

Forest & Bird comment on the Barrytown Minerals Project (FTAA-2605-1238)

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

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)	Royal Forest and Bird Protection Society of New Zealand Inc.		
First name	Nicky		
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2. We will email you draft conditions of consent for your comment			
☒	I can receive emails and my email address is correct	☐	I cannot receive emails and my postal address is correct

Forest & Bird's comments are below, and include several attachments named:

1. Forest & Bird is New Zealand's largest and longest-serving independent conservation organisation. Its mission is to be a voice for nature. Its constitutional purpose is to "take all reasonable steps within the power of the Society for the preservation and protection of the indigenous flora and fauna and the natural features of New Zealand". Forest & Bird's advocacy and legal teams help achieve that purpose by participating in consenting processes for projects that are likely to have significant adverse impacts on the natural environment.
2. Forest & Bird is grateful to have been invited to comment on the Barrytown Minerals Project Fast Track Application (FTAA-2605-1238).

3. Forest & Bird is the owner of the 27-hectare Dick Jackson Memorial Reserve, located south of Punakaiki and surrounded by the Paparoa National Park and Te Ara Taiko Nature Reserve. The Dick Jackson Memorial Reserve is a native forested reserve which is home to the Westland petrel. The Dick Jackson Reserve is ecologically connected to a larger specially protected nature reserve known as the Punakaiki Important Bird Area (IBA) and is the world's only breeding area for the Westland petrel. The Punakaiki Important Bird Area is recognised by BirdLife International as a globally important site for nesting of the Westland Petrel (BirdLife International 2006). Considering the global importance of the Westland petrel area, there is a strong imperative to ensure that the area itself and the birds, are protected from all harmful effects.
4. In the ecological context, the Dick Jackson Reserve and the surrounding land is part of a unique mountains to sea coastal ecosystem. This coastal ecosystem which includes the Barrytown coastal plain, is utilised by Westland petrels and other native fauna. Considering this ecological context, the Barrytown coastal plain though modified, at this location is regionally significant because it provides the most favourable habitat of this type for native birds, fish, lizards, and invertebrates along a long stretch of otherwise steep and rocky coastline.
5. Forest & Bird submitted on TCML's application to mine the Central Block and participated in the Environment Court appeal.¹ The appeal was resolved by agreement, including conditions regarding the management of light. These conditions included conditions on the processing plant (now referred to as Wet Concentrator Plant) – aimed at protecting the Westland Petrel and other birds such as Kororā. The 2024 mediated conditions are appended to these comments and named:

a. **Appendix 1** 2024 NZEnvC 238 Consent Order

6. Forest & Bird has recently been made aware that TCML were granted non-notified, resource consents by the Grey District Council to construct and operate a Wet Concentrator Plant (WCP)², located at a new site known as the southern block, on the Barrytown coastal plain. The southern block is the subject of this Fast Track application for sand mining. Forest & Bird has only recently been made aware that these consents were granted, non-notified.
7. Forest & Bird also understands the TCML were granted non-notified resource consents to operate a Mineral Separation Plant (MSP) at Rapahoe.³ Forest & Bird has only recently been made aware that these consents were granted, non-notified.
8. Consents for the Wet Concentrator Plant (Land use consent LU3473/25 and LU3489/25) authorise a 24-hour, 7 day-a-week operation requiring lighting notwithstanding that this may cause known adverse effects on Tāiko/Westland petrel. Numerous conditions addressing adverse avifauna effects have not been replicated in the Wet Concentrator Plant conditions, for example:

¹ *Coast Road Resilience Group v West Coast Regional Council* [2024] NZEnvC 238 (Grey District Council Resource Consent Reference: LU3473/25 and LU3489/25. West Coast Regional Council Resource Consent Reference: RC-2025-0170)

