with her assessment being fair and justified, minus a few areas which have been further discussed within my evidence.

Naomi Louise Crawford

Dated this 24th day of March 2025

IN THE MATTER **AND** **IN THE MATTER**	of the Fast-track Approvals Act 2024 (**FTAA**) of an application for approvals under the FTAA for the Whiterock Class 3 Managed Fill development **FTAA-2502-1062**

STATEMENT OF EVIDENCE OF DR RICHARD BRENT MEADE

27 June 2026

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1. Introduction

1.1 Scope of this Evidence

1. I have been asked by Environment Canterbury to assess the economic analysis (**the Analysis**) provided by Sapere on behalf of Whiterock Lime Limited (**the Applicant**) in support of the Whiterock Class 3 Managed Fill application (**the Application**) under the Fast-track Approvals Act 2024 (**FTAA**) for the development of a Class 3 managed fill facility at the Whiterock Lime Quarry near Loburn in Canterbury (**the Project**).

2. In particular, I have been asked whether, in my opinion as an expert economist, the Analysis credibly and robustly demonstrates the extent of the Project's regional or national benefits, and whether there are material adverse impacts arising from the Project either not addressed or inadequately accounted for in the Analysis. I have also been asked to provide my opinion on the significance of the Project's regional or national benefits.

1.2 Background, Experience and Code of Conduct

3. I am a professional economic consultant and researcher with 34 years' experience in providing economic and financial analysis and advice. My primary professional role is as Principal Economist at Cognitus Economic Insight, an economic consulting and research practice I founded in 2002. Since 2023, I have been an Adjunct Associate Professor at Griffith University, and was appointed a Lay Member of the High Court for Commerce Act matters in 2024. In June 2025, I retired after being on the organising committee of the Law & Economics Association of New Zealand for 10 years, having been president for three years, and Auckland vice president for six years.

4. Prior to founding Cognitus, I was an investment banker with Credit Suisse First Boston (1992-1998), through which I was a valuation and corporate finance specialist. I have also taught undergraduate and MBA finance and/or corporate finance for Victoria University of Wellington in New Zealand and Hong Kong multiple times, and completed a graduate-level course in finance as part of my PhD (further details below).

5. I have also been a Research Principal at the New Zealand Institute for the Study of Competition and Regulation (2001-2011), and a Senior Research Fellow at Auckland University of Technology (2015-2025). In addition to teaching finance or corporate finance, I have also lectured in industrial organisation and/or environmental economics at Auckland University of Technology and University of Auckland multiple times.

6. Since 1992, I have provided independent advice to 10 iwi/tribes, or groups of iwi, in negotiations with the Crown for settlements of historical claims arising from Crown breaches of the Treaty of Waitangi, including the landmark Ngāi Tahu settlement. I have also provided independent expert advice for multiple other Māori organisations, and government agencies in relation to Māori matters, on a range of policy and commercial matters.

7. I hold the following qualifications: a PhD (awarded with Distinction) in industrial organisation and regulation, as well as an MPhil and MSc in economic theory and econometrics, all from Toulouse School of Economics. I also hold a BSc (Hons, First Class) in statistics and operations research (including papers in economics and finance), a BSc in statistics and operations research, and a BCA in economics and finance, all from Victoria University of Wellington.

8. I belong to multiple professional and academic associations, including the Law & Economics Association of New Zealand (Member), Competition Law & Policy Institute of New Zealand (Member), Asia-Pacific Industrial Organisation Society (Member), New Zealand Association of Economists (Member), the New Zealand Institute of Forestry (Ordinary Member), and the Australian Centre for International Commercial Arbitration (Associate Member).

9. Relevant examples of my work for this exercise include:

    9.1. Assessing economic evidence provided in support of other applications under the FTAA, including for the Waihi North and Bendigo-Ophir gold-mining applications, the Te Ākau Bream Bay sand-mining application, the Delmore and Sunfield housing applications, and the Stella Passage port expansion application;

    9.2. Undertaking numerous and often-times complex financial evaluations;

    9.3. Applying the total economic value (**TEV**) framework for describing and categorising the full range of economic values that attach to a given activity or resource, and also non-market valuation (**NMV**) techniques for ascribing monetary values to product or service attributes that are not traded in markets and hence which lack identifiable market prices;

    9.4. Co-authoring a study commissioned by Te Puni Kōkiri on the economic value of recognising and protecting Māori taonga, sole-authoring a study on the economic value of access to kapa haka festivals, and providing expert evidence before the Waitangi Tribunal assessing the welfare costs to whānau of inequitable access to Māori language immersion schooling;

9.5. Providing expert evidence or commercial advice regarding fair sharing – e.g. of net social benefits or commercial returns;

9.6. Co-authoring a study commissioned by Kāhui Wai Māori on translating traditional Māori concepts regarding customary rights (over freshwater and geothermal resources) into contemporary economic terms;

9.7. Undertaking research on how land use is affected when land provides cultural services as well as commercial value, as well as research more broadly on the role of cooperative ownership in affecting business viability and behaviour; and

9.8. Providing expert economic evidence (including for multiple landmark cases) in the High Court, Waitangi Tribunal, and Environment Court.

10. I confirm that I have read the Environment Court Practice Note 2023 – Code of Conduct for Expert Witnesses (**the Code**), and have complied with it in the preparation of this evidence. I also agree to follow the Code when participating in any subsequent processes, such as expert conferencing, directed by the Panel. I confirm that the opinions I have expressed are within my area of expertise and are my own, except where I have stated that I am relying on the work or evidence of others, which I have specified.

1.3 Documents Reviewed

11. In preparing this evidence, I have reviewed the following documents:

11.1. A report prepared by Sapere for Whiterock dated April 2026, *Whiterock Class 3 Managed Fill: A Review of Economic Benefits* (**Sapere Report**);

11.2. An undated report prepared by WSP, *Attachment 8: Anticipated and Known Adverse Effects* (**WSP Report**);

11.3. An undated document prepared by or on behalf of the Applicant entitled *Whiterock Quarry and Managed Fill – Consultation Material* (**Consultation Material**);

11.4. An undated document prepared by WSP on behalf of the Applicant, *Appendix R: Containment Risk Assessment* (**Containment Risk Report**); and

11.5. Other documents and materials as referenced throughout this statement of evidence.

1.4 Summary of Main Conclusions

12. In the following sections I set out my detailed assessment of the Analysis. By way of summary, it is my opinion that:

12.1. The FTAA requires a clear assessment of whether the Project delivers net benefits to New Zealand's social welfare once all costs, disbenefits, and adverse impacts are accounted for. In economic terms, this necessitates a cost-benefit analysis (**CBA**), rather than an economic impact assessment (**EIA**).

12.2. The Sapere Report provides both an EIA (for full-time equivalent (**FTE**) employment impacts, and regional GDP impacts) and a partial CBA (for certain non-market benefits, ignoring non-market costs) – it is therefore not, or only partially, fit for purpose under the FTAA framework. Its EIA measures economic activity rather than benefits, includes costs as benefits, and overstates impacts due to use of input-output (**I-O**) multipliers which are known to over-state project impacts. Its CBA assesses non-market benefits but omits significant non-market adverse impacts. In either case, the results materially overstate the project's economic contribution. Accordingly, the Project's claimed impacts, let alone benefits, are not robustly established.

12.3. Critically, the Project's assessed benefits/impacts are immaterial at even the Canterbury regional level (hence only even more immaterial at the national level), even before allowing for potentially substantial unmitigated cultural adverse impacts, which costs are likely to be sufficient to offset any claimed Project impacts/benefits.

12.4. On the available evidence, it is implausible that the project delivers significant net regional or national benefits as required under the FTAA.

2. Comprehensive Cost-Benefit Analysis Required, Not Economic Impact Analysis or Only Partial Cost-Benefit Analysis

2.1 Overview

13. In this section I:

13.1. Explain why I understand the FTAA to require a comprehensive (not selective or partial) CBA of the Project's net benefits, accounting for both market and non-market benefits and costs; and

13.2. Explain why EIA of the sort used in the Analysis, which assesses the Project's "impacts" rather than its "benefits", is inappropriate, and how reliance on project "impacts" can result in projects being approved that lessen social welfare/wellbeing – i.e. result in disbenefits at a regional or national level.

2.2 Cost-Benefit Analysis Framework

14. I understand the framing of the FTAA to require a CBA, since the focus of s.3 is on projects that deliver significant regional or national "benefits":

14.1. By any interpretation, a regional or national "benefit" is something that makes a region or the nation "better off" in some sense – which is what "social welfare" in the CBA framework captures:

14.1.1. By contrast, impacts identified using EIA may or may not make a region or the nation better off, and do not do so comprehensively (since EIA's focus is on "market economy" impacts only – it ignores non-market considerations altogether, as discussed further in Section 3.2 below).

15. It follows that s. 3 must be focusing on projects that deliver positive net benefits (since if a project's net benefits are negative, then by definition the project is not beneficial):

15.1. By construction, EIA does not weigh benefits against costs, and can even conflate them by counting costs as relevant impacts (making it impossible in that case to determine net benefits).

16. These features alone point to the FTAA requiring some form of CBA (and not EIA, except as below) – it requires a comparison of project (gross) benefits (things that make a region or the nation better off) with project costs (things that make a region or the nation worse off), with the difference between the two measuring the extent to which the project generates "benefits":

16.1. I understand s. 85(3) of the FTAA to support this interpretation, requiring a consideration of a project's adverse impacts, which under the standard CBA framework – if applied comprehensively – would naturally be incorporated

(including non-market impacts), either quantitatively if possible or qualitatively otherwise;

16.2. Either way a Panel, as for any CBA, is able to weight relevant costs and benefits as it considers appropriate, and a formal CBA systematically transparently sets out all relevant costs and benefits, which helps to avoid omissions or double-counting.

17. Notably, the s. 3 focus is on "benefits" – if Parliament had intended that s. 3 should instead focus on "impacts", "GDP impacts", "GDP", "economic impacts", or "economic activity", I would have expected it and the FTAA to have said so:

17.1. <u>These other measures are only pertinent if and to the extent they measure "benefits"</u> – i.e. things that improve social welfare;

17.2. Impacts or activity are not necessarily beneficial – e.g. socially-harmful activities like illegal drug supply – this implies a need to establish how impacts or activity improve social welfare (whereas by definition "benefits" in a CBA are necessarily things that improve welfare).

18. From an economic perspective, that naturally favours CBA, and not EIA, especially if "impacts" include costs, which favours inefficient projects over comparable but efficient ones.

19. Note that the legislation does not specifically require or mandate CBA, but I understand that it does so in effect due to its framing (as above), with CBA in any case an economically coherent and systematic framework that directly aligns with the s. 3 focus on "benefits", and also informing s. 85(3) assessments (without precluding panel weighting, and helping to avoid omissions or double counting):

19.1. By contrast, in my opinion EIA is <u>inconsistent with</u> FTAA requirements <u>unless</u> it speaks directly to assessing net benefits – since it is not complying with the s. 3 focus on "benefits" otherwise.

19.2. EIA is remote from s. 3 "benefits" focus, and therefore needs to demonstrate how impacts are benefits, and properly distinguish costs from benefits, whereas CBA directly aligns with that focus.

20. In summary, the FTAA's focus on project "benefits" (net of monetary project costs and other monetary disbenefits), suitably weighed against project adverse impacts (including, among

other things, non-monetary costs), necessarily requires an assessment of how that project enhances New Zealand's social welfare/wellbeing (at a regional or national level), since if a project does not increase social welfare/wellbeing, then in economic terms it is not beneficial at an aggregated (i.e. regional or national) level:

20.1. I note that my conclusion, that the FTAA requires a CBA and not an EIA to assess a project's (net) benefits, has been echoed in a recent article by two other prominent New Zealand economists, Dr Timme Denne of Resource Economics, and Dr Adolf Stroombergen of Infometrics;[1]

20.2. I further note that the Sapere Report plainly acknowledges that it has assessed the Project's impacts on economic activity, and not its contribution to social welfare.[2]

2.3 Focus on Benefits – Not Impacts – Essential for Assessing Whether Projects Improve Social Welfare/Wellbeing

21. Elaborating on the above discussion, following Treasury guidance, and based on my own assessment – for the purposes of sound economic decision-making – any assessment of whether the Project gives rise to significant regional or national benefits as required under the FTAA necessarily requires a CBA, and not an EIA (and partial CBA) as provided in the Analysis (discussed further below):

21.1. Such a CBA measures the net benefits of an undertaking like the Project, being the total incremental benefits of the Project, less its total incremental costs (including opportunity costs, and both indirect market and non-market costs and benefits as well as direct ones), appropriately adjusted for time and risk, and allowing for any salient distributional impacts;

21.2. By contrast, EIA purports to measure the economic impact of the Project, not its benefits (and hence not its contribution to social wellbeing) *per se* – including by treating Project costs as benefits, even if national wellbeing could be improved by allocating fewer resources elsewhere:[3]

[1] https://www.rmla.org.nz/rmla-insights/benefits-analysis-under-the-ftaa.

[2] Sapere Report, at p. 16.

[3] Treasury, 2015, *Guide to Social Cost Benefit Analysis*, July, at p. 54.

21.2.1. The classic example of EIA indicating a benefit, when society is not in fact made better off by the relevant activity, is paying a person to dig a hole and then pay them to fill it in again.

21.2.2. This is counted as a gain under EIA – two payments of wages – but not under CBA – wage costs are incurred for a socially pointless activity, when the relevant labour resources could have been used for socially beneficial activities elsewhere in the economy at the same wage cost.

22. Indeed, Treasury argues for the use of CBA as follows:[4]

22.1. "[A]ll advice that is aimed at helping decision-makers make a decision, should adopt a CBA framework as an organising principle"; and

22.2. Investment in systematic CBA is justified whenever decisions impact on large numbers of people.

23. By contrast, Treasury notes the following additional shortcomings of EIA (which measures components of GDP):[5]

23.1. It does not measure social welfare *per se*;

23.2. It makes no inherent distinction between economic impact accruing to local parties and economic impact accruing to overseas parties – i.e. it fails to identify whether project impacts accrue to New Zealand (as is required by "significant regional or national benefits") or to overseas parities (about whose welfare the FTAA appears to be unconcerned);

23.3. It ignores non-market effects, which can be socially important; and

23.4. It offers no insight as to any distributional concerns – i.e. whether resources are allocated to groups deemed in need of greater access than others.[6]

[4] Treasury, 2015, *Guide to Social Cost Benefit Analysis*, July, at p. 39.

[5] Treasury, 2015, *Guide to Social Cost Benefit Analysis*, July, at p. 47.

[6] This latter issue can be partially addressed through an alternative approach involving a social accounting matrix (**SAM**), which the Analysis does not apply.

24. Treasury concludes that "EIA can provide useful contextual information for decision-makers, but it is not suitable as a tool for measuring the balance of costs and benefits of a decision to society"[7] [emphasis added]:

    24.1. This appears highly pertinent to assessing FTAA applications.

25. To Treasury's list I would also point out that EIA typically focuses on only gross Project "market" (versus "non-market") economic impacts – see Section 3.2 below for further discussion – and as such does not account for adverse Project economic impacts (whether market or non-market) or non-market Project benefits for that matter. Hence EIA is inherently partial in its coverage, whereas CBA, if applied properly, captures all relevant positive or negative project effects:

    25.1. Furthermore, as above, EIA can even treat adverse project impacts as benefits – e.g. by treating expenditures to remediate adverse impacts as desirable Project impacts – such as due to requiring expenditures on capital, labour or other inputs (whereas in CBA terms such expenditures would be counted as costs incurred to mitigate the social costs of the relevant adverse impacts, with any such mitigation counting as a social benefit).

26. By way of illustration, if an oil spill creates $10m in non-market social costs (e.g. environmental harms not directly affecting market economic activity), but those social costs are halved by spending $1m on cleanup, then CBA counts the cleanup costs as a cost, while recording a reduction in the oil spill social costs of $5m (still counting the remaining unremedied $5m of the spill's social costs as an outstanding social cost):

    26.1. EIA by contrast ignores the social costs of the spill (whether pre- or post-cleanup), but counts the expenditure on cleanup as a positive economic impact – as if a social welfare gain has been enjoyed due to the oil spill, when in net terms society bears $5m in unmitigated social costs, and spent $1m of resources that could have been used elsewhere for social benefit (e.g. spending on health, education, infrastructure, etc).

27. As such, failing to assess the Project in terms of its net social benefits under a CBA framework risks misallocating national resources, with purported regional or national benefits potentially being lower – and distributed more inequitably – than what could be

[7] Treasury, 2015, *Guide to Social Cost Benefit Analysis*, July, at p. 39.

achieved through more efficient and equitable use of resources (as might be identified using CBA).

28. I consider a full CBA of the Project to be feasible, and warranted given its identified adverse impacts (discussed further in Section 3.4 below).

29. A hypothetical example further illustrates how relying on project impacts rather than project benefits can lead to a reduction in social welfare/wellbeing – i.e. negative project benefits, or net project disbenefits (either way, failing to achieve the FTAA's purpose). Specifically, if two projects deliver exactly the same non-employment benefits, but one of them involves twice the employment level of the other:

    29.1. EIA would suggest that the project with the higher employment level is to be preferred due to having larger employment impacts – yet the other project is by assumption twice as labour-efficient, since it can deliver the same non-employment benefits with only half the required employees (also meaning that the extra employees required to deliver the less efficient project could be deployed elsewhere in the economy, and thereby generate even further benefits for the region or nation);

    29.2. A CBA would prefer the project that delivers the given level of non-employment benefits with the lower required workforce, and lead to better overall economic outcomes – i.e. would deliver greater economic "benefits" as required for FTAA purposes, if not higher economic "impacts" (as measured by EIA).

3. Assessment of Sapere's Economic Analysis

3.1 Overview

30. In this section I explain how the Analysis:

    30.1. Applies EIA to assess the Project's employment (i.e. full-time equivalent, **FTE**) and GDP impacts (as opposed to benefits), and a one-sided and partial CBA of certain Project non-market benefits (ignoring offsetting Project non-market costs);

    30.2. Overstates the Project's impacts due to its use of I-O multipliers which are known to produce biased (i.e. overstated) impacts because they rest on certain restrictive assumptions that are typically not valid in practice;

30.3. Further overstates the Project's impacts/benefits by not accounting for all relevant project costs, disbenefits, or adverse impacts – notably, unmitigated cultural costs, which I conservatively show to be of an order of magnitude sufficient to either fully or largely offset the Project's claimed impacts/benefits;

30.4. Implicitly assumes, without providing justification, that existing waste levels are socially desirable, and that it is desirable to accommodate those waste levels, albeit more efficiently, via the Project;

30.5. Claims that the Project provides important enabling benefits (i.e. benefits to other sectors such as construction), but explicitly assumes that the Canterbury region's waste requirements will be met without the Project (just at very slightly higher costs);

30.6. Incorporates certain technical errors – both material and immaterial;

30.7. Fails to provide sensitivity analyses, and is insufficiently transparent to fully test and validate its key assumptions and modelling choices;

30.8. Provides assessed Project impacts/benefits differing by an entire order of magnitude across scenarios, making it difficult to understand what the true level of claimed Project impacts/benefits really are; and

30.9. Results in claimed Project impacts/benefits which, even if taken at face value, are immaterial at a regional level (and hence only even more immaterial at a national level), so cannot plausibly constitute significant regional or national benefits as required under the FTAA.

3.2 Sapere Report Does Not Provide a Comprehensive Assessment of Project Benefits

31. The Sapere Report provides a hybrid form of analysis, comprising:

31.1. An EIA of the Project's employment (i.e. FTE) and GDP impacts; and

31.2. A partial but one-sided assessment of the Project's non-market benefits – specifically, the value of travel time savings, reduced greenhouse gas emissions, and avoided crash costs are assessed, but offsetting non-market Project costs (i.e. cultural costs) are not assessed.

32. As explained in Section 2, impacts assessed using EIA are not the same as benefits as required under the FTAA, so by definition EIA fails to provide an accurate assessment of even the Project's "market" benefits:

    32.1. On the other hand, while the Analysis legitimately assesses non-market Project benefits, its omission of relevant non-market costs means it further fails to fully assess the Project's (net) benefits.

33. To better understand the distinction between "market" and "non-market" benefits and costs, market-based values relate to things (like commodities, or labour) that are traded in markets and which can be valued by reference to market prices. Conversely, non-market goods or services are not traded in markets:

    33.1. This does not mean non-market goods or services are unimportant (publicly-provided health or education services are a prominent example), but rather that their value is often overlooked or incompletely assessed because it is not possible to use market prices to estimate their value – when they are not treated commensurately with market goods or services, their values tend to be under-acknowledged;[8]

    33.2. Such non-market costs/benefits are typically not immaterial just because they lack market prices – according to a prominent study assessing non-market values of New Zealand's land-based ecosystems, those non-market values can be at least as great as their market values.[9]

34. A framework commonly used by economists to characterise the full range of both market and non-market values is the so-called Total Economic Value (**TEV**) framework:[10]

    34.1. For example, the TEV framework can be used to characterise the full range of values that can be attached to things like natural resources;[11]

[8] Eppink et al., 2016, *Non-Market Values in a Cost-Benefit World: Evidence from a Choice Experiment*, https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0165365.

[9] Patterson and Cole, 2013, *'Total Economic Value' of New Zealand's Land-Based Ecosystems and their Services.*

[10] A survey of the TEV literature is provided in NZIER, 2018, *What's the Use of Non-Use Values?*

[11] It is also increasingly being used to assess cultural value. For a survey, see Allan et al., 2013, Value and Culture, Motu Working Paper 13-09.