² Land use consent LU3473/25 and LU3489/25

³ Grey District Council Resource Consent Reference: LU3329/25

- a. The requirement for an Avian Management Plan and Lighting Management Plan (condition 6).
 - b. that the “processing plant building must be constructed without windows, to avoid light spill from the building” (condition 13.4).
 - c. a requirement for nightly on ground searches which specifies the number of cameras required (condition 18.5).
 - d. A procedure for dealing with Westland Petrel interactions. (Condition 18.7).
 - e. A process for dealing with the detection of two or more interactions with Westland Petrel (Condition 18.8).
 - f. Specific timeframes for detecting Kororā, relevant expertise required, triggers for when fences are required and specifics as to where the fence must go (Condition 18.9).
 - g. Development of an Avian Management Plan in consultation with the Department of Conservation, which details, among others, a description of surrounding avian habitats (Conditions 18.11 and 18.12)
 - h. requirements for an annual bird management report (condition 18.15).
9. At the time of preparing these comments, Forest & Bird has written to both the Applicant and Grey District Council⁴ and awaits a response as to why the avifauna conditions developed for the Central Block have not been carried over to the consents for the Wet Concentrator Plant.
10. Forest & Bird understands that the Fast Track Approvals Act (FTAA) application (FTAA-2605-1238) is for the activity of sandmining and rehabilitation, at the southern block on the Barrytown Flats.
11. Forest & Bird understands that the FTAA application differs from the 2024 application for mining activities at the central block, in that the activities have been separated. The Wet Concentrator Plant referred to in [8-9] has been granted consent. With the sand mining and other activities at the southern site including mine closure and rehabilitation being applied for through the FTAA application. We understand the dry mining method originally proposed and consented for the central block, has been changed to dredge mining of the southern block, in the FTAA application. Forest & Bird is concerned that the 2024 NZEnvC 238 Consent Order consent conditions for the suite of sand mining activities at the central block, have not been transferred fully to the non-notified Council resource consents for the WCP nor as proposed conditions in the FTAA application.
12. Forest & Bird is concerned that the FTAA application will not avoid adverse effects on Westland petrels and other avifauna. Forest & Bird is particularly concerned that the proposed light management provisions fall short of what is required to avoid adverse effects on Westland petrels. The proposed conditions for the mining activities at the southern block are weaker than the mediated conditions for the central block.
13. It is Forest & Bird’s expectation, that if the Panel is of the mind to grant FTAA permission for the mining activity at the southern site, then the consent conditions will need to be at least as robust as (if not more) than those established through mediation for the central site, considering the

⁴ On 22 September 2026.

larger scale mine and the longer duration. As currently proposed the conditions will not avoid adverse effects on threatened or at-risk indigenous taxa.

14. Accompanying this comment are legal submissions prepared by Forest & Bird's legal counsel, which includes Forest & Bird's comments on the proposed FTTA application conditions.
15. Also, accompanying this comment is expert evidence of Dr. Susan Mary Micol on the effects of the proposed activities on Westland petrels and other avifauna.
16. In her evidence, Dr. Micol refers to the evidence of Mike Harding, the terrestrial ecologist engaged by the Grey District Council (GDC), to review terrestrial ecological matters related to the 2023 application (LU3154-23) by TiGa Minerals and Metals for mining at Barrytown Flats. Mr Harding highlights the importance of the Barrytown coastal plain supporting numerous – ecologically interconnected – areas of lagoon, wetland, flaxland, shrubland and forest, as habitat for numerous threatened and at-risk species.
17. Mr Harding's evidence is in two parts appended to this comment and named:
 - a. **Appendix 2** Grey District Plan Mike Harding LU3154-23 TiGa Minerals and Metals Review – Terrestrial Ecology Dated 12 December 2023; and
 - b. **Appendix 3** Supplementary Statement of Mike Harding on behalf of Perspective Consulting/Grey District Council Terrestrial Ecology Dated: 18 March 2024.
18. While Mr Harding's statements were provided specifically for the 2023 TiGa Minerals and Metals Limited application to mine the central site – they provide important ecological context for the Barrytown coastal plain, including the importance of the remaining intact wetlands and hydrology of the coastal plain, which is relevant to this FTTA application.
19. Forest & Bird is also concerned about the impacts of climate change, the risk of coastal erosion and inundation by the sea because of sand mining on the coastal plain and because of extreme weather events.
20. Mr Harding in his 2023 evidence states "Predicted effects of climate change are increased intensity and frequency of storm events, and consequent coastal erosion, which increase the risk of catastrophic landform failure at the mine location. Storm events, and changes in sea-surface temperatures, make the species potentially affected by the activity (notably tāiko) more vulnerable to population declines and extinction."⁵
21. The FTAA application does not appear to have adequately assessed the risk of climate change impacts, particularly regarding the impact of sea water inundation.

Support for the concerns raised by the Coast Road Resilience Group

⁵ Grey District Plan Mike Harding LU3154-23 TiGa Minerals and Metals Review – Terrestrial Ecology Dated 12 December 2023 Paragraph 150.

22. Forest & Bird supports the concerns raised by the Coast Road Resilience Group (CRRG) in so far as they are consistent with Forest & Bird's concerns. The Barrytown coastal plain ecosystem, though modified is an important part of the area's broader natural environment, a feature that draws people to live there. Though modified through decades of historic human activity which has resulted in severe loss of ecological values in places, the coastal plain, and its remaining wetlands are important aspects of the area's natural character.
23. Furthermore, the Barrytown coastal plain and its mountainous backdrop is the Southern gateway to Paparoa National Park and the world-famous Pancake Rocks, which are visited by up to half a million people annually.⁶ The adverse effects of the mining activity on the area's natural character and as a buffer to Paparoa National Park appear to have been downplayed by the applicant at best and at worst largely ignored, and the benefits of mining, inflated.

Conclusion

24. The application should be declined. The adverse impacts are likely significant. Of particular concern is the spatial scale and duration of the effects of the mining activity, and the uncertainty around the avoidance of effects on Westland petrels and other threatened avifauna. A much higher level of confidence in the effectiveness of the consent conditions to identify and properly manage adverse effects is needed to ensure that any adverse effects resulting from the activity would avoid adverse effects on Westland petrels and other at-risk and threatened avifauna and its habitat.

Thank you for receiving these comments

⁶ <https://www.doc.govt.nz/globalassets/documents/our-work/paid-parking-pilot/paid-parking-pilot-engagement-report-stage-one.pdf>

**IN THE ENVIRONMENT COURT
AT CHRISTCHURCH
I TE KŌTI TAIAO O AOTEAROA
KI ŌTAUTAHU**

Decision No. [2024] NZEnvC 238

IN THE MATTER of the Resource Management Act 1991

AND an appeal under s120 of the Act

BETWEEN COAST ROAD RESILIENCE
GROUP INCORPORATED

(ENV-2024-CHC-41)

Appellant

AND WEST COAST REGIONAL
COUNCIL

First Respondent

AND GREY DISTRICT COUNCIL

Second Respondent

Environment Judge P A Steven – sitting alone under s279 of the Act

In Chambers at Christchurch

Date of Consent Order: 2 October 2024

CONSENT ORDER

A: Under ss 279(1)(b), 279(1), 290(1) and 108AA(1)(a) of the Resource Management Act 1991, the Environment Court, by consent, orders that:



CRRG v WCRC & GDC – CONSENT ORDER

- (1) the appeal is allowed to the extent that TiGa Minerals and Metals Limited is granted resource consent to undertake open-cast sand mineral mining on the Barrytown Flats in accordance with the conditions and plan as set out in Appendix 1, attached to and forming part of this order;
- (2) the respondents are directed to re-issue the resource consents (reference WCRC: RC-2023-0046 and GDC: LUN-3154/23) incorporating the changes directed under (1), so that any reader not familiar with this proceeding can read the resource consent and understand it as a whole, without having to read, interpolate and consider separately the changes made by this consent order;
- (3) the appeal is otherwise dismissed.

B: Under s285 of the Resource Management Act 1991, there is no order as to costs.

REASONS

Introduction

[1] This proceeding concerns the Coast Road Resilience Group Incorporated's ('GRRGI') appeal against the decision of the West Coast Regional Council and Grey District Council to grant resource consent¹ to TiGa Minerals and Metals Limited to undertake open cast mineral sands mining and processing over 12 years at a site on Barrytown Flats, State Highway 6, West Coast.² GRRGI appealed seeking that the decision be overturned and consents refused or any further or consequential relief as may be necessary to address the matters it raised in its submission and appeal.

¹ Reference WCRC: RC-2023-0046 and GDC: LUN-3154/23.

² *Independent Commissioners' Decision on Application by TiGa Minerals and Metals Limited to Mine at Barrytown*, dated 29 April 2024.

[2] I have read and considered the consent memorandum of the parties dated 20 September 2024 which details the agreement reached between the parties to resolve the appeal. The parties have agreed a number of changes that address the parties' concerns and will ensure the adverse effects of the proposal are avoided where necessary. I have also read and considered the affidavit of planner, Katherine McKenzie,³ who described the fundamental changes agreed to the conditions of consent, recording her opinion that the agreed changes are within scope and will:⁴

- (a) aid in providing clarity and consistency;
- (b) reduce the effects or the risk of effects occurring from the mining operation; and/or
- (c) reduce the extent of operations on the site from those granted on first instance.