34.2. Relatedly, over many decades economists from multiple specialisations (e.g. environmental, transport, labour, health, education and cultural economics) have developed an extensive and well-established range of sophisticated non-market valuation (**NMV**) techniques to objectively estimate people's subjective non-market values.

35. A 2018 Treasury discussion paper applies the TEV framework to the valuation of natural capital (i.e. minerals, energy resources, land, soil, water, trees, plants and wildlife),[12] stating that the "general framework has been recognised for the past 30 years".[13]

36. In short, the TEV framework recognises that the value attaching to any given resource (e.g. minerals) is not confined to the value that can be realised in a market exchange of that resource or the commercial produce it can sustain, but can either:

36.1. Sustain a range of co-existing and additive other values (e.g. social, environmental or cultural values), even if market prices do not exist to directly quantify those other values; or

36.2. Conflict with those other values – e.g. creating non-market opportunity costs.

37. While there are numerous variants of the TEV framework applied in practice,[14] Figure 1 illustrates one such variant, based on a prominent study assessing TEV for New Zealand's land-based ecosystems.[15] Importantly, the Analysis:

37.1. Considers via its EIA only impacts (vs benefits) relating to what Figure 1 characterises as just a subset of "use value" relating to the Project, namely provisioning services value;

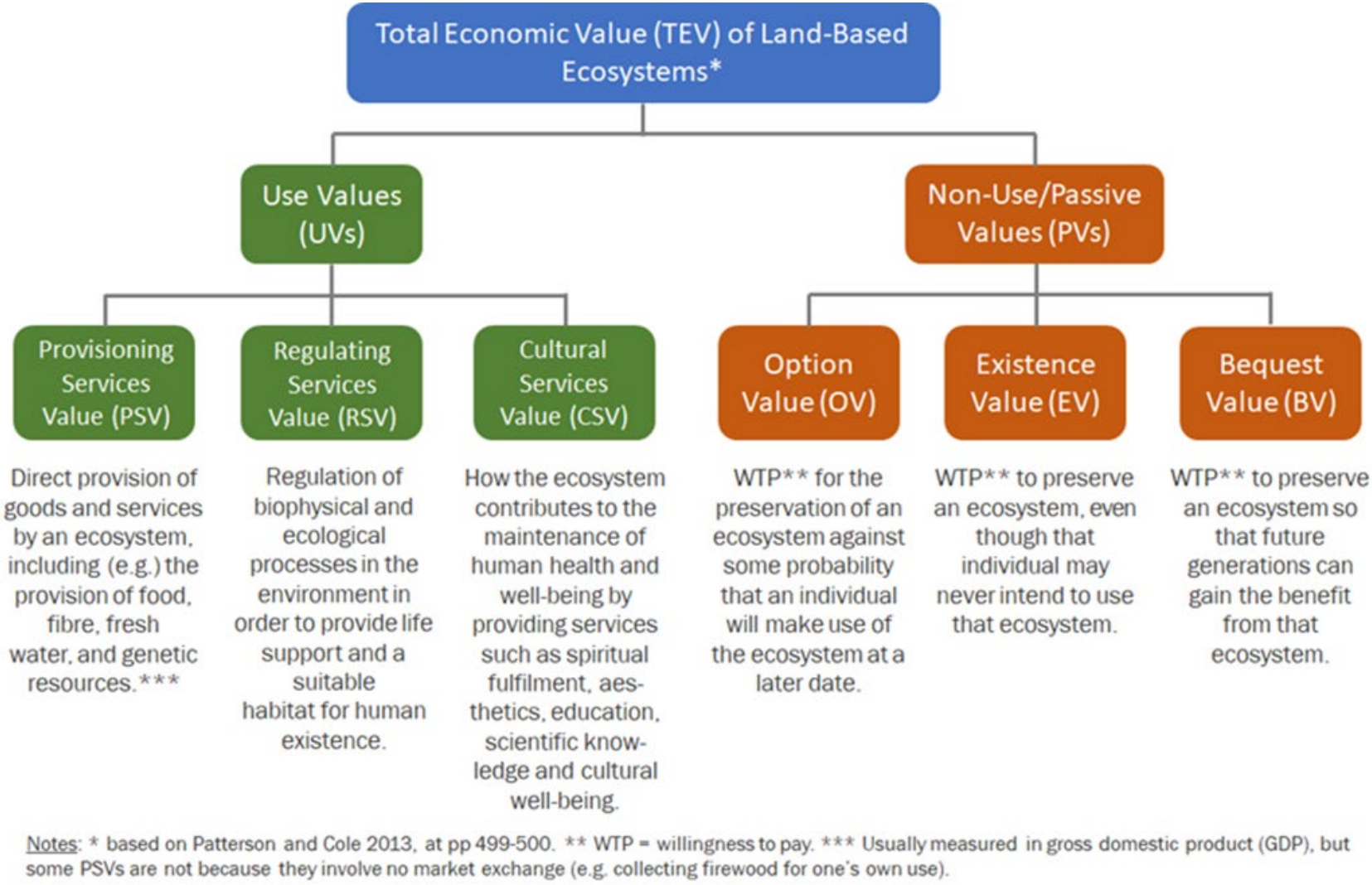
[12] van Zyl and Au, 2018, *The Start of a Conversation on the Value of New Zealand's Natural Capital*, Treasury Discussion Paper 18/03.

[13] van Zyl and Au, 2018, *The Start of a Conversation on the Value of New Zealand's Natural Capital*, Treasury Discussion Paper 18/03, at p. 7.

[14] For multiple examples, see van Zyl and Au, 2018, *The Start of a Conversation on the Value of New Zealand's Natural Capital*, Treasury Discussion Paper 18/03, Appendix 1, at pp 36-39.

[15] Patterson and Cole, 2013, *'Total Economic Value' of New Zealand's Land-Based Ecosystems and their Services*.

Figure 1 – Total Economic Value (TEV) Framework as Applied to New Zealand's Land-Based Ecosystems by Patterson and Cole 2013



Source: Author's adaptation of Patterson and Cole 2013.

37.2. Considers benefits – or in this case, avoided costs – relating to other use values (regulating services value), but not foregone cultural services value (i.e. cultural costs); and

37.3. Ignores other likely important values relating to the Karetu River, such as "passive values" relating to option, bequest and existence values, all of which are likely to be important components of cultural values attaching to the river.

38. Notable in relation to the latter, the WSP Report acknowledges that the Project has more than minor adverse effects, or potentially significant adverse effects, on the cultural landscape because Ngāi Tūāhuriri, as local mana whenua and cultural experts:[16]

38.1. Oppose the Project; and

38.2. Consider themselves adversely affected by the Project due to its proximity to the Karetu River, including (among other things) because it diminishes the river's mauri.

39. Clearly it is open to the Panel to weigh any adverse impacts of the Project against claimed Project benefits (whether measured as impacts or benefits) with or without any or all of those adverse impacts being monetised. However:

39.1. This would seem incongruous if any adverse effects are inherently monetisable and benefits/impacts have been presented in monetary terms;

39.2. Good modelling practice would be to systematically and transparently include all credibly monetisable costs and benefits in the model itself, since omitting relevant and material costs or benefits clearly risks misleading modelling conclusions being reached;

39.3. If relevant and material adverse effects are not monetised in some objective way, they can only be weighed in purely subjective terms against monetised (net) project benefits, which calls the very purpose of economic modelling into question (if it is not necessary for adverse effects, then is it necessary for benefits/impacts, and if not, then what would be the basis for assessing regional or national benefits?);

39.4. Hence, monetising impacts – where this can be done credibly – should assist Panels in their assessment of how project benefits compare with project adverse impacts.

[16] WSP Report, at p. 27.

40. In practice, many non-market benefits can only be monetised approximately. However, it is a false dichotomy to suggest that any or all market impacts/benefits can be monetised more accurately. This is because the Project's market impacts/benefits arise over a future 20 year period, and it is impossible to accurately assess Project impacts/benefits arising in even five let alone 20 years' time, given the relevant market prices and production technologies are inherently uncertain and impossible to predict with accuracy:

    40.1. This is not to suggest that modelling should be abandoned – rather that it be applied as systematically, transparently and robustly as it can be, highlighting the implications of key areas of uncertainty for modelled results – e.g. performing sensitivity analyses on key input assumptions, as discussed further in Section 3.8 below;

    40.2. That would then better support any remaining subjective trade-offs that need to be made, while avoiding the need for subjective trade-offs wherever possible.

41. In any case, I agree in general terms with the approach taken in the Sapere Report to apply widely-used metrics of relevant non-market values to assess the Project's non-market benefits – Sapere has not taken the position that only market impacts/benefits can or should be monetised:

    41.1. My main point of departure with Sapere's approach to assessing non-market impacts/benefits is that only non-market benefits have been monetised, and no attempt has been made to asses even the relevant order of magnitude of any corresponding non-market (e.g. cultural) costs;

    41.2. As a consequence, the Sapere Report presents an upwards-biased assessment of the Project net non-market impacts/benefits.

3.3 Multiplier-Based Economic Impact Analysis Has Known Limitations Leading to Overstated Benefits, Which Alternative Methods Avoid

42. Even if an EIA were deemed appropriate for establishing significant regional or national benefits, this requires use of an approach that more properly assesses the flow-on economic impacts of the Project than the I-O multiplier method used in the Sapere Report. That method

has widely-acknowledged limitations due to the restrictive and unrealistic assumptions it is based upon, and systematically overstates economic benefits due to those limitations.[17]

43. For example, the Australian Bureau of Statistics (**ABS**) ceased publishing I-O multipliers almost 25 years ago due to the method's unrealistic assumptions and inherent bias, stating:[18]

> "Production of multipliers was discontinued with the 2001–02 issue for several reasons. There was considerable debate in the user community as to their suitability for the purposes to which they were most commonly applied, that is, to produce measures of the size and impact of a particular project to support bids for industry assistance of various forms. …
>
> "I–O multipliers are most commonly used to quantify the economic impacts (both direct and indirect) relating to policies and projects. While their ease of use makes I–O multipliers a popular tool for economic impact analysis, they are based on limiting assumptions that results in multipliers being a biased estimator of the benefits or costs of a project." [emphasis added]

44. The ABS summarises the "inherent shortcomings and limitations of multipliers for economic impact analysis" as follows:[19]

    44.1. **Lack of supply–side constraints:** The most significant limitation of economic impact analysis using multipliers is the implicit assumption that the economy has no supply–side constraints. That is, it is assumed that extra output can be produced in one area without taking resources away from other activities, thus overstating economic impacts. The actual impact is likely to be dependent on the extent to which the economy is operating at or near capacity.

    44.2. **Fixed prices:** Constraints on the availability of inputs, such as skilled labour [or housing], require prices to act as a rationing device. In assessments using multipliers, where factors of production are assumed to be limitless, this rationing response is

[17] For example, see Counsell, K., 2024, "Improving economic analysis in environmental decision-making: a tale of two coal mines", *Resource Management Journal*, August. A more comprehensive discussion of I-O multipliers and their alternatives for economic impact analysis is given in Dwyer, L., Forsyth, P. and W. Dwyer, 2020, chapter 9, "The Economic Impacts of Tourism", *Tourism Economics and Policy*, Channel View Publications.

[18] https://www.abs.gov.au/ausstats/abs@.nsf/Previousproducts/5209.0.55.001Main%20Features42009-10.

[19] https://www.abs.gov.au/ausstats/abs@.nsf/Previousproducts/5209.0.55.001Main%20Features42009-10.

assumed not to occur. Prices are assumed to be unaffected by policy and any crowding out effects are not captured.

44.3. **Fixed ratios for intermediate inputs and production:** Economic impact analysis using multipliers implicitly assumes that there is a fixed input structure in each industry and fixed ratios for production. As such, impact analysis using multipliers can be seen to describe average effects, not marginal effects. For example, increased demand for a product is assumed to imply an equal increase in production for that product. In reality, however, it may be more efficient to increase imports or divert some exports to local consumption rather than increasing local production by the full amount;

44.4. **No allowance for purchasers' marginal responses to change:** Economic impact analysis using multipliers assumes that households consume goods and services in exact proportions to their initial budget shares. For example, the household budget share of some goods might increase as household income increases. This equally applies to industrial consumption of intermediate inputs and factors of production.

44.5. **Absence of budget constraints:** Assessments of economic impacts using multipliers that consider consumption induced effects (type two multipliers) implicitly assume that household and government [e.g. local government] consumption is not subject to budget constraints.

44.6. **Not applicable for small regions:** Multipliers that have been calculated from the national I–O table are not appropriate for use in economic impact analysis of projects in small regions. For small regions multipliers tend to be smaller than national multipliers since their inter–industry linkages are normally relatively shallow. Inter–industry linkages tend to be shallow in small regions since they usually don't have the capacity to produce the wide range of goods used for inputs and consumption, instead importing a large proportion of these goods from other regions.

45. Notably, for the Project, the Analysis' methodology not allowing for supply–side constraints means that competition for things like (skilled) labour, materials, or accommodation for construction and other workers – if there is not significant excess capacity for those things – might simply displace economic activity elsewhere.

46. Likewise, due to implicitly assuming fixed input prices, the Project's purported impact may turn out to be much less beneficial than as assessed if competition for things like (skilled)

labour or temporary accommodation for development and other workers bids up prices such as wages and rents.

47. Given these limitations, Treasury guidance when assessing project proposals is that I-O multipliers of the sort used in the Analysis of the Project should be ignored unless there is significant unemployment (I would add, or other significant spare capacity – e.g. in accommodation for construction workers, etc) in the economy:[20]

    47.1. This means, at best, the Project's assessed impact (let alone benefit) is at most that assessed in the Analysis;

    47.2. In reality, since the Analysis ultimately measures gross economic impact, and does so using I-O multipliers, its assessment of the Project's economic impact will *overstate* the Project's actual benefits.

48. A technique better suited to assessing the economic impact of the Project is computable general equilibrium (**CGE**) analysis. Unlike I-O multipliers-based EIA, CGE more comprehensively and realistically accounts for how an economic stimulus ripples through other parts of the economy (either by sector or region), including by allowing for constraints in the supply of labour, housing (etc), and also allowing for prices to adjust in response to the proposed stimulus:

    48.1. In my opinion, where an EIA is used, it is preferable to undertake a full CGE analysis of the Project's regional and national impacts – though, as above, only if and to the extent that such impacts constitute regional or national benefits;

    48.2. By better accounting for regional and economy-wide feedback loops than I-O multipliers-based EIA, CGE analysis would better identify whether the Project gives rise to net regional benefits, and also net national benefits.

3.4 Unmitigated Cultural Costs are Likely to Fully or Largely Offset Claimed Project Impacts/Benefits

49. As noted above, the WSP report acknowledges that the Project has more than minor adverse effects, or potentially significant adverse effects, on the cultural landscape. While I defer to Ngāi Tahu rūnanga, Ngāi Tūāhuriri – as mana whenua – to represent the scale of such adverse effects, here I show, by reference to published willingness-to-pay (**WTP**) metrics that

[20] Treasury, 2015, *Guide to Social Cost Benefit Analysis*, July, at p. 16.

are likely to very conservatively understate the Project's cultural costs, that those costs are plausibly sufficient to offset the Project's claimed impacts/benefits.

50. As to the latter, the Analysis claims the following impacts/benefits:

    50.1. Minimum GDP impacts of $1.39m/year, and maximum GDP impacts of $1.76m/year;[21]

    50.2. Minimum "efficiency gains" (i.e. avoided travel time, emissions, and crash costs) of $34,747/year to $185,448/year (Kate Valley counterfactual), and maximum efficiency gains of $306,711/year to $1,764,395/year (Taiko Road counterfactual).[22]

51. This implies:

    51.1. Minimum claimed annual Project impacts/benefits of $1.39m + $0.035m = c. $1.4m/year; and

    51.2. Maximum claimed annual Project impacts/benefits of $1.76m + $1.764m = c. $3.5m/year.

52. Published research on New Zealand (i.e. not necessarily Māori – let alone Ngāi Tūāhuriri or Ngāi Tahu) individuals' WTP to achieve moderate (respectively, good) lowland freshwater outcomes, instead of poor outcomes, is $89/person/year (respectively, $100/person/year; midpoint $94.50) in 2026$, even when those individuals do not directly engage with those lowland freshwater habitats:

    52.1. When those individuals do directly engage with those lowland freshwater habitats, the corresponding figures are $95-107/person/year (midpoint $101).[23]

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[21] Sapere Report, at p. 16.

[22] Underlying figures taken from Sapere Report at Tables 7-9 ("Base case" without resource consenting constraints), and from p. 25 ("Consent constraints" case).

[23] All figures taken from Table 3.5 of Tait et al., 2017, *Assessing New Zealand public preferences for native biodiversity outcomes across habitat types: A choice experiment approach incorporating habitat engagement*, Lincoln University AERU Research Report No. 345. CPI adjustments from 2015 to 2026 were made using the Reserve Bank's inflation calculator: https://www.rbnz.govt.nz/monetary-policy/about-monetary-policy/inflation-calculator.

53. I do not suggest that these figures represent the WTP of Ngāi Tūāhuriri member's for improved freshwater outcomes, which only those members can advise:

    53.1. Rather, I reference these published WTP metrics as conservative lower bounds on what that WTP might be, to illustratively identify how even such conservatively assessed costs affect whether the Project's claimed impacts/benefits are more or less than those costs – i.e. whether the Project's claimed impacts/benefits are net positive or net negative even allowing for only conservatively-assessed cultural costs.

54. To make this illustrative assessment, it is necessary to make assumptions as to the relevant affected populations, which in this case might include:

    54.1. Ngāi Tūāhuriri (adult) members;

    54.2. Ngāi Tahu (adult) members based in Canterbury; or

    54.3. Ngāi Tahu (adult) members.

55. Due to data limitations, for illustrative purposes I conservatively assume either 17,265 adult Canterbury Ngāi Tahu members, or 60,158 Ngāi Tahu adult members, in each case using 2023 Census data:[24]

    55.1. Assuming the former population, the illustrative conservative total WTP to avoid the Project's cultural impacts would be in the order of 17,265 x $94.50 = $1.63m/year, which is almost half of the maximum claimed Project impacts/benefits of $3.5m/year, and greater than the minimum claimed Project impacts/benefits of $1.4m/year;

    55.2. Assuming the latter population, the illustrative conservative total WTP to avoid the Project's cultural impacts would be in the order of 60,158 x $94.50 = $5.7m/year, which clearly exceeds even the maximum claimed Project impacts/benefits of $3.5m/year.

56. Once again, I stress I am not purporting to represent the position of Ngāi Tūāhuriri as to the actual level of cultural costs arising due to the Project (or whether those costs can or should be monetised):

[24] https://tewhata.io/ngai-tahu-kai-tahu/.

56.1. Instead, I demonstrate, using conservative publicly-available WTP metrics, that those cultural costs alone could easily far exceed the Project's claimed impacts/benefits.

3.5 Sapere Report Implicitly Assumes that Current Waste Levels are Socially Desirable

57. The Sapere Report assesses the Project's claimed efficiency benefits in terms of enabling existing waste levels to be accommodated more cheaply than can be achieved through alternative means. It stresses that the Project does so by reducing travel time, emissions, and crash costs for handling those waste levels.

58. However, this presumes that the current level of waste is in some sense socially desirable, and hence we should only care about handling that waste as efficiently as possible. The implicit assumption is that absent the Project the costs (i.e. transport-related costs and gate fees) of handling waste will be in some sense "too high":

58.1. No evidence is presented to justify this assumption, and in reality it is possible that the total costs of handling the region's existing waste reflect only private costs, and do not fully internalise the total costs, including social costs, of such waste;

58.2. As such, it could in fact be socially desirable to <u>increase</u> the costs of handling such waste, to achieve a reduction in such waste, which the Project – if its efficiency benefits are real – might frustrate.

3.6 Sapere Report Does Not Assume Regional Waste Needs Will Not Be Met Absent the Project

59. The Sapere Report stresses that the Project will:

59.1. "[E]nable the continued functioning of existing regionally significant infrastructure";[25] and

59.2. "[A]lign with both national and regional direction by enabling more cost-effective diversion of inert materials, reducing pressure on Class 1 facilities, and supporting more efficient and sustainable waste system performance across the region."[26]

[25] Sapere Report, at p. 6.

[26] Sapere Report, at p. 9.

60. However, the Project's assessed efficiency benefits are predicated on the region's existing waste management needs being accommodated even without the Project, just at slightly higher travel time, emissions, and crash costs:

    60.1. As such, and because those efficiency benefits are so modest, there is nothing in the Analysis that suggests the region's waste management needs cannot be effectively accommodated even without the Project proceeding;

    60.2. Indeed, for the reasons discussed above, the Project could in fact result in perpetuating a socially-excessive level of regional waste.

3.7 Sapere Report Contains Material and Immaterial Technical Errors

61. The formula provided in the Sapere Report for converting 20 years of annual GDP impacts into a present value of $17.3m is incorrect, and impossible to interpret given the provided variable definitions:[27]

    61.1. That said, the $17.3m figure provided is correct, so this error is immaterial in practice.

62. More materially, travel time savings are presented as social benefits, and private transport cost savings (i.e. of waste transporters) due to the Project are argued to be transfers that re not relevant for CBA purposes:[28]

    62.1. In this case, however, any travel time savings are likely to be private in nature – i.e. accruing to users of waste transport services in the form of lower waste transport costs;

    62.2. Such private benefits are very much relevant for transport CBA purposes, and are not treated as transfers that can be ignored in such CBAs.[29]

[27] Sapere Report, at p. 17. The correct formula is $PV = (A / r) \times [1 - (1 + r)^{-n}]$.