Other relevant matters

[3] The Director-General of Conservation, Royal Forest and Bird Society Incorporated, and Te Rūnanga o Ngāti Waewae each gave notice of an intention to become a party to this appeal under s274 of the Resource Management Act ('the RMA' or 'the Act') and have signed the memorandum setting out the relief sought.

[4] No party seeks costs, all parties agreeing that costs should lie where they fall.

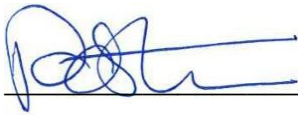
[5] The parties advise that all matters proposed for the court's endorsement fall within the court's jurisdiction and conform to the relevant requirements and objectives of the Act including, in particular, Pt 2.

³ Affirmed 19 September 2024.

⁴ At [16].

Outcome

[6] The court makes this order under ss 279(1), 290(1) and 108AA(1)(a) RMA, such order being by consent rather than representing a decision or determination on the merits pursuant to s297. The court understands for the present purposes that all relevant parties to the proceeding have executed the memorandum requesting the orders. On the information provided to the court, I am satisfied that the orders will promote the purpose of the Act so I will make the orders sought.



P A Steven
Environment Judge



Appendix 1: Conditions of Consent (September 2024)

General Conditions for GDC and WCRC 2

1.0 General.....	2
2.0 Notification.....	2
3.0 Review of Conditions.....	2
4.0 Bond Conditions.....	3
5.0 Annual Work Programme	4
6.0 Management Plans	5
7.0 Method of Operations.....	<u>76</u>
8.0 Hazardous Substances	<u>87</u>
9.0 Rehabilitation.....	<u>98</u>
10.0 Complaints and Non-Compliance.....	<u>109</u>
11.0 Community Liaison Group	10
Grey District Council Conditions	<u>1244</u>
12.0 Hours of Operation	<u>1244</u>
13.0 Buildings.....	<u>1244</u>
14.0 Site Access.....	<u>1244</u>
15.0 Transport.....	<u>1342</u>
16.0 Lighting.....	<u>1544</u>
17.0 Noise	<u>1645</u>
18.0 Avian Management	<u>1846</u>
19.0 Planting	<u>2149</u>
21.0 Accidental Discovery Protocol.....	<u>2324</u>
General Conditions to Apply to all WCRC Consents	<u>2522</u>
22.0 Method of Mining	<u>2522</u>
23.0 Erosion and Sediment Control Plan	<u>2522</u>
24.0 Water Management Plan	<u>2522</u>
Conditions to Apply to WCRC Discharge Permit.....	<u>2724</u>
25.0 Method of Discharge during mining activity	<u>2724</u>
26.0 Water Monitoring	<u>2926</u>
Conditions to Apply to WCRC Air Discharge Permit.....	<u>3228</u>
27.0 Dust Management Plan.....	<u>3228</u>
28.0 Air Quality Management and Monitoring	<u>3329</u>
Conditions to Apply to WCRC Water Take Permit.....	<u>3329</u>
29.0 Groundwater and surface water abstraction outcomes	<u>3329</u>
30.0 Canoe Creek water take.....	<u>3430</u>



Appendix 1: Conditions of Consent (September 2024)