[28] Sapere Report, at p. 23.

[29] For example, see De Rus et al., 2022, "Cost-benefit analysis of transport projects: Theoretical framework and practical rules", *Transport Policy*, 123, at pp 25-26, 29-30, and 36.

63. Critically, the assumed travel time, emissions cost, and crash cost savings attributed to the Project are based on social savings metrics that accrue to all New Zealand, not specifically to Canterbury:

    63.1. As such, the claimed Project impacts/benefits cannot be understood to be just regional impacts/benefits, which is relevant to assessing their regional or national significance (as discussed further in Section 3.10 below).

3.8 Sapere Report Fails to Provide Sensitivity Analyses, and is Insufficiently Transparent

64. While the Sapere Report does consider various scenarios (e.g. comparing the Project's travel time, emissions, and crash costs with those relative to both Taiko Road and Kate Valley), it does not follow standard modelling practice of showing how modelled efficiency results change in response to plausible changes in input assumptions, particularly where those input assumptions are material, and their values are not certain (including over time):[30]

    64.1. Indeed, FTE and GDP impacts are presented as point estimates only, with not even scenario modelling provided.

65. This means the results presented for each modelled scenario hinge on the assumed input values, and the sensitivity of scenario results to changes in those assumptions cannot be determined:

    65.1. As such, the Panel has not been presented with sufficient information to assess the robustness of the modelled results to changes in input assumptions.

66. Relatedly, the Analysis is insufficiently transparent and replicable to either test its assumptions and approach, or to translate the claimed Project impacts into annual figures over time (particularly in relation to efficiency benefits, which are stated to grow in line with district-level population growth,[31] for which no data are provided):

[30] For example, waste generation assumptions are set out in Table 5 of the Sapere Report, and key efficiency assumptions are set out elsewhere on pp 23-25, but results are not reported for plausible different values of such assumptions.

[31] Sapere Report, at p. 26.

66.1. Such transparency is a matter of good modelling practice, since it clearly identifies both key assumptions, and how those assumptions affect key modelling outputs – both of which are essential for establishing the veracity of the Analysis.

3.9 Assessed Project Efficiency Benefits Differ by Orders of Magnitude, Complicating Interpretation

67. While the Project's claimed FTE and GDP impacts are essentially point estimates, with no variation, its claimed efficiency benefits differ by orders of magnitude, i.e. referring to the annual impacts/benefits summarised in Section 3.4 above:

67.1. For the Taiko Road counterfactual, annual efficiency benefits range from $1.76m/year in the "Base case" (with no resource consent constraints) down to $0.31m/year in the "Consent constraints" case – some 82% lower;

67.2. For the Kate Valley counterfactual, the corresponding figures are $0.19m/year down to $0.035m/year – also some 82% lower;

67.3. For the "Base case", benefits are assessed to be as high as $1.76m/year for the Taiko Road counterfactual, and as low as $0.185m/year for the Kate Valley counterfactual – some 89% lower; and

67.4. For the "Consent constraints" case, benefits are assessed to be as high as $0.307m/year for the Taiko Road counterfactual, and as low as $0.035m/year for the Kate Valley counterfactual – also some 89% lower.

68. While it is legitimate and desirable to allow for key Project uncertainties, as captured in these modelled scenarios, the utility of the modelled results is reduced when those results are so highly-sensitive to the scenario descriptions:

68.1. When the variability of results is this high, then absent further information to understand which scenario is the most reliable, it is hard to meaningfully interpret those results;

68.2. All that can be said otherwise is that the results might be at a certain level, or a vastly different level – this makes it hard for decision-makers (e.g. the Panel) to understand what the true level of claimed impacts/benefits really are.

3.10 Even Claimed Impacts/Benefits are Immaterial, So Not Significant at Either a Regional or National Level

69. When Project impacts/benefits are measured in FTE or GDP terms, it is natural to consider their regional or national significance by reference to their regional or national FTE and GDP counterparts:[32]

    69.1. For reference purposes, Canterbury employment and GDP in 2025 were 365,376 filled jobs (not FTEs per se) and $53,919m respectively.[33]

70. Taking the Project's claimed maximum FTE impact of 8.7 jobs as stated, this amounts to just 0.0024% (i.e. 24 millionths) of Canterbury's filled jobs – in other words, Canterbury's number of filled jobs is more than 40,000 times the Project's maximum claimed FTE impact.

71. Taking the Project's claimed maximum annual GDP impact of $1.76m/year as stated, this amounts to just 0.0033% (i.e. 33 millionths) of Canterbury's annual GDP – in other words, Canterbury's annual GDP is more than 30,000 times the Project's maximum claimed GDP impact:

    71.1. While the Project's maximum claimed efficiency benefits of $1.76m/year (coincidentally the same figure as the maximum claimed GDP impacts) is not directly comparable to regional GDP, the same conclusion applies – annual regional GDP is more than 30,000 times those claimed maximum annual efficiencies;

    71.2. For the Project's minimum claimed efficiency benefits of $0.035m/year, the comparison is even more stark – Canterbury's annual GDP is more than 1.5 million times those claimed benefits.

72. At these levels, the Project's claimed maximum FTE and GDP impacts are not even statistical noise:

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[32] While practice in this regard differs across FTAA applications, I note that the economist for the applicant in the Bendigo-Ophir gold-mining FTAA application chose to assess the significance of claimed Project FTE and GDP impacts by reference to regional FTE and GDP levels.

[33] Using regional economic data published by Infometrics: https://regions.infometrics.co.nz/canterbury-region/.

72.1. The average annual change in Canterbury's filled jobs is 5,175 jobs, so the Project's claimed maximum FTE impact of 8.7 jobs is an immaterial share (0.17%) of even the average annual change in the region's employment;

72.2. The average annual change in Canterbury's GDP is $1,068m, so the Project's claimed maximum GDP impact of $1.76m is also an immaterial share (0.16%) of even the average annual change in the region's employment.

73. As such, if the Project did not proceed, that would not affect Canterbury's employment or GDP in any discernible way:

73.1. Since Canterbury's waste management needs are assumed in the Sapere Report to be fulfilled even without the Project, just at very modestly greater cost, this too points to the Project not having discernible regional effects more generally.

74. Notably, all of these conclusions apply before:

74.1. Allowing for the fact that not all EIA-based impacts are benefits;

74.2. Deducting the non-market value of cultural costs – which I showed above to conservatively be possibly as great as the claimed Project impacts/benefits, i.e. essentially causing those impacts/benefits to be zero or possibly even negative in net terms; and

74.3. Allowing for the fact that the claimed efficiency benefits are based on social cost metrics that apply at a national level, so cannot be assumed to be attributable to just the Canterbury region.

75. This means that the claimed Project impacts/benefits – whether in terms of FTE, GDP, or waste management service provision – are immaterial, and in net terms are even zero or negative, at a regional level:

75.1. As such, they are even more immaterial at a national level.

76. In my opinion, it is implausible to conclude that even the Project's claimed impacts/benefits – let alone its actual net benefits – are significant at a regional or national level, as required under the FTAA.

4. Conclusions

77. In conclusion, it is my opinion that:

77.1. The FTAA requires a clear assessment of whether the Project delivers net benefits to New Zealand's social welfare once all costs, disbenefits, and adverse impacts are accounted for. In economic terms, this necessitates a CBA, rather than an EIA.

77.2. The Sapere Report provides both an EIA (for FTE employment impacts, and regional GDP impacts) and a partial CBA (for certain non-market benefits, ignoring non-market costs) – it is therefore not, or only partially, fit for purpose under the FTAA framework. Its EIA measures economic activity rather than benefits, includes costs as benefits, and overstates impacts due to use of input-output (I-O) multipliers which are known to over-state project impacts. Its CBA assesses non-market benefits but omits significant non-market adverse impacts. In either case, the results materially overstate the project's economic contribution. Accordingly, the Project's claimed impacts, let alone benefits, are not robustly established.

77.3. Critically, the Project's assessed benefits/impacts are immaterial at even the Canterbury regional level (hence only even more immaterial at the national level), even before allowing for potentially substantial unmitigated cultural adverse impacts, which costs are likely to be sufficient to offset any claimed Project impacts/benefits.

77.4. On the available evidence, it is implausible that the project delivers significant net regional or national benefits as required under the FTAA.

Richard Meade (PhD, Toulouse School of Economics)
Principal Economist, Cognitus Economic Insight

Whiterock Landfill Fast Track Referral Application Benefits Report – Peer review

I have been asked by Waimakariri District Council to peer review the WSP report Whiterock Quarry and Managed Fill Analysis of the Significant Benefits to the Region, in particular waste demand aspect, which is in support of the Whiterock Class 3 Managed Fill application under the Fast-track Approvals Act 2024 at the Whiterock Lime Quarry near Loburn in Canterbury.

I hold a Bachelor of Science with First Class Honours in Geology and a Master of Civil Engineering, with research that focused on risk assessment for closed landfills in North Canterbury. I have more than 10 years' senior management experience in the waste industry in Canterbury and across New Zealand.

The proposed Whiterock Landfill has approximately 500,000 m³ of usable airspace and is anticipated to operate for approximately 20 years, implying an average intake of approximately 800,000 tonnes, averaged at 40,000 tonnes per year. The same 40,000 tonnes per year is subsequently used to calculate transport and emissions benefits. It is challenging to conclusively determine how many tonnes of actual waste will likely be generated over this period.

The report claims that the proposed facility is well located and would expand disposal options available in Canterbury. Given the proximity of Whiterock to Christchurch, this statement in the report seems generally correct. Furthermore, Whiterock going ahead would increase competition in the landfill market.

The report refers to national waste data, including an estimate that between 4.5 and 7.5 million tonnes of soil is disposed of nationally in 2022-23. This claim supports the proposition that soil disposal is a significant national waste management issue. The report does not establish the volume of waste generated in Canterbury or the proportion of material that would realistically be available to Whiterock. These national figures are useful context, but do not accurately establish a regional need.

The report relies on forecast population growth, infrastructure investment and proposed development projects as important drivers of future waste demand. These factors do reasonably support an expectation that C&D waste and surplus soil will continue to be generated. It is noted that the report does not address increasing efforts for reuse and recycling of this material. For example, major residential development may generate significant earthworks material, but this does not necessarily mean that material will require off-site disposal. Companies such as Frews (at Marshs Road) and South Demolition (at Owaka Road) have also recently invested in material recovery and blending operations in Christchurch, avoiding landfill disposal for many materials previously considered waste.

The report identifies recent projects which generated approximately 14,500 tonnes of material that could be diverted from Class 1 or Class 2 landfill facilities to Whiterock. This is useful evidence that relevant waste streams are currently generated in Canterbury. The 14,500 tonnes identified are equivalent to approximately 35% of the 40,000-tonne annual throughput assumed in the report. Whiterock location would have been convenient for many of these projects.

The report could be enhanced if further information were to be provided regarding:

- current annual throughput at competing facilities;
- remaining consented capacity at these facilities;
- expected operating lives; and
- overlap between the competing facilities' WACs and the Whiterock WAC.

Without this information, it is difficult to determine whether Canterbury faces an actual capacity deficit, as opposed to a situation where additional capacity would principally increase competition and choice.

The report does not identify that Kate Valley currently accepts Class 2 and Class 3 (“high density”) material. The author understands Kate Valley has significant airspace and capacity for many decades, enough to take all the addressable market for Class 2 and 3 waste in Canterbury. It is recommended that the report reconsiders Kate Valley’s current disposal options and gate rates for these classes of materials.

Other Observation

Section 3.1 of the report states that contaminated soil and sorted C&D are inert. In reality, both contaminated soil and C&D have the potential to generate leachate, and the anerobic decomposition of organic material in C&D waste (without gas collection and destruction) will generate methane. For this reason, the term “inert” used in section 3.1 of the report could be reconsidered.

Conclusion

It is considered that the proposed facility is convenient and would expand disposal options available in Canterbury. Competition would increase, which would be commercially beneficial to those wishing to dispose of waste to land. The report uses national, rather than regional data to justify its benefit and does not identify that established landfills, including Kate Valley Landfill, likely have long-term capacity for Canterbury’s disposal needs for the foreseeable future.

The report does not discuss the increasing trend in industry for reuse, blending and recycling of Class 2 and 3 materials (e.g. at Frews and South Demolition facilities), avoiding the need for some current landfilling activities.

On balance, the report correctly identifies that the proposal has the potential to increase commercial landfilling options and competition in Canterbury. In my view the report does not demonstrate a critical demand or regional significance in its current form, given other disposal options and increasing recovery outlets available in the Canterbury market.

Greg Slaughter

Transwaste Canterbury Limited

Annual Report

For the year ended 30 June 2025



View across Kate Valley to Waipara Valley and Mt Grey

The Board of Directors is pleased to present the Annual Report of Transwaste Canterbury Limited for the year ended 30 June 2025

For and on behalf of the board



G S Miller
Chairman



H E G Maehl
Director

25 September 2025

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Directory

Company Number	951024
Registered Office and Address for Service	Buddle Findlay 33 Cathedral Square Christchurch 8011
Directors	Mr G S Miller (appointed Independent Chairman on 21 May 2025) Mr W G Cox (finished 21 May 2025) Mr H E G Maehl Mr I G Kennedy Mr T H Nickels Mr R A Pickworth Mr J T Gough

Shareholders

	No. of Shares (Ordinary)
Waste Management NZ Limited	10,000,000
Christchurch City Council	7,780,000
Waimakariri District Council	780,000
Selwyn District Council	600,000
Ashburton District Council	600,000
Hurunui District Council	240,000
	20,000,000

Independent Chair of the Audit Committee	Brent McKenzie
Auditors	Ernst & Young on behalf of the Auditor-General
Solicitors	Buddle Findlay 33 Cathedral Square Christchurch 8011 Chapman Tripp Level 5, 60 Cashel Street Christchurch 8013
Bankers	Westpac Banking Corporation 83 Cashel Street Christchurch 8011
Principal Activity	To own, operate and continue development of a non-hazardous regional landfill in Canterbury.

Directors' Report to the Shareholders

For the year ended 30 June 2025

Your directors take pleasure in presenting their Annual Report including the financial statements of the company for the year ended 30 June 2025.

Principal Activities

The company was incorporated on 31 March 1999 with the principal purposes of selecting, consenting, developing, owning and operating a non-hazardous regional landfill in Canterbury.

The company holds six wholly owned name protection subsidiaries, all of which are inactive and have no assets and liabilities.

State of Affairs

The nature of the company's business activities remained unchanged during the accounting period.

The results of operations during the period, financial position and state of affairs of the company are as detailed in the accompanying financial statements.

Directors' Remuneration

	Directors Fees	Other Remuneration
	$	$
Mr G S Miller	51,295	-
Mr W G Cox	73,279	-
Mr T H Nickels	43,967*	-
Mr I G Kennedy	43,967*	-
Mr R A Pickworth	50,712	3,843
Mr H E G Maehl	43,967*	-
Mr J T Gough	43,967	-

*The directors fees for these directors are paid to the companies they represent.

No other remuneration or benefits have been paid to directors, with the exception of Mr R A Pickworth who has received $3,843 in consulting fees. The fees and remuneration have been entered in the interests register.

The company is required to maintain an interests register in which the particulars of certain transactions and matters involving the directors must be recorded. The interests register for the company is available for inspection by shareholders at the registered office.

Directors' Report to the Shareholders
For the year ended 30 June 2025

Directors' Interests

The directors have disclosed an interest in the following entities pursuant to section 140 of the Companies Act 1993:

MR W G COX (finished 21 May 2025)

	Position Held
Elastomer Products Limited	Director
Barlow Brothers NZ Limited	Director
Anderson Lloyd	Board Member
MOTUS Health Limited	Director
Waimakariri Irrigation Limited and subsidiary	Director
Venues Otautahi Limited	Director
Christchurch City Holdings Limited	Director
Te Kaha Project Delivery Limited	Director
Committee for Canterbury	Trustee
Project Crimson	Trustee
Foodco New Zealand Limited (finished 30 November 2024)	Director

MR I G KENNEDY

	Position Held
Waste Management NZ Limited	Employee

MR T H NICKELS

	Position Held
KT Advisory Limited	Director
OCS Australia & New Zealand	Advisory Board Member
City Care Limited (commenced 25 October 2024)	Director
Whangarei Anglican Church	Commissioner

MR R A PICKWORTH

	Position Held
Westroads Limited	Director
Ashburton Contracting Limited	Director
Pipeline Group Limited, plus various wholly owned subsidiaries	Director
McLenaghan Contracting Limited (finished 24 October 2024)	Director
Industrial Controls South Canterbury Limited	Director
Waiotahi Contractors Limited	Director
Network Tasman Limited	Director
Electraserve Limited (commenced 1 April 2025)	Director

MR G S MILLER

	Position Held
Selwyn District Council	Councillor
Canterbury Regional Landfill Joint Committee	Committee Member
Central Plains Water Limited	Director
Porahui Farms Limited	Shareholder

Directors' Report to the Shareholders
For the year ended 30 June 2025

MR H E G MAEHL

	Position Held
Waste Management NZ Limited and its NZ parent companies, plus various wholly owned subsidiaries	Director
Waste Management NZ Limited	Employee
Waste Disposal Services	Executive Committee Member
WM Risk Management Ltd	Director

MR J T GOUGH

	Position Held
Christchurch City Council	Councillor
Canterbury Regional Landfill Joint Committee	Committee Member
Fendalton-Waimairi-Harewood Community Board	Board Member
Civic Building Limited	Director
Gough Property Corporation Limited	Shareholder and Director
Gough Family Limited	Shareholder and Director
Gough Family Investments Limited	Shareholder and Director
Gough Corporation Holdings Limited and various wholly owned subsidiaries	Shareholder and Director
Antony Gough Trust	Trustee
The Terrace Carpark Limited	Director
The Terrace Christchurch Limited	Director
The Terrace on Avon Limited	Director
Te Runanga O Waihao Holdings Limited (commenced 18 December 2024)	Director
Canterbury Rugy Football Union (incorporated society)	Director

All transactions the company has entered into with parties in which directors hold directorships have been entered into in the ordinary course of business.

Directors' Remuneration and Other Benefits
Details of the directors' remuneration are provided above.

Information used by Directors
No member of the board of Transwaste Canterbury Limited issued a notice requesting to use company information received in their capacity as directors which would not otherwise have been available to them.

Indemnification and Insurance of Officers and Directors
The company indemnifies all directors named in this report against all liabilities (other than to the company) that arise out of the performance of their normal duties as director, unless the liability relates to conduct involving lack of good faith. An indemnity is also provided to the independent chair of the audit committee. To manage this risk, the company has indemnity insurance. The annual cost of this insurance is $27,650 (2024: $31,650).

Directors' Report to the Shareholders
For the year ended 30 June 2025

Dividend

The general policy for the company is to declare dividends calculated at 100% of the net profit after tax after allowing for working capital requirements, as set out in the company's Statement of Intent. Dividends of $19,650,000 were paid during the year.

A final dividend in relation to the 2025 year of $7,000,000, which was declared after balance date, is disclosed in note 7.

Donations

The company made donations of $90,831 to the Kate Valley Landfill Community Trust (2024: $91,681) during the year.

Auditor's Remuneration

The auditor of the company is Ernst & Young, acting on behalf of the Auditor-General.

The annual remuneration for auditing services for the company provided by Ernst & Young was $79,000 (2024: $75,000). No other services were provided by the auditor.

Chairman's Review

For the year ended 30 June 2025

Welcome to the Transwaste Canterbury Limited (Transwaste) 2025 Annual Report.

Transwaste recognised several milestones this year the most significant being the retirement of long serving Chair Mr Gill Cox.

Gill was appointed in 1999 and retired this year having completed 25 years of service to the company.

On behalf of Transwaste, its shareholders, and the wider stakeholder community, I wish to thank Gill for his outstanding contribution to the company.

Transwaste now enters its 21st year of physical operations at our Kate Valley site.

Our Operations

Total tonnes to landfill were 346,287 in the year compared to 355,048 in the previous year.

The general waste portion (commercial and domestic sources) remained similar to the previous year at 298,096 t vs 299,936 t.

However, high-density waste (mostly contaminated soils) reduced in volume from 29,937 t to 21,339 t. This reduction is largely responsible for the reduction in volume to landfill compared to the 2024 year.

The Waste Levy increased on 1 July 2024 to $60 per tonne for class 1 landfills such as Kate Valley (an increase of $10 over previous year).

Transwaste continues to be concerned that without the Levy being uniformly applied across all waste disposal facilities, the incentive exists for waste to be inappropriately disposed of into facilities operating at a lower environmental standard than Kate Valley.

We continue to actively plan for the future by always having a minimum of 12 months airspace developed at Kate Valley with significant potential future capacity (100+ years).

Energy production onsite increased from 16,517 Mwh to 17,584 Mwh. It was pleasing to note that this was achieved with a higher energy generated per engine hour (.79 Mwh 2025 vs .72 Mwh 2024).

The company continues to advance options to fully utilise the generation capacity available.

Our commitment to reducing the GHG emissions produced in the operation of Kate Valley continues with the recent acquisition of our first fully electric linehaul truck which will transport waste from transfer stations to Kate Valley. This will initially be operated as a trial to ascertain the best operable utility and how this trial may be extended if successful. We look forward to being able to report further on this exciting development in 2026.



EV Truck about to start its trial hauling to Kate Valley

Transwaste Green House Gas emissions are audited and certified by Toitu. The audit occurs post the publication of the Annual Report so the 2025 Information is not yet available.

The most recent certified emissions results are shown below All figures are tonnes of CO2 equivalent (t CO2e)	Certified 2024		Certified 2022 Baseline	
Potential emissions from landfill gas	297,608		261,676	
Less gas captured and destroyed or otherwise oxidised	282,693		226,135	
Direct emission	14,915		35,541	
Emissions from fuel for transport and landfill plant	4,581		3,794	
Green House Gas Emission Footprint	19,496		39,335	
Sequestration into Transwaste's own forest (commercial and indigenous)	- 7,295		- 6,612	
Net Emission	12,201	CO2e	32,723	CO2e

Transwaste captured and destroyed of 95% of the landfill gas produced in 2024, by way of comparison this was approximately the emissions produced by 118,000 cars.

The destruction of the gas also generated enough electricity to power over 2,000 homes.

Offsetting the above, Transwaste Canterbury as a major Class 1 landfill, is required to participate in the Emissions Trading Scheme. During this financial year Transwaste surrendered 31,140 ETS units relating to the calendar year 2024.

Our People

Care for our people remains our top priority, making sure that each of our team members are safe at work and come home safely to their families each day.

The board wholeheartedly supports our safety culture and commends our principal contractor, WM New Zealand, for the passion, resources, and dedication to health and safety they apply in the daily operations of Transwaste.

Board members actively participate in reviewing all aspects of health, safety and wellbeing as well as undertaking regular site visits to the business.

Transwaste, in consultation with its shareholders, engaged BDO in 2024 to undertake a comprehensive independent review of the company and operations.

In submitting its report and recommendations, BDO noted Transwaste as being a unique and highly successful public/private partnership that is very well governed and managed.

Our Financials

	2025 $'000's	2024 $'000's
Waste related operations (excluding levy)	55,677	53,536
Generation	3,088	2,597
Other (Forestry)	1,293	-
Trading Revenue	**60,058**	**56,133**
Profit After Tax	**13,939**	**14,542**
Dividends paid:		
Landfill	14,650	12,050
BRRP project final dividend	5,000	
Total paid in the year	**19,650**	**12,050**

The Waste Levy has been excluded from the figures ($60/t 2025 $ 50/t 2024).

Waste related income rose 4%. This was not reflected in the earnings due to an increase in operational costs and amortisation of the Whole of Life capital cost of the landfill.

Similarly, Generation income rose 19% but was offset by scheduled generator servicing that occurred in 2025 rather than 2024.

The Forestry Income whilst significant had minimal impact on the year's profit as the margin earned was offset by the reduction the harvest caused in the forestry valuation.

The board was pleased to be able to declare and pay $14.65m of dividends during the year relating to both the 2024 and 2025 financial years. I note a further $7m relating to the 2025 year was declared and paid during August 2025.

In addition, the board was pleased to be able to release the final contingency funds held from the Burwood Resource Recovery Park project (BRRP) as a dividend this year.

Transwaste is proud of its role in assisting Canterbury recover from the devastating 2011 earthquake sequence, being able to provide and manage significant waste volumes at short notice with potentially high risk.

The project ceased receiving material in December 2019 with the site being restored over the following years to a park environment.

I particularly wish to thank the Transwaste team associated with setting up and operating this project whilst dealing with the impact the earthquakes had on their own family lives.

Our Future

As we move into our third decade of operations it is appropriate to reflect on the foresight and actions of people such as Gareth James, Denis O'Rourke, Jim Fulton and Gill Cox in the establishment of Transwaste as an awarded world class landfill that provides high quality management of residual community waste and energy generation.

The company seeks to maintain and enhance this legacy, maintaining high environmental standards and controls, supporting the community in its desire to reduce its creation of waste.

Tiromoana Bush, our indigenous conservation and regeneration project is now attracting national attention and recently featured in a short film 'Think Like a Forest'. We encourage you to walk its trails and enjoy its resurgence.

We thank our shareholders and the wider community for their continued support.



Grant Miller

Chair

25 September 2025

Directors' Responsibility Statement

For the year ended 30 June 2025

The directors are responsible for ensuring that the financial statements give a true and fair view of the financial position of the company as at 30 June 2025 and its financial performance and cash flows for the year ended on that date.

The directors consider that the financial statements of the company have been prepared using appropriate accounting policies, consistently applied and supported by reasonable judgements and estimates and that all relevant financial reporting and accounting standards have been followed.

The directors believe that proper accounting records have been kept which enable, with reasonable accuracy, the determination of the financial position of the company and facilitate compliance of the financial statements with the Companies Act 1993.

The directors consider they have taken adequate steps to safeguard the assets of the company and to prevent and detect fraud and other irregularities.

The directors have pleasure in presenting the statement of objectives and performance, and the financial statements, set out on pages 14 to 57 of Transwaste Canterbury Limited for the year ended 30 June 2025.

The board of directors of Transwaste Canterbury Limited authorised these financial statements for issue on 25 September 2025.

For and on behalf of the board



G S Miller
Chairman



H E G Maehl
Director

25 September 2025

Statement of Objectives and Performance

For the year ended 30 June 2025

Targets were set under the Statement of Intent for the three years ending 30 June 2027. A comparison of achievement against those targets is as follows:

Objective

Environment: To ensure that Transwaste, as a minimum, meets present and future environmental standards in a manner which is consistent with the preservation of the natural environment and the careful and sustainable management of its natural resources.

Desired Outcomes	Performance Measures and Target	Achievement
(a) No proven breaches of Resource Management Act consents.	Nil established consent breaches notified during the year by ECan or Hurunui District Council.	There were no breaches notified by Ecan or Hurunui District Council.

Objective

Environment: Support New Zealand's "Predator Free by 2050" goal.

Desired Outcomes	Performance Measures and Target	Achievement
(a) Limit large mammal pests (pigs and deer) to low levels in Tiromoana Bush.	No adverse impacts on restoration plantings from deer and pig rooting (such damage being evident in <5% of vegetation monitoring plots).	Achieved – maintained active pest control resulting in minimal damage
(b) Small mammal pests (mustelids, rodents, possums, cats, hedgehogs) reduced to levels that have minimal impact on native biodiversity in Tiromoana Bush.	The abundance of bird life (as indicated by remeasuring of the bird monitoring transects) is greater than the 2005-2009 baseline for bellbird and grey warbler.	No monitoring completed during the year. A survey is scheduled for the 2026 year alongside upgraded automated monitors.

Statement of Objectives and Performance (Continued)
For the year ended 30 June 2025

Objective
Environment: Reduce Green House Emission intensity, to use the gas captured in a socially and economically sustainable way and to generate carbon offsets via commercial and indigenous forestry.

Desired Outcomes	Performance Measures and Target	Achievement
(a) Measure Transwaste's carbon footprint.	An independent certifier has been engaged to provide certification and annual audit services, with appropriate KPIs.	Achieved – certification obtained and audit completed for the year ended 30 June 2024.
(b) Maximise capture and destruction of landfill gas from Kate Valley landfill.	Ensure the capture and destruction of in excess of 95% of landfill gas produced by Kate Valley landfill.	Achieved for the year ended 31 December 2024. The next measurement date is 31 December 2025.
(c) Reduce GHG emission intensity from Controlled Waste haulage.	Increased average Eurostar certification of the fleet.	Achieved – average rose from 5.1 to 5.2.
(d) Reduce GHG emissions from leachate haulage.	Use of BeneVap for a 50% reduction in leachate hauled offsite over the SoI period.	Achieved – zero leachate hauled.
(e) Reduce embedded GHG emissions from grid supply.	Replacement of grid supply by onsite green supply for a 50% reduction in grid electricity consumption over the SoI period.	Not yet achieved – to meet by 2027. Striving to use more of own generation, including onsite supply to the Benevap in the 2026 financial year.
(f) To ensure the beneficial use of landfill gas to obtain the best economic value.	To increase the beneficial use of landfill gas by 25% over the five year period to 2029.	Not yet achieved – sufficient generation capacity is available on site to support the target, however achieving the target remains dependent on transmission line improvements, which is under continuing investigation.
(g) Increase in carbon sequestration of exotic forestry (subject to harvest and replanting).	Monitor and report the tonnage of carbon sequestered (5 yearly) (measured by accrual of ETS units).	Next ETS vesting period is December 2026.
(h) Provide ongoing planting and growth of native trees and bush in the Tiromoana Bush area.	Monitor and report the tonnage of carbon sequestered (5 yearly) (measured by accrual of ETS units).	Next ETS vesting period is December 2026.
(i) Report annually carbon emissions attributable to the waste received from each Territorial Local Authority area, both before and after carbon reduction initiatives.	Development and distribution of carbon emissions reporting to Territorial Local Authorities.	Not achieved – methodology in place but reporting delayed.

Statement of Objectives and Performance (Continued)

For the year ended 30 June 2025

Objective

Corporate Citizenship/Community Relations: To be a responsible Corporate Citizen by acting fairly and honestly and to be sensitive to local issues.

Desired Outcomes	Performance Measures and Target	Achievement
(a) Finance the Kate Valley Landfill Community Trust (from the Disposal Charge) for the purpose of benefiting the local community.	Annual payment to Kate Valley Landfill Community Trust, to be determined on an annual basis.	Achieved. The company has made contributions to the trust for the 2024/25 year totalling $90,831.
(b) Develop, maintain and promote the use of education material with regard to waste management and the environment.	Material is being used by schools.	Achieved. However, usage of online material remains low. Investigating options to increase this.
(c) Plan for sites aftercare and closure – financially and revenue streams.	Adequate provisioning, which stands up to audit scrutiny, in financial statements for aftercare and closure costs.	Achieved. Methodologies comply with the applicable accounting standards, no audit adjustments required.

Objective

Service Quality: Meet the present and future needs of the people of Canterbury with high standards of value, quality and service and establish effective relations with customers.

Desired Outcomes	Performance Measures and Target	Achievement
(a) Timely, high quality and reliable waste transport services.	Zero events where a transfer station is unable to receive waste during its normal operating hours due to Transwaste's failure to supply containers.	Achieved – zero events.
(b) Reliability of access to the Kate Valley landfill.	Landfill is available to waste transporters for more than 99% of normal annual transport access hours.	Achieved – more than 99% availability for normal access hours, with no closure events during the period.

Statement of Objectives and Performance (Continued)
For the year ended 30 June 2025

Objective
Health and Safety: Strive for zero injury accidents in all operations the Company and its main contractor, WM New Zealand, will be responsible for, whilst maintaining a high level of service and production.

Desired Outcomes	Performance Measures and Target	Achievement
(a) Ensuring that in all activities the Company and its contractors have Health and Safety Management Plans in place.	Maintain or improve current total recordable injury frequency rate (TRIFR) for the last 12 months.	Not achieved. 1 Medical Treatment Injury (MTI), resulting in TRIFR of 8.2, compared to nil last year.
(b) Maintain Kate Valley public walkways to an acceptable standard, (track maintenance, signage).	Annual operational plans objectives met, with no serious avoidable injuries.	Achieved.
(c) No traffic incidents where WM New Zealand drivers at fault.	No at-fault incidents.	Not achieved – 1 at fault event, which has been appropriately addressed.

Objective
Good Employer: Be a Good Employer, through either direct employment or by way of the management contract with WM New Zealand.

Desired Outcomes	Performance Measures and Target	Achievement
(a) Ensure WM New Zealand has objectives and policies that detail the relationship with employees, their remuneration, safety and other issues such as equal opportunity in employment.	No more than 15% of WM New Zealand landfill and transport staff annual FTE turnover.	Achieved. Turnover of permanent employees was 13% for the 12 month period.
(b) Ensuring that its employees have secure and rewarding employment which provides the means for personal development.	10 hours per FTE annually for WM New Zealand staff training.	Achieved. Kate Valley staff have undertaken 18 hours per FTE.

Statement of Objectives and Performance (Continued)

For the year ended 30 June 2025

Objective

Consultation/Communication: Establish and maintain good relations with the local host community of the Kate Valley landfill and consult with those groups and other interest groups (including Tangata Whenua) on issues that are likely to affect them.

Desired Outcomes	Performance Measures and Target	Achievement
(a) Consult with the host community concerning landfill operations by way of direct communication and via the Community Liaison Group.	At least two Kate Valley Community Liaison group meetings held per year.	Achieved. The Community Liaison Group held quarterly meetings in the period.
(b) Engage with other interest groups including Tangata Whenua and discuss all issues likely to affect them.	Three interactions with interest groups per year.	Achieved. More than three interactions with Kate Valley neighbours, community and interest groups.

Objective

Legislative/Regulatory Compliance: To be a good Corporate Citizen by acting lawfully, to ensure compliance with all relevant legislative requirements.

Desired Outcomes	Performance Measures and Target	Achievement
(a) Monthly reporting to Board of any non-compliance.	Monthly reports received.	Achieved. Monthly reporting is undertaken. Compliance reporting up to date at Kate Valley.
(b) No legislative and statutory non-compliance notices received.	No non-compliance in all key areas.	Achieved. No actions required notified.

Statement of Objectives and Performance (Continued)
For the year ended 30 June 2025

Objective
Shareholder Interests: To operate a successful business, providing a fair rate of return to its shareholders.

Desired Outcomes	Performance Measures and Target	Achievement
(a) To effectively operate the consented regional landfill at Kate Valley to achieve specific commercial performance targets.	Total Revenue (inclusive of waste levy) of $79,979,000	Achieved. $80,811,000 – log sales offset waste volume drop.
	EBIT of $21,329,000	Not achieved. $1,054,000 (5%) below budget at $20,275,000 through a combination of decreased tonnes of waste to landfill compared to budget and continuing cost pressures.
	Dividends paid (relating to Kate Valley) of $14,900,000	Not achieved. Dividends totalling $14,650,000 were paid during the year for the Kate Valley operations, the lower dividend corresponding to the slightly reduced earnings compared to budget. A further, final project dividend of $5,000,000 was paid in relation to the now completed Burwood Resource Recovery Park project.

Statement of Comprehensive Income
For the year ended 30 June 2025

	Notes	2025 $'000	2024 $'000
Revenue			
Sales excluding waste levy		60,058	56,133
Waste levy		20,753	17,753
Sales including waste levy	3	80,811	73,886
Rental		63	63
Changes in fair value of forest	9	345	(368)
Total revenue		**81,219**	**73,581**
Expenses			
Audit fees	4	75	89
Depreciation and amortisation	4,8	7,237	6,721
Directors' fees	4	351	382
Forestry harvest costs		1,250	-
Landfill and facilities operating costs		27,842	24,998
Loss on sale of property, plant and equipment		47	17
Waste levy	3	20,777	17,753
Other expenses		3,365	2,523
Total expenses		**60,944**	**52,483**
Profit before finance costs and tax		**20,275**	**21,098**
Net finance costs	5	865	901
Profit before tax		**19,410**	**20,197**
Income tax expense	6	5,471	5,655
Profit for the year		**13,939**	**14,542**
Other comprehensive income			
Net change in fair value of cash flow hedging instrument	14	206	(206)
Total comprehensive income for the year		**14,145**	**14,336**

The accompanying notes form part of these financial statements

Statement of Changes in Equity

For the year ended 30 June 2025

	Notes	Contributed equity $'000	Other reserves $'000	Retained earnings $'000	Total equity $'000
Balance 1 July 2023		16,000	625	18,141	34,766
Profit for the year		-	-	14,542	14,542
Other comprehensive income	14	-	(206)	-	(206)
Total comprehensive income for the year ended 30 June 2024		**16,000**	**419**	**32,683**	**49,102**
Dividends	7	-	-	(12,050)	(12,050)
Balance 30 June 2024		**16,000**	**419**	**20,633**	**37,052**
Balance 1 July 2024		**16,000**	**419**	**20,633**	**37,052**
Profit for the year		-	-	13,939	13,939
Other comprehensive income	14	-	206	-	206
Total comprehensive income for the year ended 30 June 2025		**16,000**	**625**	**34,572**	**51,197**
Dividends	7	-	-	(19,650)	(19,650)
Balance 30 June 2025		**16,000**	**625**	**14,922**	**31,547**

The accompanying notes form part of these financial statements

Statement of Financial Position
As at 30 June 2025

	Notes	2025 $'000	2024 $'000
Assets			
Non-current assets			
Property, plant & equipment	8	58,911	55,149
Forestry	9	2,400	2,338
Emission units	10	1,093	456
Environmental restoration account	6	5,370	5,370
Derivative financial instruments	24	19	42
Total non-current assets		**67,793**	**63,355**
Current assets			
Cash and cash equivalents	11	100	5,658
Trade and other receivables	12	7,616	6,655
Emission units	10	1,935	1,137
Derivative financial instruments	24	-	69
Total current assets		**9,651**	**13,519**
Total assets		**77,444**	**76,874**
Equity			
Contributed equity	13	16,000	16,000
Reserves	14	625	419
Retained earnings	15	14,922	20,633
Total equity		**31,547**	**37,052**
Liabilities			
Non-current liabilities			
Interest-bearing borrowings	16	200	-
Provisions	17	25,157	21,513
Deferred income tax liability	6	6,633	7,693
Total non-current liabilities		**31,990**	**29,206**
Current liabilities			
Trade and other payables	19	10,528	8,954
Derivative financial instruments	24	-	285
Income tax payable	6	2,218	1,107
Provisions	17	1,161	245
Directors' fees	18	-	25
Total current liabilities		**13,907**	**10,616**
Total liabilities		**45,897**	**39,822**
Total equity and liabilities		**77,444**	**76,874**

For and on behalf of the board

G S Miller
Chairman
25 September 2025

H E G Maehl
Director
25 September 2025

The accompanying notes form part of these financial statements

Cash Flow Statement
For the year ended 30 June 2025

	Notes	2025 $'000	2024 $'000
Cash flows from operating activities			
Receipts from customers (including waste levy)		79,850	73,736
Interest received		417	342
Other revenue		63	63
Payments to suppliers and employees		(29,978)	(29,841)
Interest paid		(36)	(51)
Waste levy paid		(19,737)	(16,100)
Income tax paid	6	(5,500)	(6,262)
Goods and services tax (net)		(355)	846
Net cash from operating activities	20	**24,724**	**22,733**
Cash flows from investing activities			
Purchase of property, plant & equipment		(7,629)	(5,684)
Purchase of emission units	10	(3,203)	-
Environmental restoration account	6	-	45
Net cash used in investing activities		**(10,832)**	**(5,639)**
Cash flows from financing activities			
Bank funding	16	200	-
Dividends paid	7	(19,650)	(12,050)
Net cash used in financing activities		**(19,450)**	**(12,050)**
Net increase/(decrease) in cash and cash equivalents		**(5,558)**	**5,044**
Cash and cash equivalents at the beginning of the year		5,658	614
Cash and cash equivalents at the end of the year	11	**100**	**5,658**

The accompanying notes form part of these financial statements

Notes to the Financial Statements
For the year ended 30 June 2025

1. General Information

Reporting Entity

Transwaste Canterbury Limited is a company registered under the Companies Act 1993 and is a Council Controlled Trading Organisation as defined in Section 6 of the Local Government Act 2002.

The company represents a joint venture between Waste Management NZ Limited and five local authorities in Canterbury.

The primary objective of the company is to own, operate and continue development of a non-hazardous landfill for the Canterbury region. The company continues to hold six wholly owned non-trading subsidiaries, which are held for name protection purposes and have no assets and liabilities. All companies are incorporated and domiciled in New Zealand.

The financial statements of Transwaste Canterbury Limited are for the year ended 30 June 2025. The financial statements were authorised for issue by the Board on 25 September 2025.

The entity's owners do not have the power to amend these financial statements once issued.

2. Summary of Material Accounting Policies

2.1 Basis of preparation

The financial statements of the company have been prepared on a going concern basis in accordance with Generally Accepted Accounting Practice in New Zealand (NZ GAAP) for entities adopting the New Zealand equivalents to International Financial Reporting Standards (NZ IFRS), and its interpretations as appropriate to for-profit entities.

The company is designated as a for-profit entity for financial reporting purposes. The financial statements have been prepared in accordance with the requirements of the Companies Act 1993 and the Local Government Act 2002.

For the purposes of complying with NZ GAAP, the company is required to apply Tier 1 For-profit Accounting Standards (New Zealand equivalents to International Financial Reporting Standards). In complying with NZ IFRS the company also complies with International Financial Reporting Standards.

The financial statements have been prepared on a historical cost basis, except where modified by the revaluation of financial instruments (including derivative instruments) and forestry.

The financial statements are presented in New Zealand dollars (NZD) and all values are rounded to the nearest thousand dollars ($'000). The functional currency of Transwaste Canterbury Limited is New Zealand dollars.

Notes to the Financial Statements
For the year ended 30 June 2025

Certain comparatives have been restated to conform with current year presentation.

There have been no changes in accounting policies, which have been consistently applied during the financial year.

The company has applied the following relevant standards and amendments for the first time for their annual reporting period commencing 1 July 2024:

- Amendments to FRS-44 - *Disclosure of Fees for Audit Firms' Services*

There are standards issued that are not yet effective that would be expected to have a material impact on the entity in the current or future reporting periods and on foreseeable future transactions.