General Conditions for GDC and WCRC	
1.0 General	
1.1	The Consent Holder must carry out the mineral sand mining activities in general accordance with the application and associated documents dated April 2023, further information provided 26 July 2023, 5 September 2023, information provided and amendments made through the hearing, <u>and the Site Plan enclosed as Schedule 1 prepared by Tai Poutini Resources, and the "Additional Weland Mitigation Planting" Plan enclosed as Schedule 9.</u>
1.2	The Consent Holder must ensure all staff and contractors are made aware of, and have access to, <u>and comply with</u> , the resource consent conditions prior to the commencement of mining. A copy of the resource consent conditions <u>and the map required by 7.1(c)</u> must also be readily available on-site.
1.3	All actual and reasonable costs incurred by the Consent Authorities in monitoring, enforcement and administration of this resource consent must be met by the Consent Holder.
1.5	Accountable Person
	a. Within 2 months of the commencement of these consents, the Consent Holder must appoint an Accountable Person to be responsible for ensuring compliance with all conditions of these consents. The Accountable Person must be based on-site for a minimum of 4 hours per day, for three days per week. The Accountable Person must: i. Review, submit and ensure compliance with all management plans listed in the conditions of these consents; ii. Ensure there is another person who can provide cover in the event they are sick or unavailable, and to provide for succession ('Nominated Cover Person'); iii. Be the point of contact between the Consent Holder, the Consent Authorities, the Community Liaison Group (CLG) and the community generally, and pro-actively engage with these parties as required under these consents; iv. Deliver on reporting requirements required by the conditions of these consents. b. The Consent Authorities must be advised of the name and contact details of the Accountable Person and the Nominated Cover Person. In the event that the Accountable Person or Nominated Cover Person change, the Consent Authorities must be notified. <u>c. A sign must be erected at the property boundary adjacent to the site access road, which provides the name and contact details of the Accountable Person and Nominated Cover Person required to be appointed under sub-clause a.</u> <u>Advice Note: The Accountable Person, any other representatives of the Consent Holder should note that CRRG members have expressed a desire for an 'in writing' approach when liaising with all community parties including neighbours. Two contacts available for in-writing contact should be established with parties, including the consent holder, within 5 working days prior to commencement of works on-site. During communications, respectful lead in times of at least one week's notice should be used when disseminating information. 'Cold calling' via phone, text or in person is not considered acceptable unless agreed upon in writing with individual parties.</u>
2.0 Notification	
2.1	For monitoring purposes, the Consent Holder must notify the Consent Authorities of the following: a. the intended commencement date of works on-site at least 15 working days prior to commencement of works on-site; and b. the intended completion of final mine closure rehabilitation activities at least 15 working days prior to works ceasing on-site.
3.0 Review of Conditions	
3.1	Pursuant to Section 128(1) of the Resource Management Act 1991, the Consent Authorities may review any of the conditions of these consents by serving notice on the Consent Holder within a period of 60 working days, commencing on each anniversary of the date of commencement of these consents for any of the following purposes: a. To deal with any unanticipated adverse effect on the environment which may arise from the exercise of the consents which is appropriate to deal with at a later stage, including any material elevation of noise levels associated with the mining or processing operation for extended

Appendix 1: Conditions of Consent (September 2024)

	periods of time, which was not anticipated by the noise modelling that informed the resource consent conditions. b. To assess the <u>effectiveness and</u> appropriateness of imposed monitoring parameters, monitoring regimes and monitoring frequencies and to alter these accordingly. c. To ensure that any management plan required by- conditions gives effect to conditions of these consents. ~~If the information made available to the Consent Authorities by the applicant for the purposes of applying for consent contained material inaccuracies and the effects of the exercise of the consent are such that it is necessary to apply more appropriate conditions.~~
<u>3.2</u>	<u>Notwithstanding the annual review, the Consent Authority may review the conditions of this consent at any time to avoid adverse effects on Westland Petrel, in response to reporting under conditions 18.7, 18.8 or 18.15, where an interaction or interactions have continued to occur despite implementation of further mitigation measures in accordance with conditions 18.7 or 18.8.</u>
4.0 Bond Conditions	
4.1	The Consent Holder must provide and maintain in favour of the Consent Authorities (the West Coast Regional Council and the Grey District Council [jointly for their respective interests]) a bond or bonds related to mine closure activities <u>and rehabilitation</u> required by these consents. <i>Advice Note: The Consent Holder remains liable under the Resource Management Act 1991 (or its successor) for any breach of these consents which occurs before expiry of these consents and which become apparent during or after the expiry of the relevant consent.</i>
4.2	The payment of the bond quantum by the Consent Holder, as required by Condition 4.5 must ~~either~~ be: ~~a~~ <u>A</u> bond in favour of the Consent Authorities for the guarantee sum in a form and executed by a surety acceptable to the Consent Authorities;~~;- or~~ ~~A cash bond deposited with and held in a bank account by the Consent Authorities.~~
4.3	~~Where a bond is guaranteed in accordance with Condition 4.2 a), the~~ <u>The</u> guarantor must bind itself to pay up to the bond quantum for the carrying out and completion of all obligations of the Consent Holder under the bond.
4.4	The bond (as set at any time under Condition 4.1) must be held or remain in full force and effect throughout the term of these consents until all conditions under these consents have been performed unless otherwise agreed by the Consent Authorities.
4.5	a. The bond quantum must be: \$160,000.00; plus - A sum to be determined by the average of two quotes provided to the Consent Authorities by the Consent Holder for the removal of the processing plant building and ancillary buildings and structures within the processing plant area shown in Schedule 2 and the reinstatement of this area to pasture. b. The method for arriving at the bond quantum does not limit the scope of the bond, which is set by Condition 4.1.
4.6	The provisions of Section 109 of the Resource Management Act 1991 must apply to any bond, or bonds, required pursuant to the above and must not be limited by the details of the bond instrument.
4.7	The amount of the bond ~~must~~ <u>may</u> be inflation adjusted ~~annually after 3 years from the execution of the bond under Condition 4.8, issue of consent, if requested by the Consent Authorities, or and may be inflation adjusted if requested by the Consent Authorities,~~ by the movement of the CPI relative to the CPI at the date when the bond is first provided.
4.8	The Consent Holder must not exercise these consents: - Until the bond required by Condition 4.1 has been fully executed by the Consent Holder and guarantor, ~~or has been deposited with the Consent Authorities,~~ or - In respect of any inflation adjusted bond referred to in Condition 4.7, after 30 working days have expired from the date the Consent Holder was notified of the terms of the inflation adjusted bond by the Consent Authorities unless the inflation adjusted bond has been executed with the