- NZ IFRS 18 *Presentation and Disclosure in Financial Statements* is effective for the year ending 30 June 2028 and will impact the presentation of the Statement of Profit or Loss and Other Comprehensive Income, with an allocation of income and expenses between operating, investing and financing categories, and new sub-totals such as Operating profit. Financial performance measures used to explain the company's financial performance in public communications outside the financial statements will also be required to be disclosed. The company has not yet made an assessment of the scope of changes and as such the impact of adoption has not yet been determined.

2.2 Revenue recognition

Revenue comprises the fair value of the consideration received or receivable for the sale of goods and services in the ordinary course of the company's activities. Revenue is shown net of Goods and Services Tax, rebates and discounts. Revenue is recognised as follows:

a) Sales of goods

Sales of goods are recognised at a point in time when the company has delivered products to the customer and the customer has accepted the products, fulfilling the company's performance obligations.

b) Sales of services

Sales of services are recognised at a point in time in the accounting period in which the services are rendered, by reference to completion of the specific transaction.

c) Government grants

Government grants relating to the purchase of plant and equipment are recorded as a reduction in the cost of the plant and equipment.

Notes to the Financial Statements
For the year ended 30 June 2025

d) Interest income

Interest income is recognised on an accrual basis using the effective interest method. When a loan and receivable is impaired, the company reduces the carrying amount to its recoverable amount, being the estimated future cash flow discounted at the original effective interest rate of the instrument, and continues unwinding the discount as interest income. Interest income on impaired loans and receivables are recognised using the original effective interest rate.

2.3 Borrowing costs

Borrowing costs are recognised as an expense in the period in which they are incurred, other than borrowing costs directly attributable to the construction of any qualifying assets, including the initial construction of the landfill, which are capitalised as part of that asset. A qualifying asset is an asset that necessarily takes a substantial period of time (typically a minimum of twelve months) to get ready for its intended use or sale.

2.4 Income tax

Income tax expense in relation to the profit or loss for the period comprises current tax and deferred tax.

Current tax is the amount of income tax payable based on the taxable profit for the current year, plus any adjustments to income tax payable in respect of prior years. Current tax is calculated using rates that have been enacted or substantively enacted by balance date.

Deferred tax is the amount of income tax payable or recoverable in future periods in respect of temporary differences and unused tax losses. Temporary differences are differences between the carrying amount of assets and liabilities in the financial statements and the corresponding tax bases used in the computation of taxable profit.

Deferred tax liabilities are generally recognised for all taxable temporary differences. Deferred tax assets are recognised to the extent that it is probable that taxable profits will be available against which the deductible temporary differences or tax losses can be utilised.

Deferred tax is not recognised if the temporary difference arises from the initial recognition of goodwill or from the initial recognition of an asset and liability in a transaction that is not a business combination, and at the time of the transaction, affects neither accounting profit nor taxable profit.

Deferred tax is recognised on taxable temporary differences arising on investments in subsidiaries and associates, and interests in joint ventures, except where the company can control the reversal of the temporary difference and it is probable that the temporary difference will not reverse in the foreseeable future.

Deferred tax is calculated at the tax rates that are expected to apply in the period when the liability is settled or the asset is realised, using tax rates that have been enacted or substantively enacted by balance date.

Notes to the Financial Statements
For the year ended 30 June 2025

Current and deferred tax is recognised against the profit or loss for the period, except to the extent that it relates to a business combination, or to transactions recognised in other comprehensive income or directly in equity.

2.5 Environmental restoration account

The environmental restoration account is a scheme administered by Inland Revenue, intended to provide certainty on securing appropriate tax deductions for closure and post-closure costs incurred by landfill operators. Deposits into, and withdrawals from, the company's environmental restoration account are recorded at cost, with a corresponding entry to or from deferred tax liability.

2.6 Cash, cash equivalents and bank overdrafts

Cash and cash equivalents includes cash in hand, deposits held at call with banks, other short-term highly liquid investments with original maturities of three months or less, and bank overdrafts.

Bank overdrafts are shown within borrowings in current liabilities on the Statement of Financial Position where the bank has no right of setoff.

2.7 Trade and other receivables

Trade and other receivables are initially measured at fair value and subsequently measured at amortised cost using the effective interest method, less loss allowance.

Collectability of trade receivables is reviewed on an ongoing basis. Debts which are known to be uncollectible are written off. A provision for doubtful receivables is established when there is objective evidence that the company will not be able to collect all amounts due according to the original terms of receivables. The amount of the provision is the difference between the asset's carrying amount and the present value of estimated future cash flows, discounted at the effective interest rate. The amount of the provision is recognised in the profit and loss component of the statement of comprehensive income.

The company applies the NZ IFRS 9 simplified approach to measuring expected credit losses which uses a lifetime expected loss allowance for all trade receivables.

To measure the expected credit losses trade receivables have been grouped based on shared credit risk characteristics and days past due.

2.8 Financial assets

Classification

The company classifies its financial assets as being measured at amortised cost.

Financial assets measured at amortised cost are non-derivative financial assets with fixed or determinable payments that are not quoted in an active market. They are included in current assets, except for maturities greater than 12 months after the end of the reporting period. These are classified as non-current assets. The company's financial assets measured at amortised cost comprise 'trade and other receivables', 'cash and cash equivalents', 'term deposits' and 'owing from related party' in the Statement of Financial Position.

Notes to the Financial Statements
For the year ended 30 June 2025

Recognition and measurement

Regular purchases and sales of financial assets are recognised on trade date - the date on which the company commits to purchase or sell the asset. All financial assets are initially recognised at fair value plus transaction costs for all financial assets not carried at fair value through profit or loss. The financial assets are subsequently carried at amortised cost using the effective interest method.

Offsetting financial instruments

Financial assets and liabilities are offset and the net amount reported in the Statement of Financial Position when there is a legally enforceable right to offset the recognised amounts, and there is an intention to settle on a net basis or realise the asset and settle the liability simultaneously.

Impairment of financial assets

Assets carried at amortised cost

The company assesses at the end of each reporting period the estimated 12-month expected loss allowance for credit losses.

Credit loss is the present value of the difference between the contractual cash flows that are due to an entity under the contract; and the cash flows that the entity expects to receive.

The company will measure the loss allowance for a financial instrument at an amount equal to the lifetime expected credit losses if the credit risk on that financial instrument has increased significantly since initial recognition.

If the asset's carrying amount is reduced, the amount of the loss is recognised in the profit and loss component of the statement of comprehensive income.

If, in a subsequent period, the amount of the expected credit loss decreases and the decrease can be related objectively to an event occurring after the loss was recognised (such as an improvement in the debtor's credit rating), the reversal of the previously recognised loss is recognised in the statement of comprehensive income.

Derecognition

Financial assets are derecognised when the rights to receive cash flows from the asset have expired or have been transferred and the company has transferred substantially all risks and rewards of ownership.

Notes to the Financial Statements
For the year ended 30 June 2025

2.9 Property, plant and equipment

Property, plant and equipment is shown at cost, less accumulated depreciation and impairment losses.

Additions

The cost of an item of property, plant and equipment is recognised as an asset if, and only if, it is probable the future economic benefits or service potential associated with the item will flow to Transwaste Canterbury Limited and the cost of the item can be measured reliably.

In most instances, an item of property, plant and equipment is recognised at its cost. Where an asset is acquired at no cost, or for a nominal cost, it is recognised at fair value as at the date of acquisition.

Disposals

Gains and losses on disposals are determined by comparing the proceeds with the carrying amount of the asset. Gains and losses on disposals are included in the profit or loss.

Subsequent costs

Costs incurred subsequent to initial acquisition are capitalised only when it is probable that future economic benefits or service potential associated with the item will flow to Transwaste Canterbury Limited and the cost of the item can be measured reliably.

Borrowing costs incurred for the construction of any qualifying assets, including the initial construction of the landfill, are capitalised during the period of time that is required to complete and prepare the asset for its intended use. A qualifying asset is an asset that necessarily takes a substantial period of time (typically a minimum of twelve months) to get ready for its intended use or sale.

Notes to the Financial Statements
For the year ended 30 June 2025

2.10 Depreciation

Depreciation is provided on a straight-line basis on all property, plant and equipment other than land, landfill development costs and future landfill site restoration and aftercare costs, at rates that will write off the cost of the assets to their estimated residual values over their useful lives. The useful lives and associated depreciation rates of major classes of assets have been estimated as follows:

	Life
Landfill development	Expected physical life
Deferred site restoration and aftercare costs	Pattern of benefits from landfill use
Buildings and site improvements	15 – 50 years, or length of resource consent if shorter
Plant and machinery	5 – 33 years, or length of resource consent if shorter
Motor vehicles and related equipment	3 – 15 years
Office equipment, furniture and fittings	3 – 5 years

Assets under construction are not depreciated until commissioned.

The residual value and useful life of an asset is reviewed, and adjusted if applicable, at each financial year-end.

The depreciation of the total landfill development costs is based upon the total anticipated waste volume of the landfill over its economic life (being the physical capacity of the landfill). The annual depreciation amount is calculated based on the waste volumes consumed for the financial year as compared to the anticipated waste volume over the economic life of the landfill.

Future landfill site restoration and aftercare costs capitalised in the Statement of Financial Position are depreciated at rates that match the pattern of benefits expected to be derived from the landfill, including power generation using landfill gas.

Notes to the Financial Statements
For the year ended 30 June 2025

2.11 Forestry assets

Forestry assets are revalued annually at fair value less estimated point of sale costs using appropriate valuation methods and techniques, depending on the age and species of the trees.

Gains or losses arising on initial recognition of biological assets at fair value less estimated point of sale costs and from a change in fair value less estimated point of sale costs are recognised in profit or loss.

The costs to maintain the forestry assets are recognised as an expense as incurred.

2.12 Emission units and emissions obligations

Emission units that have been allocated by the Government under the forestry scheme are recorded at nominal value (nil value). Purchased emission units are recorded at cost (purchase price). Emission units, whether allocated or purchased, are recorded as intangible assets. Emission units are not revalued subsequent to initial recognition.

Emission obligations are recognised as a current liability as the emission obligation is incurred. Up to the level of units held, the liability is recorded at the carrying value of those units. When emission obligations exceed the units held the liability is calculated either at contract prices under forward purchase agreements for the number of units contracted where these exist, or at fair value at balance date.

Forward contracts for the purchase of emission units are recognised when the contracts are settled.

2.13 Impairment of non-financial assets

Non-financial assets that have an indefinite useful life are not subject to amortisation and are tested annually for impairment. Assets that have a finite useful life are reviewed for impairment whenever events or changes in circumstances indicate that the carrying amount may not be recoverable. An impairment loss is recognised for the amount by which the asset's carrying amount exceeds its recoverable amount. The recoverable amount is the higher of an asset's fair value less costs to sell and value in use.

If an asset's carrying amount exceeds its recoverable amount the asset is impaired and the carrying amount is written down to the recoverable amount. The impairment loss is recognised in the profit or loss. For assets other than goodwill, the reversal of an impairment loss is recognised in the profit or loss.

Notes to the Financial Statements
For the year ended 30 June 2025

2.14 Provisions - General

Transwaste Canterbury Limited recognises a provision for future expenditure of uncertain amount or timing when there is a present obligation (either legal or constructive) as a result of a past event, it is probable that expenditures will be required to settle the obligation and a reliable estimate can be made of the amount of the obligation. Provisions are not recognised for future operating losses.

Provisions are measured at the present value of the expenditures expected to be required to settle the obligation using a pre-tax discount rate that reflects current market assessments of the time value of money and the risks specific to the obligation. The increase in the provision due to the passage of time is recognised as an interest expense and described in the profit or loss as a time value adjustment.

2.15 Closure and Post-Closure Costs

A provision for future landfill site restoration and aftercare costs is recognised when the activities giving rise to the need for site restoration and aftercare have commenced. The provision is stated at the present value of the future cash outflows expected to be incurred, which increases each period due to the passage of time. Any increase in the provision due to the change in present value is recognised in profit or loss as a time value adjustment in interest expense.

Future landfill site restoration and aftercare costs provided for are initially capitalised in the Statement of Financial Position. Any change in the provision for future landfill site restoration and aftercare costs arising from a change in estimate of those costs (through discount rate or closure and post-closure cost estimate updates) is also recognised in non current assets in the Statement of Financial Position.

2.16 Borrowings

Borrowings are initially recognised at their fair value. After initial recognition, all borrowings are measured at amortised cost using the effective interest method.

2.17 Goods and Services Tax (GST)

All items in the financial statements are stated exclusive of GST, except for receivables and payables, which are stated on a GST inclusive basis. Where GST is not recoverable as input tax then it is recognised as part of the related asset or expense.

The net amount of GST recoverable from, or payable to, Inland Revenue (IR) is included as part of receivables or payables in the Statement of Financial Position.

Notes to the Financial Statements
For the year ended 30 June 2025

2.18 Derivatives: Hedges Receivable and Payable

Transwaste Canterbury Limited enters into derivative financial instruments including power supply agreements to manage its exposure to price fluctuation risks. Derivatives are initially recognised at fair value on the date a derivative contract is entered into and are subsequently remeasured to their fair value at each reporting date. The fair value of forward power supply agreements is their quoted market price at the Statement of Financial Position date, being the present value of the quoted forward price. The effective portion of the gain or loss on the hedging instrument is recognised in the Statement of Comprehensive Income as other comprehensive income, while any ineffective portion is recognised immediately in the Statement of Comprehensive Income as selling and administration expenses.

Initial recognition and measurement

Derivatives are classified, at initial recognition, as financial liabilities at fair value through profit or loss or as derivatives designated as hedging instruments in an effective hedge, as appropriate. All derivatives are recognised initially at fair value.

2.19 Share capital

Ordinary shares are classified as equity.

Incremental costs directly attributable to the issue of new shares are shown in equity as a deduction, net of tax, from the proceeds.

2.20 Critical accounting estimates and assumptions

Landfill closure and post-closure provisions

In preparing these financial statements Transwaste Canterbury Limited has made estimates and assumptions concerning the future. These estimates and assumptions may differ from the subsequent actual results. Estimates and assumptions are continually evaluated and are based on historical experience and other factors, including expectations or future events that are believed to be reasonable under the circumstances. The key area in which estimates and assumptions that have a significant risk of causing a material adjustment to the carrying amounts of assets and liabilities within the next financial year are applied is detailed in Note 17 - landfill closure and post-closure provisions.

Notes to the Financial Statements
For the year ended 30 June 2025

3. Revenue

	2025 $'000	2024 $'000
Waste disposal (excluding waste levy)	44,934	44,136
Waste levy on-charged to customers	20,753	17,753
Waste disposal sales including waste levy	65,687	61,889
Waste transport	10,743	9,400
Electricity generation	3,088	2,597
Forestry harvesting	1,293	-
	80,811	**73,886**

Waste levy cost

The Ministry for the Environment introduced a waste levy in 2009. The waste levy payable in respect of the year to 30 June 2025 was $60 per tonne of waste to landfill (2024: $50 per tonne). The waste levy is on-charged to customers and the on-charge is included in sales revenue. The waste levy cost is included in expenses.

Nature of revenue

The company contracts with its customers to lawfully dispose of waste at the Kate Valley landfill. For shareholders, the Company contracts to deliver empty waste containers to refuse stations, and collect full containers and deliver them to the landfill.

Contractual payment terms are typically within one month after the month the contents are lawfully disposed into landfill.

The company has a contract to sell electricity generated at its Kate Valley landfill into the national grid.

The company, as lessor, has entered into contracts to lease land for farming activities, and has entered into a contract with a third party to harvest and sell forestry assets as required.

Consideration is fixed and there is no significant financing component in the contracts.

4. Expenses

Profit before tax includes the following specific expenses:

Directors' fees

	2025 $'000	2024 $'000
Directors' fees	**351**	**382**

Notes to the Financial Statements
For the year ended 30 June 2025

Depreciation and amortisation

	2025 $'000	2024 $'000
Landfill development	5,631	5,414
Deferred closure costs	646	529
Buildings	18	6
Plant and machinery	942	772
Total depreciation and amortisation	**7,237**	**6,721**

Audit fees

Audit services - Ernst & Young		
- Additional audit fees for prior year annual audit of the financial statement	75	75
- Audit fees adjustment for prior year financial statements audit	-	14
Total remuneration for audit services	**75**	**89**

The auditor did not provide any other audit related services or non-audit services during the year ended 30 June 2025 (2024: nil).

5. Finance income and costs

	2025 $'000	2024 $'000
Finance income		
Interest received	417	342
Total finance income	**417**	**342**
Finance costs		
Interest paid	129	176
Provisions - Time value adjustment (Note 17)	1,153	1,067
Total finance costs	**1,282**	**1,243**
Net finance costs	**865**	**901**

6. Tax

Components of tax expense

	2025 $'000	2024 $'000
Current tax expense	6,611	5,657
Deferred tax expense	(1,140)	(2)
Income tax expense	**5,471**	**5,655**

Notes to the Financial Statements
For the year ended 30 June 2025

Relationship between tax expense and accounting profit

	2025 $'000	2024 $'000
Profit before tax	19,410	20,197
Tax at 28%	5,435	5,655
Non-deductible expenses	36	-
Tax expense	**5,471**	**5,655**

Deferred tax assets/ (liabilities)	Property, plant and equipment $'000	Environmental Restoration $'000	Other $'000	Total $'000
Balance at 1 July 2023	(3,235)	(5,370)	831	(7,774)
Credited/(charged) to profit or loss	(418)	-	419	1
Charged to equity	-	-	80	80
Balance at 30 June 2024	**(3,653)**	**(5,370)**	**1,330**	**(7,693)**
Credited to profit or loss	847	-	293	1,140
Charged to equity	-	-	(80)	(80)
Balance at 30 June 2025	**(2,806)**	**(5,370)**	**1,543**	**(6,633)**

Income tax payable

	2025 $'000	2024 $'000
Opening tax payable	(1,107)	(1,712)
Current tax expense	(6,611)	(5,657)
Income tax paid	5,500	6,262
Closing tax payable	**(2,218)**	**(1,107)**

Environmental restoration account

The company utilises the environmental restoration scheme, administered by Inland Revenue. The scheme allows funds to be deposited with Inland Revenue up to an amount based on the closure and post-closure provision at year end, with a deduction against current tax payable. The corresponding amount to the deposit made is recognised in deferred tax. The deposit is only refundable in line with reductions in the closure and post-closure provision.

Notes to the Financial Statements
For the year ended 30 June 2025

The environmental restoration account movements follow:

	2025 $'000	2024 $'000
Opening balance	5,370	5,414
Interest paid out	-	(44)
Closing balance	**5,370**	**5,370**

Imputation Credit Account

	2025 $'000	2024 $'000
Imputation credits available for subsequent reporting periods based on a tax rate of 28% (2024: 28%)	**6,348**	**7,379**

The above amounts represent the balance of the imputation account as at the end of the reporting period, adjusted for:

a) Imputation credits that will arise from the payment of the amount of the provision for income tax
b) Imputation debits that will arise from the payment of dividends recognised as a liability at the reporting date; and
c) Imputation credits that will arise from the receipt of dividends recognised as receivables at the reporting date.

7. Dividends

	2025 $'000	2024 $'000
Dividends paid during the year		
Interim dividends for current year[1]	7,000	6,850
Final dividends for prior year[2]	7,650	5,200
BBRP Project Final Dividend[3]	5,000	-
	19,650	**12,050**

[1] A fully imputed interim dividend of $7,000,000 was declared and paid on 29 February 2025 (2024: $6,850,000 fully imputed on 29 February 2024).

[2] A fully imputed final dividend for 2024 of $7,650,000 was declared and paid on 24 August 2024 (2023: $5,200,000 fully imputed on 24 August 2023).

[3] A fully imputed final dividend of $5,000,000 in respect of the Burwood Resource Recovery Park (BRRP) project was declared and paid on 30 May 2025.

Post balance date, a fully imputed final dividend of $7,000,000 in respect of 2025 was declared and paid on 28 August 2025.

Notes to the Financial Statements
For the year ended 30 June 2025

8. Property, plant and equipment 2025

	Cost 1 July 2024	Accumulated depreciation and impairment charges 1 July 2024	Carrying amount 1 July 2024	Current year additions/ transfers & reassessments	Current year disposals/ reassessments	Current year depreciation	Cost 30 June 25	Accumulated depreciation and impairment charges 30 June 25	Carrying amount 30 June 25
	$'000	$'000	$'000	$'000	$'000	$'000	$'000	$'000	$'000
Property, plant & equipment									
Landfill development	90,779	(61,902)	28,877	4,352	-	(5,631)	95,131	(67,533)	27,598
Land	3,190	-	3,190	-	-	-	3,190	-	3,190
Buildings	376	(260)	116	525	(42)	(18)	794	(213)	581
Assets under construction [1]	6,411	-	6,411	1,079	-	-	7,490	-	7,490
Deferred site restoration costs (Note 17)	18,712	(6,941)	11,771	3,418	-	(646)	22,130	(7,587)	14,543
Plant and equipment	11,932	(7,148)	4,784	1,672	(5)	(942)	13,445	(7,936)	5,509
Total property, plant & equipment	**131,400**	**(76,251)**	**55,149**	**11,046**	**(47)**	**(7,237)**	**142,180**	**(83,269)**	**58,911**

Approximately 1,050 hectares of the land held by the company is designated as relating to its current landfill activities. The area directly utilised for landfill-related activities is approximately 140 ha, with the balance comprising 500 ha of farming and forestry land and 410 ha of the Tiromoana Bush conservation area.

Westpac holds a Registered First Debenture dated 7 July 2000 over assets, undertakings and uncalled capital of the company and a Registered First Mortgage dated 11 August 2000 and 21 October 2003 over the property located at Kate Valley, North Canterbury.

[1] The net movement in Assets under construction comprises additions of $7,518,000 and transfers to completed property plant and equipment of $6,439,000

Notes to the Financial Statements
For the year ended 30 June 2025

8. Property, plant and equipment (continued) 2024

	Cost 1 July 2023	Accumulated depreciation and impairment charges 1 July 2023	Carrying amount 1 July 2023	Current year additions/ transfers & reassessments	Current year disposals/ reassessments	Current year depreciation	Cost 30 June 24	Accumulated depreciation and impairment charges 30 June 24	Carrying amount 30 June 24
	$'000	$'000	$'000	$'000	$'000	$'000	$'000	$'000	$'000
Property, plant & equipment									
Landfill development	87,111	(56,487)	30,624	3,667	-	(5,414)	90,779	(61,902)	28,877
Land	3,190	-	3,190	-	-	-	3,190	-	3,190
Buildings	376	(254)	122	-	-	(6)	376	(260)	116
Assets under construction[2]	6,442	-	6,442	(31)	-	-	6,411	-	6,411
Deferred site restoration costs (Note 17)	16,392	(6,412)	9,980	2,320	-	(529)	18,712	(6,941)	11,771
Plant and equipment	10,045	(6,520)	3,525	2,048	(17)	(772)	11,932	(7,148)	4,784
Total property, plant & equipment	**123,556**	**(69,673)**	**53,883**	**8,004**	**(17)**	**(6,721)**	**131,400**	**(76,251)**	**55,149**

[2] The net movement in Assets under construction comprises additions of $5,429,000 and transfers to completed property plant and equipment of $5,460,000

Notes to the Financial Statements
For the year ended 30 June 2025

9. Forestry assets

	2025 $'000	2024 $'000
Balance at 1 July	2,338	2,706
Decreases due to harvest	(283)	-
Gains/(losses) arising from changes in fair value less estimated point of sale costs	345	(368)
Balance at 30 June	**2,400**	**2,338**

Transwaste Canterbury Limited owns 315.9 hectares of forest area, of which 297.0 hectares is stocked and 18.9 hectares is unstocked, awaiting replanting. The standing trees are predominantly pinus radiata, which are at varying stages of maturity ranging from 12 to 44 years.

A total of 18.9 hectares of forest has been harvested during the period (2024: nil).

Registered valuer Kirsten Stuart of Laurie Forestry Limited has valued forestry assets as at 30 June 2025 using, depending on the age and species of the trees, the Immediate Liquidation method, a blended Cost Compounded and NPV method or Nominal Value method.

The Immediate Liquidation method is applied to mature standing trees. Net (stumpage) values are derived by deducting average current day marketing, harvesting, infrastructure and transportation costs from one-year straight average point of sale log prices. Point of sale can include "at mill door" or "at wharf gate".

In the absence of reliable transaction evidence of recent forest sales, a blending of the Cost Compounded and Net Present Value (NPV) methods has been used for pinus radiata that is between the ages of 6 and 15 years.

For the Cost Compounded Method values are calculated as the sum of costs compounded from the time of occurrence to the present day. A compound rate of 3.8% (2024:5.5%) has been used in the valuation.

The NPV method calculates the Crop Expectation Value, which is the value of the tree crop calculated by discounting a net cash flow at a specified discount rate. A pre-tax discount rate of 8.0% (2024: 8.0%) has been used in discounting the present value of expected pre-tax cash flows.

The Nominal Value Method, reflecting the direct costs of inputs to date, is used to value species where there is difficulty in applying standard growth modelling and crop performance assumptions.

Fair value hierarchy

Fair value for the forestry assets is based on valuation techniques with significant non-observable inputs (level 3), where one or more significant inputs are not observable.

Notes to the Financial Statements
For the year ended 30 June 2025

Sensitivity analysis – impact of changes in key variables

The impact of changes in key assumptions on the forestry asset value are shown in the table below.

	Change in variable	2025 $'000	2024 $'000
Discount rate (and offsetting compound cost rate)	+1.0%	(149)	(140)
	-1.0%	167	159
Log prices	+5.0%	331	345
	-5.0%	(331)	(345)

Financial risk management strategies

Transwaste Canterbury Limited is exposed to financial risks arising from changes in timber prices. Transwaste Canterbury Limited is a long-term forestry investor and does not expect timber prices to decline significantly in the longer term and, therefore, has not taken any measures to manage the risks of a decline in timber prices. Transwaste Canterbury Limited reviews its outlook for timber prices regularly in considering the need for active financial risk management.

10. Emissions units

The New Zealand Emissions Trading Scheme (ETS) became law on 28 September 2008 with the passing of the Climate Change Response (Emissions Trading) Amendment Act 2009 (the Act).

Transwaste Canterbury Limited is a participant in the ETS as follows:

- As a landfill operator, the company is liable to surrender carbon credits for greenhouse gas emissions resulting from tonnes of waste to landfill.
- Through its holdings of 315.9 hectares of forestry, the company is a participant in the forestry scheme, with the effect that
    - NZ Carbon Credit allocations are granted for pre-1990 forest to compensate for lost value and, if harvested trees are not replanted within 4 years the company is liable to surrender carbon credits. Approximately 11.0 hectares of the forestry held at balance date is pre-1990 forest
    - For post-1989 forest, carbon credits accrue as the trees grow and credits must be surrendered on deforestation.

	2025 Units	2025 $000	2024 Units	2024 $000
Balance at the beginning of the year	166,133	1,593	199,056	2,652
Purchased units	35,000	3,203	-	-
Surrendered to the Crown (Note 20)	(31,140)	(1,768)	(32,923)	(1,059)
Balance at the end of the year	**169,993**	**3,028**	**166,133**	**1,593**

Notes to the Financial Statements
For the year ended 30 June 2025

Comprising:

	2025 $000	2024 $000
Current	**1,935**	**1,137**
Non-current	**1,093**	**456**
Total emission units on hand	**3,028**	**1,593**

The NZUs on hand comprise:

	2025 Units	2024 Units
Purchased units (landfill)	53,345	49,485
Allocated units (forestry)	116,648	116,648
Total units on hand	**169,993**	**166,133**

All units held are recorded at cost, which is nil for forestry units. The market value of all units held as at 30 June 2025 is approximately $10,030,000 (cost $3,028,000).

Landfill

The company has adopted policies to manage the pricing and risk issues arising from the commencement of ETS obligations from 1 January 2013 for the Kate Valley landfilling operations.

The company has entered into a forward agreement to purchase 35,000 units, totalling $2,379,300, to acquire emissions units to be used to meet its ETS obligations. The cost of the acquisition under this agreement is recognised when the units are acquired.

Forestry

Transwaste Canterbury Limited is registered for both the pre-1990 forest and post-1989 forest.

With regard to pre-1990 forestry:

- Under the NZ Government's Allocation Plan, the company has received its allocation of 4,260 emissions units. The units are recorded at cost (nil).
- Additionally, under the ETS the company will have an obligation to account for any emission released as a consequence of deforestation of pre-1990 land by surrendering credits equal to the extent of that emission. There is no liability for deforestation as at 30 June 2025, on the basis that it is intended to replant areas that were harvested in the 2025 financial year.

With regard to post-1989 forestry, the company has received its allocation entitlements to 31 December 2022 and there is no liability for deforestation at 30 June 2025.

Notes to the Financial Statements
For the year ended 30 June 2025

11. Cash and cash equivalents

	2025 $'000	2024 $'000
Cash at bank - current account/short term deposits	100	5,658
Total cash and cash equivalents	**100**	**5,658**

12. Trade and other receivables

	2025 $'000	2024 $'000
Trade receivables	2,700	2,582
Related party receivables (Note 23)	4,916	4,073
Gross trade and other receivables	**7,616**	**6,655**
Less provision for impairment	-	-
Total trade and other receivables	**7,616**	**6,655**

The carrying value of trade and other receivables approximates their fair value.

The ageing profile of receivables at year end is detailed below:

	2025			2024		
	Gross $'000	Impairment $'000	Net $'000	Gross $'000	Impairment $'000	Net $'000
Not past due	7,568	-	7,568	6,655	-	6,655
Past due 1-60	48	-	48	-	-	-
Past due >90	-	-	-	-	-	-
Total	**7,616**	**-**	**7,616**	**6,655**	**-**	**6,655**

All receivables greater than 30 days in age are considered to be past due.

The company applies the NZ IFRS 9 simplified approach to measuring expected credit losses using a lifetime expected credit loss provision for trade receivables. To measure expected credit losses on a collective basis, trade receivables are grouped based on similar credit risk and aging.

There were no individual or collective impairment provisions at 30 June 2025 (2024: nil), nor were there any movements in provisions.

Notes to the Financial Statements
For the year ended 30 June 2025

13. Contributed equity

	2025 $'000	2024 $'000
Issued and paid in capital		
20,000,000 ordinary shares	20,000	20,000
Less: Uncalled capital	(4,000)	(4,000)
Total paid in capital 30 June	**16,000**	**16,000**

None of the above shares are held by the company. All ordinary shares on issue have been paid to the proportion held by each shareholder.

Uncalled capital is payable at such times as the board may from time to time determine.

All ordinary shares rank equally with one vote attached to each share. Ordinary shares do not have a par value.

14. Reserves

Capital reserve

	2025 $'000	2024 $'000
Balance at the beginning of the year	625	625
Balance at end of year	**625**	**625**

Capital reserves comprise capital gains realised on sales to third party purchasers of land and buildings.

Hedging reserve

	2025 $'000	2024 $'000
Balance at the beginning of the year	(206)	-
Total recognised comprehensive income, net of tax	206	(206)
Total retained surplus	**-**	**(206)**

The hedging reserve comprises the effective portion of the cumulative net change in the fair value of cash flow hedging instruments related to hedged transactions relating to electricity contracts for difference that have not yet impacted on the Statement of Comprehensive Income.

Notes to the Financial Statements
For the year ended 30 June 2025

15. Retained earnings

	2025 $'000	2024 $'000
As at 1 July	20,633	18,141
Profit for the year	13,939	14,542
Dividends paid	(19,650)	(12,050)
As at 30 June	**14,922**	**20,633**

16. Borrowings

	2025 $'000	2024 $'000
Non-current borrowings – Bank loans		
Westpac multi-option credit facility	**200**	**-**

Bank loans

The company has entered into a multi option credit facility with Westpac totalling $15,000,000 for ongoing funding of the Kate Valley landfill construction and operations. The facility is secured by way of a registered first general security agreement over all owned assets, undertakings and uncalled capital of the parent company and first ranking mortgage over the property owned by the company.

During the financial year, the facility has been utilised periodically as required, with a $200,000 balance at balance date.

The weighted average effective interest rate on the facility for the year is 1.27% (2024: 1.09%).

Fair value of non-current borrowings

Bank loans, where applicable, have been valued at fair value. The carrying amounts of other non-current borrowings approximate their fair values. The carrying amounts of borrowings repayable within one year approximate their fair value.

Notes to the Financial Statements
For the year ended 30 June 2025

17. Provisions

Provisions are represented by:

Closure and post-closure provisions

	2025 $'000	2024 $'000
Opening balance	21,758	20,512
Assessment of current value of landfill costs:		
- Closure and post-closure - cost assessment	5,169	3,935
- Discount rate change	(1,751)	(1,615)
Effect of time value adjustment	1,153	1,067
Amounts incurred during the period	(11)	(2,141)
Closing balance	**26,318**	**21,758**
Comprising:		
Current	1,161	245
Non-current	25,157	21,513
Total closure and post-closure provisions	**26,318**	**21,758**

Provision is made for the future costs of closing the company's landfill during and at the end of its economic life and for the associated post-closure costs, being the aftercare of the landfill for the prescribed periods. Estimated costs, adjusted for inflation, are built up on an item by item basis. The provision held, at each balance date, represents the net present value of the estimated future costs. A detailed reassessment of these costs and the anticipated remaining life of the landfill is performed on a regular basis, usually three yearly, by the WM New Zealand landfill advisory team, with the current reassessment completed at year end. In the intermediate years an annual high-level review of costs is performed, together with a reassessment of anticipated inflation and the discount rate applicable. The discount rates used are the Treasury's central table of risk-free discount rates as at 30 June 2025 as applicable to each forecast period (2024: Treasury's central table of risk-free discount rates).

The impact of changes to the provision arising from the reassessment of the life of the landfill and estimated future costs are capitalised to deferred closure and post-closure costs within property, plant and equipment in the Statement of Financial Position. The annual change in the net present value of the provision due to the passage of time is recorded as the time value adjustment of provisions in the profit or loss. The financial reporting standards require this to be disclosed as an interest cost in the profit or loss (see Note 5).

Notes to the Financial Statements
For the year ended 30 June 2025

Kate Valley Landfill

The remaining economic life of the currently consented Kate Valley landfill is estimated to be at least 17 years and an extension of the resource consent to operate the landfill is assumed to occur.

The cash outflows for landfill post-closure are expected to occur in 18 to 47 years time (or between 2043 and 2072). The long-term nature of the liability means that there are inherent uncertainties in estimating costs that will be incurred and as a result changes in estimates occur over time. The provision has been estimated taking into account existing technology and using discount rates applicable to the timing of estimated cash outflows, which range from 3.2% to 6.0%, at an average rate of 5.5% (2024: 4.3% to 5.3%, average rate 4.7%). An average inflation rate of 1.99% (2024: 2.01%) has been applied. The combination of applying a multi-rate discount rate, the inflation rate, closure and post-closure cost reassessments and the long term nature of the expected cash outflows has resulted in an increase to the provision and the closure and post closure asset of $3,418,000 which will be reflected in increased amortisation of the asset in future years.

18. Directors' fees

	2025 $'000	2024 $'000
Directors fees payable and accrued	-	25
Comprising:		
Current	-	25
Total directors' fees	**-**	**25**

19. Trade and other payables

	2025 $'000	2024 $'000
Trade payables	6,691	5,998
Accrued expenses	1,414	1,968
Related party payables (Note 23)	2,423	988
Total trade and other payables	**10,528**	**8,954**

Trade and other payables are non-interest bearing and are normally settled on 30-day terms, therefore the carrying value of trade and other payables approximates to their fair value.

Notes to the Financial Statements
For the year ended 30 June 2025

20. Cash flow information

Reconciliation of profit for the period to net cash flow from operating activities

	2025 $'000	2024 $'000
Total comprehensive income for the year	**14,145**	**14,336**
Add/(less) non-cash items:		
Depreciation and amortisation	7,237	6,721
(Gain)/loss on changes in fair value of forestry	(345)	368
Cost of forestry harvested (Note 9)	283	-
Cash flow hedges	(114)	331
Time value adjustment (Note 5)	1,153	1,067
ETS surrendered (Note 10)	1,768	1,059
Loss on sale of property, plant and equipment	47	17
Deferred tax expense	(1,140)	(2)
	8,889	**9,561**
Add/(less) movements in working capital items:		
Trade and other receivables	(961)	(150)
Income tax payable	1,111	(605)
Trade and other payables	1,551	1,732
	1,701	977
Less items classified as investing activities:		
Closure and post-closure provisions utilised	(11)	(2,141)
	(11)	(2,141)
Net cash inflow/(outflow) from operating activities	**24,724**	**22,733**

Non-cash investing and financing activities

There were no non-cash investing and financing transactions during the period (2024: nil).

Changes in liabilities arising from financing activities

	Non-current loans and borrowings $'000 (Note 16)	Current loans and borrowings $'000	Total $'000
Balance at 1 July 2023	-	-	-
Cash flows	-	-	-
Balance at 30 June 2024	-	-	-
Cash flows	200	-	200
Balance at 30 June 2025	**200**	**-**	**200**

Notes to the Financial Statements
For the year ended 30 June 2025

21. Capital commitments and operating leases as lessor

	2025 $'000	2024 $'000
Capital commitments contracted for at balance date but not yet incurred for property, plant and equipment	**383**	**1,309**

The company has entered into forward contracts totalling $2,379,300 (2024: $3,202,500) for the purchase of emissions units. There are no capital commitments in relation to forestry.

Operating leases as lessor

The company leases land not immediately required for its operations under operating leases. The leases are with one external party and have non-cancellable terms of 5 years from June 2023 with the exception of one area which is leased to the same party on a month-to-month basis. The future aggregate minimum lease payments to be collected under non-cancellable operating leases are as follows:

	2025 $'000	2024 $'000
Not later than one year	53	55
Later than one year and not later than five years	92	144
Later than five years	-	-
Total non-cancellable operating leases	**145**	**199**

No contingent rents have been recognised during the period.

22. Contingent assets and liabilities

Contingent assets

Under the New Zealand Emissions Trading Scheme (ETS) the company is eligible for carbon credits on sequestration of carbon in the company's post-1989 forests. Credits have been received for periods up to 31 December 2022.

The company will have an obligation to account for any emission released as a consequence of deforestation of pre-1990 land by surrendering credits equal to the extent of that emission. The company has not recognised a liability for deforestation as at 30 June 2025, on the basis that forestry harvested during the period will be replanted.

Contingent liabilities

	2025 $'000	2024 $'000
Bonds	15,912	15,912
Deforestation of pre-1990 forestry (if not replanted)	620	-
	16,532	**15,912**

Notes to the Financial Statements
For the year ended 30 June 2025

Bonds of $15,912,500 (2024: $15,912,500) have been arranged with the company's bankers in terms of resource consents granted to the company. The bond is renewed annually, with the current period expiring on 31 December 2025. The directors anticipate there being no issues arising for renewal of the bond and that no material liabilities will arise under the bond.

23. Related party transactions

The company's shareholders are considered to be related parties of the company. This includes the five territorial local authorities with shareholdings in the company and Waste Management NZ Limited.

The company has negotiated waste disposal and transport contracts with the related parties. The company also contracts with Waste Management NZ Limited for costs relating to the on-going landfill construction, landfill disposal and transport services. Pricing under the contracts is subject to annual inflation indexing and detailed three-yearly reviews which include oversight by a probity auditor.

No provision has been required, nor any expense recognised for impairment of receivables for any loans or other receivables from related parties (2024: Nil).

The following transactions were carried out with related parties:

	2025 $'000	2024 $'000
(a) Sales of services		
Entities with joint control or significant influence over the entity (landfilling and transport)	30,139	24,520
Other related parties (landfilling and transport)	27,302	24,964
	57,441	49,484
(b) Purchases of services		
Entities with joint control or significant influence over the entity (waste disposal, transport and construction)	35,771	33,316
Entities with joint control or significant influence over the entity (rates)	30	27
	35,801	33,343
(c) Year end balances arising from sales/purchases of services		
Receivables from related parties (Note 12)		
Entities with joint control or significant influence over the entity	2,538	2,015
Other related parties	2,378	2,058
	4,916	4,073
Payables to related parties (Note 19)		
Entities with joint control or significant influence over the entity	2,423	988
	2,423	988

Notes to the Financial Statements
For the year ended 30 June 2025

	2025 $'000	2024 $'000
Key management personnel		
Directors' fees	351	382

Directors' remuneration is detailed in the Directors' Report to Shareholders on page 5, with amounts payable at year end detailed in Note 18.

24. Financial instruments

24A. Financial instrument categories

The accounting policies for financial instruments have been applied to the line items below:

			2025 $'000	2024 $'000
FINANCIAL ASSETS				
Financial assets at amortised cost				
Cash and cash equivalents			100	5,658
Debtors and other receivables			7,616	6,655
Total loans and receivables			7,716	12,313
	Notional amount	**Line item in the statement of financial position**		
	$'000			
Financial assets at fair value				
Interest rate swaps – non-current	2,000	Derivative financial instruments	19	42
Interest rate swaps - current	-	Derivative financial instruments	-	69
			19	111

Notes to the Financial Statements
For the year ended 30 June 2025

			2025 $'000	2024 $'000
FINANCIAL LIABILITIES				
Financial liabilities at amortised cost				
Creditors and other payables			10,528	8,954
Borrowings:				
- Secured loans			200	-
Total financial liabilities at amortised cost			10,728	8,954
	Notional amount $'000	**Line item in the statement of financial position**		
Financial liabilities at fair value				
Electricity hedges payable – current	**-**	Derivative financial instruments	-	285
			-	285

The derivative financial instruments relating to interest rate swaps were deemed to be ineffective from 1 July 2022. The ineffectiveness recognised in profit or loss during the June 2025 year is $93,000 which is included in interest expense (2024: $126,000 interest expense).

24B Fair value hierarchy disclosures

For those instruments recognised at fair value in the Statement of Financial Position, fair values are determined according to the following hierarchy:

- Quoted market price (level 1) – Financial instruments with quoted prices for identical instruments in active markets.
- Valuation technique using observable inputs (level 2) – Financial instruments with quoted prices for similar instruments in active markets or quoted prices for identical or similar instruments in inactive markets and financial instruments valued using models where all significant inputs are observable.
- Valuation techniques with significant non-observable inputs (level 3) – Financial instruments valued using models where one or more significant inputs are not observable.

Notes to the Financial Statements
For the year ended 30 June 2025

In the normal course of business, Transwaste Canterbury Limited is exposed to risk from debtors. There are no significant concentrations of credit risk other than the Joint Venture parties. The business does not require any collateral or security to support its financial instruments. The business is not exposed to any material foreign exchange or interest rate risk. At balance date, the carrying cost and estimated fair value of the business's financial assets and liabilities were not materially different.

Derivative financial instruments are used by Transwaste Canterbury Limited in the normal course of business in order to hedge exposure to fluctuation in the movements in electricity prices and interest rates.

24C. Financial instrument risks

Transwaste Canterbury Limited has a series of policies to manage the risks associated with financial instruments. Transwaste Canterbury Limited is risk averse and seeks to minimise exposure from its treasury activities. The Treasury policies do not allow any transactions that are speculative in nature to be entered into.

Market risk

Price risk

Price risk is the risk that the fair value or future cash flows of a financial instrument will fluctuate as a result of changes in market prices. Transwaste Canterbury Limited manages its price risk on electricity prices under its policies by entering into contracts for difference agreements to hedge exposure to price fluctuations.

Currency risk

Currency risk is the risk that the fair value or future cash flows of a financial instrument will fluctuate due to changes in foreign exchange rates. Transwaste Canterbury Limited is not exposed to currency risk, as it does not enter into foreign currency transactions.

Interest rate risk

The interest rates on Transwaste Canterbury Limited’s borrowings are disclosed in Note 16.

Fair value interest rate risk

Fair value interest rate risk is the risk that the value of a financial instrument will fluctuate due to changes in market interest rates. Borrowings issued at fixed interest rates expose Transwaste Canterbury Limited to fair value interest rate risk. Transwaste Canterbury Limited’s Treasury policy outlines the level of borrowing that is to be secured using fixed interest rate instruments. Fixed to floating interest rate swaps may be entered into to hedge the fair value interest rate risk arising where Transwaste Canterbury Limited has borrowed at fixed rates. In addition, investments at fixed interest rates expose Transwaste Canterbury Limited to fair value interest rate risk.

Notes to the Financial Statements
For the year ended 30 June 2025

Cash flow interest rate risk

Cash flow interest rate risk is the risk that the cash flows from a financial instrument will fluctuate because of changes in market interest rates. Borrowings and investments issued at variable interest rates expose Transwaste Canterbury Limited to cash flow interest rate risk.

Transwaste Canterbury Limited manages its cash flow interest rate risk on borrowings under the terms of its Treasury policy by, where appropriate, using floating-to-fixed interest rate swaps. Such interest rate swaps have the economic effect of converting borrowings at floating rates and swaps them into fixed rates that are generally lower than those available if Transwaste Canterbury Limited borrowed at fixed rates directly. Under the interest rate swaps, Transwaste Canterbury Limited agrees with other parties to exchange, at specified intervals, the difference between fixed contract rates and floating-rate interest amounts calculated by reference to the agreed notional principal amounts.

Credit risk

Credit risk is the risk that a third party will default on its obligation to Transwaste Canterbury Limited, causing Transwaste Canterbury Limited to incur a loss. The company has five to ten significant customers, which are actively managed to minimise credit risk.

Transwaste Canterbury Limited invests funds in deposits with registered banks. Accordingly, the company does not require any collateral or security to support these financial instruments.

Transwaste Canterbury Limited has no collateral or other credit enhancements for financial instruments that give rise to credit risk.

Maximum exposure to credit risk

Transwaste Canterbury Limited's maximum credit exposure for each class of financial instrument is as follows:

	2025 $'000	2024 $'000
Cash and cash equivalents (Note 11)	100	5,658
Trade and other receivables (Note 12)	7,616	6,655
Total credit risk	**7,716**	**12,313**

Notes to the Financial Statements
For the year ended 30 June 2025

Credit quality of financial assets
The credit quality of financial assets that are neither past due nor impaired can be assessed by reference to S & P Global Ratings' credit ratings (if available) or to historical information about counterparty default rates:

	2025 $'000	2024 $'000
Counterparties with credit ratings		
Cash and cash equivalents		
AA-	100	5,658

Debtors and other receivables mainly arise from ongoing transactions with seven significant customers with no significant concentration of credit risk. There are procedures in place to monitor and report the credit quality of debtors and other receivables on a monthly basis, to minimise credit risk.

Liquidity risk

Management of liquidity risk

Liquidity risk is the risk that Transwaste Canterbury Limited will encounter difficulty raising liquid funds to meet commitments as they fall due. Prudent liquidity risk management implies maintaining sufficient cash, the availability of funding through an adequate amount of committed credit facilities and the ability to close out market positions. Transwaste Canterbury Limited aims to maintain flexibility in funding by keeping committed credit lines available.

Transwaste Canterbury Limited manages its borrowings in accordance with its Treasury Policy.
The maturity profiles of Transwaste Canterbury Limited's interest bearing borrowings are disclosed in Note 16.

Contractual maturity analysis of financial liabilities

The table below analyses the company's financial liabilities into relevant maturity groupings based on the remaining period at the balance date to the contractual maturity date. Future interest payments on floating rate debt are based on the floating rate on the instrument at the balance date. The amounts disclosed are the contractual undiscounted cash flows and include interest payments.

	Carrying amount $'000	Contract-ual cash flows $'000	Less than 1 year $'000	1 – 2 years $'000	2 – 5 years $'000
2025					
Creditors and other payables	10,528	10,528	10,528	-	-
Total	10,528	10,528	10,528	-	-

Notes to the Financial Statements
For the year ended 30 June 2025

	Carrying amount $'000	Contract-ual cash flows $'000	Less than 1 year $'000	1 – 2 years $'000	2 – 5 years $'000
2024					
Creditors and other payables	8,954	8,954	8,954	-	-
Total	8,954	8,954	8,954	-	-

Contractual maturity analysis of financial assets

The table below analyses the company's financial assets into relevant maturity groupings based on the remaining period at balance date to the contractual maturity date. The amounts disclosed are the contractual undiscounted cash flows and include interest receipts.

	Carrying amount $'000	Contract-ual cash flows $'000	Less than 1 year $'000	1 to 2 years $'000	2 to 5 years $'000	More than 5 years $'000
2025						
Cash and cash equivalents	100	100	100	-	-	-
Trade and other receivables	7,616	7,616	7,616	-	-	-
Total	7,716	7,716	7,716	-	-	-
2024						
Cash and cash equivalents	5,658	5,658	5,658	-	-	-
Trade and other receivables	6,655	6,655	6,655	-	-	-
Total	**12,313**	**12,313**	**12,313**	**-**	**-**	**-**

Notes to the Financial Statements
For the year ended 30 June 2025

25. Capital risk management

The company's objectives when managing capital are to safeguard the company's ability to continue as a going concern in order to provide returns for shareholders and benefits for other stakeholders and maintain an optimal capital structure to reduce the cost of capital.

In order to maintain or adjust the capital structure, the company may adjust the amount of dividends paid to shareholders, return capital to shareholders, issue new shares or sell assets to reduce debt.

The company monitors capital on the basis of the equity ratio. This ratio is calculated as total equity divided by total assets. The company's strategy, as set out in the Statement of Intent for the 2025 year, is to endeavour to operate with a consolidated shareholders' funds to total assets of 40.7% during the 2024/2025 financial year.

The equity ratio achieved at 30 June 2025 is 40.7% (2024: 48.2%), in line with the budgeted ratio.

26. Events after balance date

On 28 August 2025, a fully imputed final dividend of $7,000,000 in respect of 2025 was declared and paid.

There have been no other significant events after the reporting date that are not otherwise disclosed in these financial statements.

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INDEPENDENT AUDITOR'S REPORT

TO THE READERS OF TRANSWASTE CANTERBURY LIMITED FINANCIAL STATEMENTS AND STATEMENT OF PERFORMANCE FOR THE YEAR ENDED 30 JUNE 2025

The Auditor-General is the auditor of Transwaste Canterbury Limited (the Company). The Auditor-General has appointed me, Brendan Summerfield, using the staff and resources of Ernst & Young, to carry out the audit of the financial statements and the statement of performance of the Company on his behalf.

We have audited:

- the financial statements of the Company on pages 20 to 57, that comprise the statement of financial position as at 30 June 2025, the statement of comprehensive income, statement of changes in equity and cash flow statement for the year ended on that date and the notes to the financial statements that include accounting policies and other explanatory information; and

- the statement of objectives and performance of the Company for the year ended 30 June 2025 on pages 14 to 19.

Opinion

In our opinion:

- the financial statements of the Company:
    - present fairly, in all material respects:
        - its financial position as at 30 June 2025; and
        - its financial performance and cash flows for the year then ended; and
    - comply with generally accepted accounting practice in New Zealand in accordance with New Zealand Equivalents to International Financial Reporting Standards; and

- the statement of performance:
    - accurately reports, in all material respects, the Company's actual performance compared against the performance targets and other measures by which the Company's performance can be judged in relation to the Company's objectives in its statement of intent for the year ended 30 June 2025; and

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- has been prepared, in all material respects, in accordance with section 68 of the Local Government Act 2002 (the Act).

Our audit was completed on 26 September 2025. This is the date at which our opinion is expressed.

Basis for our opinion

We carried out our audit in accordance with the Auditor-General's Auditing Standards, which incorporate the Professional and Ethical Standards and the International Standards on Auditing (New Zealand) issued by the New Zealand Auditing and Assurance Standards Board. Our responsibilities under those standards are further described in the Responsibilities of the auditor for the audit of the financial statements and the statement of performance section of our report.

We have fulfilled our responsibilities in accordance with the Auditor-General's Auditing Standards.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Responsibilities of the Board of Directors for the financial statements and the statement of performance

The Board of Directors is responsible on behalf of the Company for preparing financial statements that are fairly presented and that comply with generally accepted accounting practice in New Zealand. The Board of Directors is also responsible for preparing the *statement of performance* in accordance with the Act.

The Board of Directors is responsible for such internal control as it determines is necessary to enable it to prepare financial statements and the statement of performance that are free from material misstatement, whether due to fraud or error.

In preparing the financial statements and the statement of performance, the Board of Directors is responsible on behalf of the Company for assessing the Company's ability to continue as a going concern. The Board of Directors is also responsible for disclosing, as applicable, matters related to going concern and using the going concern basis of accounting, unless the Board of Directors either intend to liquidate the Company or to cease operations, or has no realistic alternative but to do so.

The Board of Directors' responsibilities arise from the Local Government Act 2002.

Responsibilities of the auditor for the audit of the financial statements and the statement of performance

Our objectives are to obtain reasonable assurance about whether the financial statements and the statement of performance, as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion.

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Reasonable assurance is a high level of assurance, but is not a guarantee that an audit carried out in accordance with the Auditor-General's Auditing Standards will always detect a material misstatement when it exists. Misstatements are differences or omissions of amounts or disclosures, and can arise from fraud or error. Misstatements are considered material if, individually or in the aggregate, they could reasonably be expected to influence the decisions of shareholders, taken on the basis of these financial statements and the statement of performance.

For the budget information reported in the financial statements and in the statement of performance, our procedures were limited to checking that the information agreed to the Company's statement of intent.

We did not evaluate the security and controls over the electronic publication of the financial statements and the statement of performance.

As part of an audit in accordance with the Auditor-General's Auditing Standards, we exercise professional judgement and maintain professional scepticism throughout the audit. Also:

- We identify and assess the risks of material misstatement of the financial statements and the statement of performance, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.

- We obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control.

- We evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by the Board of Directors.

- We conclude on the appropriateness of the use of the going concern basis of accounting by the Board of Directors and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Company's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the financial statements and the statement of performance or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the Company to cease to continue as a going concern.

- We evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and whether the financial statements represent the underlying

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transactions and events in a manner that achieves fair presentation.

- We evaluate the overall presentation, structure and content of the statement of performance, including the disclosures, and assess whether the statement of performance achieves it's statutory purpose of enabling the Company's shareholders to judge the actual performance of the Company against its objectives in its statement of intent.

We communicate with the Board of Directors regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

Our responsibilities arise from the Public Audit Act 2001.

Other Information

The Board of Directors is responsible for the other information. The other information comprises all of the information included in the annual report other than the financial statements and the statement of performance, and our auditor's report thereon.

Our opinion on the financial statements and the statement of performance does not cover the other information and we do not express any form of audit opinion or assurance conclusion thereon.

In connection with our audit of the financial statements and the statement of performance, our responsibility is to read the other information. In doing so, we consider whether the other information is materially inconsistent with the financial statements and the statement of performance or our knowledge obtained in the audit, or otherwise appears to be materially misstated. If, based on our work, we conclude that there is a material misstatement of this other information, we are required to report that fact. We have nothing to report in this regard.

Independence

We are independent of the Company in accordance with the Auditor-General's Auditing Standards, which incorporate the independence requirements of Professional and Ethical Standard 1: *International Code of Ethics for Assurance Practitioners (including International Independence Standards) (New Zealand)* issued by the New Zealand Auditing and Assurance Standards Board.

Other than the audit, we have no relationship with, or interests in, the Company.



Brendan Summerfield
Ernst & Young
On behalf of the Auditor-General
Christchurch, New Zealand

Waimakariri District Council
215 High Street
Private Bag 1005
Rangiora 7440, New Zealand
Phone 0800 965 468

Our Reference: GOV-18-03 / 260910275777

10 September 2026

Hon Chris Bishop
Minister for Housing, Minister for Transport, and Minister Responsible for RMA Reform
Parliament Office
Private Bag 18888
Parliament Buildings
Wellington 6160

By email Chris.Bishop@parliament.govt.nz

Dear Minister Bishop

Loburn Quarry and Managed Landfill Proposal

We are writing representing our Council and community, to formally oppose the proposal by Whiterock Lime Limited for a quarry and landfill in Loburn.

The Council's position has been and remains: this proposal is not appropriate, nor needed and should be declined. In fact, it should not have reached the stage for consideration under fast-track legislation.

This is a significant proposal with potentially widespread environmental ramifications for our district.

Protranz has applied to establish and operate a new managed landfill, alongside quarrying activities, at 150, 154, 175 and 176 Quarry Road, Loburn.

The applications include land use consents, water permits and discharge permits covering earthworks, quarrying, landfill construction and operation, discharges to land and air, and activities close to waterways, wetlands and groundwater.

The environmental implications of the landfill component are of particular concern.
The site is close to the rural residential community of Loburn, the Karetu River, wetlands, groundwater and known natural hazard constraints.

The Council, community board, and a significant number of residents have raised significant concerns about the potential effects on water quality, flood risk, traffic, amenity, dust, noise, odour and the long-term management of contaminated material. The proposal is also opposed by Te Ngāi Tūāhuriri Rūnanga, who have particular concerns around cultural values, customary use, and protection of significant sites and waterways.

Many households in the immediate area rely on private water supplies. Any proposal that involves discharges, landfill liner leakage risk, excavation near groundwater and the handling of hazardous materials must be subject to the highest level of scrutiny. These issues should not be compressed into a Fast-Track pathway that limits public participation and reduces the ability of the affected community to be heard.

The Council also does not consider this private commercial landfill proposal demonstrates the significant regional or national benefits required to justify use of the Fast-track process.

The intent of the Fast-track reg is intended for infrastructure and development projects that deliver clear regional or national benefit. A landfill of this nature, in this location, with unresolved environmental and community concerns, does not meet that threshold. Nor is it necessary to meet an urgent regional waste need.

The wider Canterbury region already has established waste management infrastructure, including Kate Valley Landfill, which is consented and engineered for the disposal of a broad range of waste streams.

Kate Valley Landfill is a state-of-the-art world-leading facility built to replace 52 legacy landfills in Ashburton, Selwyn, Christchurch, Waimakariri and Hurunui Districts.

It is a very successful 20-year-old public private partnership which leverages private expertise and the long-term public stewardship our communities expect for an activity that will require monitoring and management for possibly centuries to come.

Kate Valley is both a Class 1 *and* Class 2 landfill with capacity and permits to accept waste from the entire South Island. Whilst its consent will require renewal in 2039, as RMA consents are only issued for 35 years at a time, there is more than enough airspace for the next 100 years and beyond.

The application should be refused on this basis alone.

Both Waimakariri District Council and Canterbury Regional Council reporting has identified environmental concerns, and WDC's section 42A report recommended that consent be declined.

The applicant's preference for a faster process should not outweigh the need for robust assessment, transparency and public confidence.

We therefore respectfully ask that you decline this proposal. It does not fit the threshold for consideration under the Fast-track Approvals Act and presents too many environmental risks to proceed.

This issue matters deeply to the Loburn community and to the wider Waimakariri District.
Residents deserve confidence that decisions about proposals with potentially long-term environmental effects will be made through a process that is open, thorough and fair. The view of Council is the proposal is better dealt with through the existing Resource Management Act consent process, which is already under way.

For the above reasons the Council requests the referral application be declined. Council's technical assessments of the application accompany this letter.

Yours sincerely,



Mayor Dan Gordon



Jeff Millward
Chief Executive



Liz McClure
Chair – Rangiora-Ashley Community Board



Philip Redmond QSM
Deputy Mayor



Cr. Niki Mealings



Cr. Tim Bartle



Cr. Brent Cairns



Cr. Wendy Doody



Cr. Tim Fulton



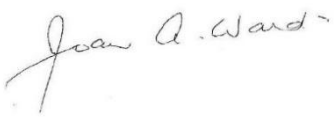
Cr. Jason Goldsowrthy



Cr. Bruce McLaren



Cr. Shona Powell



Cr. Joan Ward

Waimakariri District Council
215 High Street
Private Bag 1005
Rangiora 7440, New Zealand
Phone 0800 965 468

Our Reference: GOV-18-03 / 260910275777

11 September 2026

Hon Chris Bishop
Minister for Housing, Minister for Transport, and Minister Responsible for RMA Reform
Parliament Office
Private Bag 18888
Parliament Buildings
Wellington 6160

By email Chris.Bishop@parliament.govt.nz

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The Council's position has been and remains: this proposal is not appropriate, nor needed and should be declined. In fact, it should not have reached the stage for consideration under fast-track legislation. The perception is that the applicant considered FastTrack may provide an easier route to success as opposed to the resource consent process, which they had already embarked upon and decided to pause.

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Yours sincerely,



Mayor Dan Gordon



Jeff Millward
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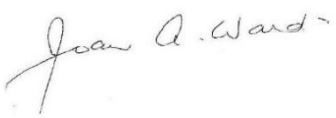
Cr. Jason Goldsowrthy



Cr. Bruce McLaren



Cr. Shona Powell



Cr. Joan Ward

Hon Simon Watts

Minister for Building and Construction
Minister of Climate Change
Minister of Local Government
Minister of Revenue
Minister for Auckland

10 September 2026

Hon Chris Bishop
Minister for Infrastructure
infrastructure.portfolio@parliament.govt.nz

FTAA-2607-1269

Dear Minister

Subject: Fast-track Application FTAA-2607-1269 – Whiterock Quarry and Managed Fill

Thank you for the opportunity to comment on the Whiterock Quarry and Managed Fill application under the Fast-track Approvals regime.

As Minister for Building and Construction, I note the proposal will deliver enabling infrastructure that supports housing development, urban growth, brownfield redevelopment, and construction activity by addressing a recognised shortage of suitable Class 3 disposal capacity in Canterbury. The project aligns most closely with Government objectives around housing growth, infrastructure delivery, construction sector productivity, and efficient supporting infrastructure.

The proposal aligns with the Government's Going for Housing Growth programme to support housing growth and infrastructure delivery by "…*Removing unnecessary planning barriers to urban growth*."

By providing for adequate disposal of fill, the proposal additionally amounts to enabling infrastructure that reduces a practical development bottleneck. This supports increased housing supply and urban development by addressing a key enabling constraint – the disposal of contaminated soil.

Further, I note existing disposal options are already constrained, including that Burwood has limited acceptance criteria and uncertain long-term availability; Kate Valley has intake constraints and higher costs; and some projects have been known to send material as far as South Canterbury or the West Coast for disposal.

Significant infrastructure projects in the region are expected to generate substantial volumes of contaminated material requiring disposal. Without adequate disposal capacity, costs and project delays are likely to increase.

Private Bag 18041, Parliament Buildings, Wellington 6160, New Zealand | +64 4 817 6814 | s.watts@ministers.govt.nz

The establishment of a managed fill at Whiterock will enable more cost-effective waste management by diverting inert materials and therefore reducing pressure on Class 1 facilities.

On this basis, the Minister considers that the proposal is broadly consistent with Government objectives relating to housing growth, construction activity, and supporting infrastructure.

Thank you for the opportunity to comment.

Yours sincerely,



Hon Simon Watts
Minister for Building and Construction

Private Bag 18041, Parliament Buildings, Wellington 6160, New Zealand | +64 4 817 6814 | s.watts@ministers.govt.nz

Hon Nicola Willis

Minister of Finance
Minister for Economic Growth
Minister for Social Investment

8 September 2026

Hon Chris Bishop
Minister for Infrastructure
Parliament Buildings
Wellington

REQ-0038652

Dear Chris

Thank you for the opportunity to comment under the Fast-track Approvals Act 2024 (the Act) on the referral applications for Whiterock Quarry and Managed Fill (FTAA-2607-1269), Out of scope

I am providing these comments in my capacity as Minister for Economic Growth. They focus on whether each application is likely to deliver significant economic benefits under section 22(2)(a)(iv) of the Act, based on the information provided by the applicants. The quantitative estimates below are drawn from economic assessments provided by the applicants.

Whiterock Quarry and Managed Fill, FTAA-2607-1269

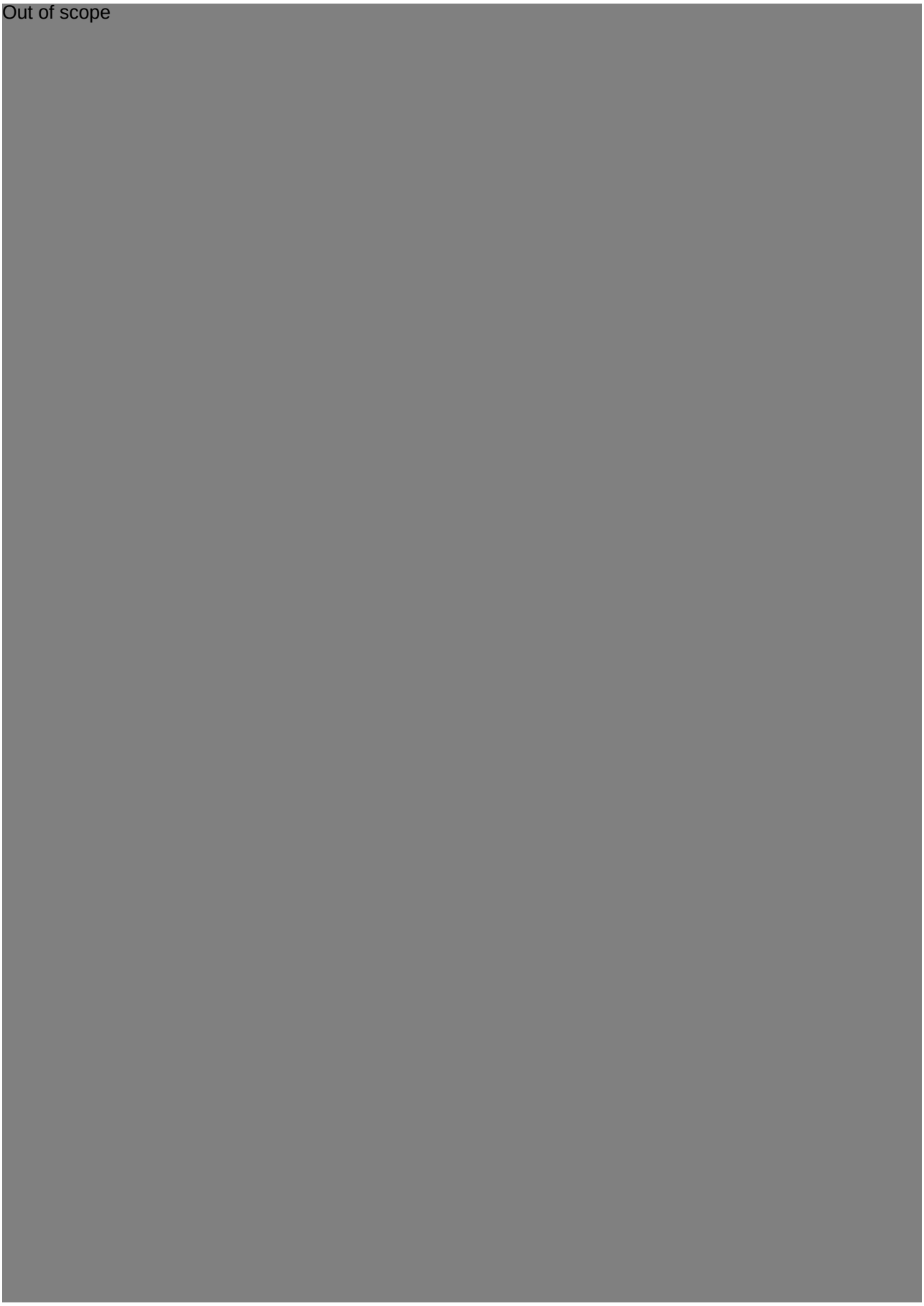
The proposed Class 3 managed fill at Whiterock Quarry in Canterbury would provide around 500,000 cubic metres (800,000 tonnes) of disposal capacity. It would accept inert construction and demolition materials, contaminated soils, and asbestos-containing materials, but no biodegradable organic waste.

The economic material in the proposal does not quantify capital expenditure or construction-related GDP, employment, or wages. Once operational, the facility is estimated to support approximately 8.7 FTEs and generate approximately $1.76 million in annual GDP, including direct, indirect, and induced effects. Over its assumed 20-year operating life, the present value of this contribution to Canterbury's GDP is estimated at approximately $17.3 million, using an 8 per cent discount rate. Operational revenue and wages are not separately quantified.

The facility may also improve the efficiency and resilience of Canterbury's waste-disposal system by providing additional Class 3 capacity for Greater Christchurch and North Canterbury. This could reduce reliance on more distant or constrained facilities and divert suitable materials from higher-specification landfills.

On balance, I consider that the proposal would provide sufficient and persistent regional economic and efficiency benefits to constitute economic benefits under section 22(2)(a)(iv) of the Act. These benefits arise from its ongoing contribution to regional GDP and the potential for additional Class 3 capacity to improve the efficiency and resilience of Canterbury's waste-disposal system. While the project's operational scale is relatively modest and the estimated efficiency benefits are sensitive to modelling assumptions, those benefits are expected to persist over the assessment period and include reduced travel times, emissions, and injury costs. The proposal may also be relevant to section 22(2)(a)(iii), as additional disposal capacity could reduce the risk that contaminated-soil disposal constraints impede housing and

brownfield development. However, this would be an indirect enabling effect rather than a direct increase in housing supply.



Out of scope

Yours sincerely



Hon Nicola Willis
Minister for Economic Growth

Hon Shane Jones

Minister for Oceans and Fisheries
Minister for Regional Development
Minister for Resources
Associate Minister of Finance
Associate Minister for Energy

8 September 2026

Hon Chris Bishop
Minister for Infrastructure
Parliament Buildings
Wellington

Fast-track Approvals Act 2024 – Whiterock Quarry and Managed Fill application (FTAA-2607-1269)

Dear Chris,

Thank you for the opportunity to comment on this referral application under the Fast-track Approvals Act 2024 (FTAA 2024).

The FTAA 2024 has been established to provide a regime that makes it easier and quicker for regionally and nationally significant projects to gain the approvals needed for development, in support of this Government's economic growth objectives.

I have considered the application and its alignment with the priorities of my Resources portfolio. My comments are attached as Annex One.

Yours sincerely,

Hon Shane Jones
Minister for Resources

Private Bag 18041, Parliament Buildings, Wellington 6160, New Zealand | +64 4 817 6826 | s.jones@ministers.govt.nz

Annex One – Resources portfolio comments

Project overview

1. The applicant, Whiterock Lime Limited, has applied for Fast-track approval for the Whiterock Quarry and Managed Fill project at Quarry Road, Loburn, Canterbury. The project involves the continued operation of the existing limestone quarry and lime processing facility, alongside the development and operation of a Class 3 Managed Fill facility within the existing quarry void.

2. The Minister for Infrastructure previously declined a referral application for this project, as he considered the application had insufficient detail around the economic and employment outcomes and other benefits the project will deliver. If declined, applicants may apply for referral again. In the new application, the applicant has provided updated supporting material on the economic and other benefits of the project. The material provided appears to concentrate on the benefits of the Class 3 Managed Fill facility component of the project.

3. The proposed managed fill would occupy approximately 5.3 hectares and provide around 500,000m³ of disposal capacity. It would be developed in two stages, with waste placement, progressive rehabilitation, and final capping occurring over an anticipated operational life of approximately 20 years. Quarrying activities would continue during the initial stages of managed fill development.

4. The project includes construction of a new bridge over the Karetu River, together with supporting water management, environmental monitoring, and ecological restoration measures. Following closure, the managed fill facility would be capped and rehabilitated to create a more natural landform.

5. The applicant's updated economic assessment finds that the facility's operation can generate both ongoing regional economic activity, and incremental efficiency gains by reducing waste disposal haulage distance, travel time, and associated external costs. The assessment states that there are constraints on disposal facility availability for contaminated soils in Canterbury, resulting in increased costs and reliance on more distant disposal sites. Accordingly, the Whiterock facility would expand the region's disposal network by providing a well-located option closer to major sources of waste generation in Christchurch City and surrounding districts.

6. Measured economic benefits of the operation of the project (excluding one-off construction effects) in the updated economic assessment include:

    a. Supporting 8.7 full-time equivalent jobs resulting from direct, indirect and induced impacts of the project.

    b. Annual GDP contribution of $1.76 million ($17.3 million net present value over 20 years), also based on direct, indirect and induced impacts.

    c. Estimated efficiency effects comprised of value of time savings, avoided emissions and avoided injuries ranging between $0.381 million and $35.113 million over 20 years, depending on alternative disposal facilities used and consenting constraints.

7. The applicant further states that the economic benefits are one component of the project's wider regional benefits, such as improving the efficiency and resilience of the regional disposal network, and not all the economic benefits of the project can currently be quantified with precision.

Comments

8. The Government's Minerals Strategy identifies minerals as essential inputs to sectors including agriculture, infrastructure and construction, and recognises the minerals sector as an important contributor to economic growth, regional development and a productive and resilient economy. The Strategy also recognises the importance of maintaining access to the mineral inputs required by key sectors of New Zealand's economy.

9. The project would enable the continued extraction and processing of limestone resources at the existing Whiterock Quarry, which has operated since the 1940s and supplies agricultural lime for use in the farming sector.

10. Agricultural lime is an important input to New Zealand's primary production sector. The continued operation of the Whiterock Quarry would support the local production and supply of agricultural lime for farmers in Canterbury and surrounding regions, while sustaining mineral extraction and processing activity at an established quarry site.

11. As outlined above, the applicant states that the project would generate economic benefits through the continued operation of the quarry and lime processing activities, together with the development of a Class 3 Managed Fill facility. An independent economic assessment estimates the project, as a whole, would support approximately 8.7 FTE jobs and contribute a present value of approximately $17.3 million to Canterbury GDP over the anticipated 20-year operating life of the managed fill facility. It is unclear what proportion would be attributed to the quarry operation.

Hon Tama Potaka

Minister of Conservation
Minister for Māori Crown Relations
Minister for Māori Development
Minister for Whānau Ora
Associate Minister of Housing

By email: infrastructure.portfolio@parliament.govt.nz

Tēnā koe Minister Bishop,

Invitation to comment on the Whiterock Quarry and Managed Fill project under the Fast-track Approvals Act 2024

Thank you for the invitation to comment on the Whiterock Quarry and Managed Fill project under section 17 of the Fast-track Approvals Act 2024.

I have considered the application and its alignment with my portfolios as Minister for Māori Crown Relations: Te Arawhiti and Minister for Māori Development.

I support the application progressing and I encourage the applicant and the panel to have due regard to:

- relevant Treaty settlement legislation and instruments; and
- any feedback received from relevant Māori groups, as set out in the Treaty settlements and other obligations (Section 18) report.

Nāku noa, nā

Hon Tama Potaka
Te Minita mō Te Arawhiti me Te Minita Whanaketanga Māori
Minister for Māori Crown Relations: Te Arawhiti and Minister for Māori Development

Private Bag 18041, Parliament Buildings, Wellington 6160, New Zealand | +64 4 817 6811 | t.potaka@ministers.govt.nz

Response to request for comments from Toitū Te Whenua Land Information New Zealand

Project name: Whiterock Quarry and Managed Fill
FTAA reference: FTAA-2607-1269
Date: 10 September 2026

Comments

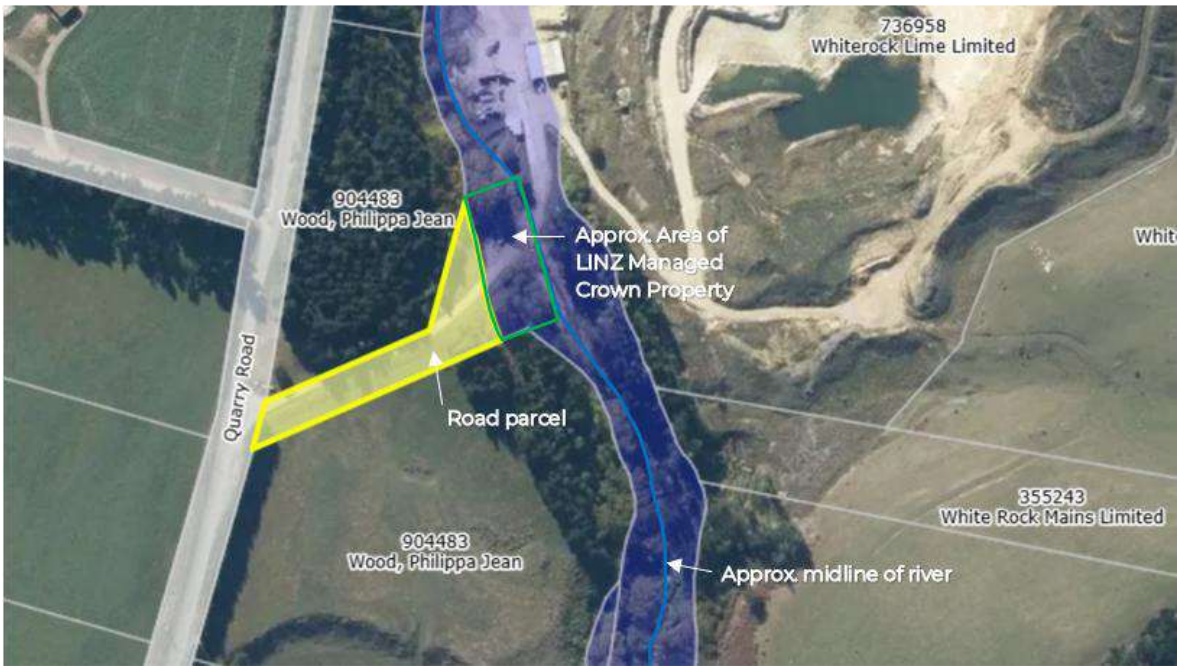
There is LINZ-administered Crown land on the right half width to the centre line of the Karetu River's bed, which lies within the project site.

In February 2026, the Commissioner of Crown Lands approved an application under the Land Act 1948, resulting in an easement being permitted over this area of Crown land for Whiterock Lime Limited's use.

As access arrangements are already in place, LINZ has no further comments to make.

Figure 1 below shows the location of the planned works, marking where the LINZ managed access lies in green. The area of Crown land can be seen in red in **Figure 2**.

Figure 1:



Toitū Te Whenua
Land Information
New Zealand

Figure 2:



WHITIORA

TO:	**Stephanie McNicholl, Application Lead**
RE:	**Whiterock Quarry and Managed Fill Project (FTAA–2607-1269)**
	Written Response to Invitation to Comment
DATE:	**10 September 2026**

INTRODUCTION

Ngāi Tūāhuriri is a principal hapū of Ngāi Tahu, acknowledged in Te Rūnanga o Ngāi Tahu Act 1996 and the Ngāi Tahu Claims Settlement Act 1998 (Settlement Act). The takiwā of the hapū is centred at Tuahiwi, and extends from Hurunui to Hakatere, sharing an interest with Arowhenua Rūnanga northwards to Rakaia, and thence inland to the Main Divide. Within this area, Ngāi Tūāhuriri has maintained noho tūturu (ahi kā), meaning the tribe's 'fires' have been kept burning and that they actively exercise rangatiratanga.

Ngāi Tūāhuriri Rūnanga has mandated Whitiora Centre Limited (Whitiora) to act on its behalf in respect of projects being processed under the Fast-track Approvals Act 2024.

On 20 August 2026, Whitiora received an invitation to provide written comments on a Referral application by Whiterock Lime Limited to construct, establish and operate a Class 3 Managed Fill landfill facility in Quarry Road, Loburn, Canterbury. This is the Whiterock Quarry and Managed Fill Project (the Project).

Whitiora provides the following comments on behalf of Ngāi Tūāhuriri Rūnanga.

SITE LOCATION

The proposed landfill site adjoins the Karetu River, which is a tributary to the Ōkūkū and Rakahuri Rivers. These awa and their surrounding environments are of significant cultural value to Ngāi Tūāhuriri. The awa are identified as Ngā Wai in the Partially Operative Waimakariri District Plan (SASM028) reflecting their importance as traditional mahinga kai, as well as being places of significant events, occupation, historic access, and travel routes. The awa also carry significance in respect of tikanga and the exercise of rangatiratanga.

The condition and treatment of Ngā Wai is considered a reflection on the health and regard for the environment.

WASTE MANAGEMENT AS A REGIONAL ISSUE

During the late 1990s, Ngāi Tahu worked in good faith with all local government entities in Canterbury to find a single waste-treatment site for North and South Canterbury regions. This reflected increasing issues over the disparate spread of multiple waste sites that existed in Canterbury pre-Kate Valley.

Following a combined Council process of site assessment and community engagement, Ngāi Tūāhuriri agreed to the location of the site in Kate Valley. The reasons for accepting this site were that:

(i) A single site was far better for the environment than the numerous sites scattered throughout Canterbury. This was a critical factor in our assessment because other proposed sites were all located near the mahinga kai our hapū had used.

(ii) It was also argued that the Kate Valley site would be designed in such a way as to protect the environment.

The location of Kate Valley was chosen for, among other benefits, its capacity to accept waste for decades to come. It is our understanding that there is sufficient capacity at Kate Vally to accept the waste proposed to be diverted to Whiterock.

The Project represents a return to locally sited and fragmented waste management, and falls short of the collaborative work undertaken by Ngāi Tūāhuriri, the community, Waste Management and the councils in the 1990s to follow industry best practice and reduce the risks caused by dispersed and poorly located landfills.

Whitiora notes that the economic assessment provided in support of the Referral application does not provide a comprehensive assessment of the waste management system within Canterbury and is selective in the sites it has included. The Ministry for the Environment's Waste facility Location's

Register (https://environment.govt.nz/facts-and-science/waste/waste-facilities-and-disposal/) has 16 listed Class 3 & 4 waste disposal facilities within the Christchurch City Council District, with more in the surrounding areas. These have not been mentioned, with the exception of Taiko Road and Kate Valley. Woodstock and Burwood were left out on 'analytical grounds' – both of these have been issued consents prior to this application being lodged.

COMMENTS

Ngāi Tūāhuriri has a number of concerns with respect to the Referral application for the Whiterock Quarry and Managed Fill. Matters of concern include:

- The Karetu River is a culturally significant waterway and is part of a significant cultural landscape. The Project fails to recognise the inherent cultural values associated with the Karetu River, the Ōkūkū River and the Rakahuri catchment, noting that the loss of cultural values is permanent.
- The Project is inappropriately located at the head of a catchment, and the local geology and topography does not provide effective, long-term containment of leachate without a high level of engineering. Accordingly, there are risks for discharge of contaminants not only to the Karetu River, but to all other downstream (ground and surface) waterbodies should the engineered base either be inadequate or fail.
- Any contamination would diminish the mauri of waterways, along with the taonga species, aquatic ecosystems and mahinga kai.
- Construction phase impacts on the river, downstream habitats, taonga species, fish and other freshwater biota;
- The methodology applied to assess the magnitude of environmental effects in previous applications, assessed effects relative to the wider Rakahuri/Ashley River catchment; and not the specific catchment directly impacted, being the Karetu River catchment. Effects on the Karetu River are therefore minimised and obscured.
- In previous applications, the applicant failed to appropriately assess the cumulative effects of the Project in combination with other activities and land uses within the Ōkūkū and Rakahuri catchments on water quality in surface and groundwater bodies;
- The loss of wetlands which are a taonga to Ngāi Tūāhuriri;
- If the landfill is established and there are consequential adverse impacts on the Karetu River and the Rakahuri catchment, these effects are unlikely to be reversible or mitigated

with any immediacy. Any leakage with consequential contamination from buried materials may exist for years/generations to come. It is assumed that in the event of contamination, removal of buried materials would be cost prohibitive;

- The Project has the potential, if consented, to create a precedent for other landfills which are in dispersed and unplanned locations;
- The Project has the potential to become a permanent and long-term facility i.e. its establishment will become an accepted part of the environment that can be expanded and/or used to accept a wider range of waste materials in the future. It is noted that the Project proposes to establish and operate a Class 3 landfill, but will be constructed as a Class 1 landfill (with liner and a leachate pond system). This further underlines the concern that the Project will become a long term facility for wider waste management purposes;
- That an application is able to proceed without an assessment of alternative sites and the costs and benefits of those alternatives in respect of their impacts on social, cultural and environmental values.
- The application does not provide a complete overview or assessment of all existing listed Class 3 & 4 waste disposal sites.

EXISTING SITE OPERATIONS

In a previous resource consent application made for the Project, Ngāi Tūāhuriri noted (through a submission) aspects of the existing site operation that fell short of current and expected best practice in environmental management, particularly in relation to stormwater management and discharges to the environment. These reduce confidence that the proposed landfill will be managed in compliance with consent conditions and with care. Ngāi Tūāhuriri requests close consideration of management practices as part of any assessment of an application under the Fast-track Approvals Act.

SUMMARY

Ngāi Tūāhuriri expects the above matters to be considered in the assessment of the Referral application, and wishes to be kept informed through its mandated agent, Whitiora Centre Ltd as the application is progressed.

Contact Details

Whitiora Centre Limited

351 Lincoln Road, Addington, Christchurch 8024

Email: consents@whitiora.org.nz

Phone: 027 274 4464