Appendix 1: Conditions of Consent (September 2024)

	Consent Authorities by the Consent Holder and guarantor, ~~or has been deposited with the Consent Authority~~; or c. In respect of any bond sum changed or reviewed pursuant to Sections 127 or 128 of the Act, after thirty 30 working days have expired from the date the Consent Holder was notified of the decision of the changed or reviewed bond by the Consent Authorities unless the changed or reviewed bond has been executed with the Consent Authorities by the Consent Holder and guarantor, ~~or has been deposited with the Consent Authorities~~, or d. If, during the term of these consents, the whole or any part of the bond is required to be used for the carrying out and completion of all obligations of the Consent Holder under the bond, unless the full bond has been executed with the Consent Authorities by the Consent Holder and guarantor, ~~or has been deposited with the Consent Authorities~~.
4.9	The Consent Holder must complete such work requested in respect of which any bond ~~or deposit~~ is held, within the time period nominated by the Consent Authorities' written request.
4.10	If the consents are transferred in part or whole to another party or person, the bond must continue until any outstanding work at the date of transfer is completed to ensure compliance with the conditions of these consents, unless the Consent Authorities are satisfied adequate provisions have been made to transfer the liability to the new Consent Holder.
4.11	In the event of any such transfer of the consents, the Consent Holder must ensure that the transfer provides a replacement bond to the Consent Authorities on the terms required by the Bond Conditions.
4.12	The Consent Holder must meet the costs of providing any bond, or bonds, including the costs of the bond and any substitute bond. <i>Advice Note: The Consent Authority will release the bond upon the closure of the mine if all conditions of consent have been complied with to the satisfaction of the Consent Authorities.</i>
5.0 Annual Work Programme	
5.1	At least <u>420</u> working days prior to mining activities commencing and thereafter on or before the anniversary date of the mining activities commencing, the Consent Holder must submit a programme of work ("Annual Work Programme") for certification by the Consent Authorities detailing: a. The proposed works to be carried out over the next 12 months including: - Equipment to be used; - Areas of topsoil and overburden stripping and stockpile locations; - New areas of land disturbance that will be mined; - Access tracks; - Drilling or prospecting sites and other tracks to be constructed; and - Any other site works within the consent area. b. The approximate open volume of the working pit at the start of the year including the depth of excavations and the area of the working pit. c. The progressive rehabilitation works to be carried out over the next 12 months including: - Areas of unrestored land (i.e. any land not finally topsoiled and revegetated) at the beginning of the 12 month period; - The area that will be fully rehabilitated during the forthcoming 12 months; - Maximum slope angles, bench heights and widths of recontoured ground, if applicable; - Rehabilitation methods and techniques including replacement of topsoil and vegetation cover; d. Description of measures to prevent adverse effects on natural waterbodies, including drainage works within the consent area, and the collection and treatment of site run-off; e. Any general soil conservation measures undertaken; f. Any pit wall stability measures undertaken; g. A description and analysis of any unexpected adverse effects that have arisen as a result of activities within the last 12 months, the steps taken to address those adverse effects and measures implemented to avoid a repeat occurrence of them.
5.2	The following plans, reports and results of monitoring must also be submitted as part of the Annual Work Programme:

Appendix 1: Conditions of Consent (September 2024)

	a. A detailed plan or aerial photograph showing: i. The open working area at the start of the year; ii. Proposed mine path for the forthcoming year including haul and access roads; iii. Rehabilitated ground behind the open pit area; iv. Location of existing and intended topsoil or overburden dumps and their dimensions; v. Location of natural surface water bodies; vi. Location of present and intended drainage works and settling ponds; and vii. Any other site works within the consent area. b. A Site Specific Erosion and Sediment Control Plan in accordance with Condition 23.0. c. Results of surface water quality, surface water flows, and groundwater level monitoring from the previous 12 months in the form of an Annual Hydrological and Water Quality Report required by Condition 26.5. d. Any proposed updates to management plans submitted in accordance with the respective conditions of consent. e. Results of any previous dust monitoring required by Condition 28.3.
5.3	The Consent Holder must provide the Consent Authorities with any further information, which the Consent Authorities may reasonably request after considering any Annual Work Programme. This information must be provided within 5 working days of any request from the Consent Authorities.
6.0 Management Plans	
6.1	At least <u>240</u> working days prior to undertaking any activities authorised by these consents, the Consent Holder must submit the following management plans to the Consent Authorities for certification: a. Noise Management Plan b. Avian Management Plan c. Wetland Construction and Riparian Planting Plan d. Dust Management Plan e. Rehabilitation Management Plan f. Water Management Plan and Monitoring and Mitigation Plan g. Erosion and Sediment Control Plan h. Landscape Mitigation Planting Plan i. Transport Management Plan j. Lighting Management Plan <i>Advice Note: These are collectively referred to as 'Management Plans'.</i> <i>Advice Note: Where a plan requires the input of an appropriately qualified professional, the Consent Authorities may engage an appropriately qualified person to peer review the plan as part of the certification process. <u>The cost of any required peer reviews will be met by the Consent Holder.</u></i>
6.2	a. The purpose of the Management Plans is to implement the relevant conditions of these consents. All Management Plans must include (where relevant): i. The purpose/objective of the plan; ii. Reference to the conditions of these consents that the management plan implements; iii. How each of the relevant conditions have been given effect to; iv. Procedures for implementing the relevant plan; v. Plan auditing check lists; vi. Monitoring programmes and/or monitoring protocols; vii. Feedback mechanisms for adaptive management, including circumstances in which a material change to the management plan would be required; viii. An organisational chart showing staff and contractor positions and responsibilities for plan implementation; ix. Relevant training and induction procedures and training schedules <u>for staff and contractors</u>; and x. Reporting procedures and format for providing the results of any monitoring or surveys required by the plan. b. Where plans require the input of an appropriately qualified professional, the Consent Holder must engage an appropriately qualified person to prepare the Plan.

Appendix 1: Conditions of Consent (September 2024)

6.3	Site activities must not commence until the Management Plans listed in condition 6.1 have been certified by the Consent Authorities.
6.4	<u>Within 20 working days of the date of submission of a management plan under Condition 6.1, the Consent Authorities must:</u> a. <u>If the Consent Holder has not received a response from the Consent Authorities confirm to the Consent Holder that the management plan is certified; or within 20 working days of the date of submission of a management plan under Condition 6.1, the management plan must be deemed certified.</u> b. <u>If the response from the Consent Authorities is respond that they are not able to certify the management plans, the Consent Holder must consider any and provide reasons and recommendations provided by the Consent Authorities, amend the management plan accordingly, and resubmit the management plan to the Consent Authorities to the Consent Holder.</u> <u>Advice note: If a Consent Authority does not certify a management plan under Condition 6.4.b, the Consent Holder will need to resubmit the management plan under Condition 6.1.</u>
6.5	The Consent Holder may amend a management plan at any time to take into account: a. Any positive measure/s to ensure the stated objectives of the management plan are achieved; b. Any changes required to further reduce the potential for adverse effects as a result of actions identified in the Annual Work Programme; and c. Any required actions identified as a result of monitoring to address a. or b. d. <u>Any changes or opportunities to reduce actual or potential adverse effects on the environment in response to concerns, comments or complaints received from the Consent Authorities and the Community Liaison Group.</u> Where the preparation of a management plan required the input of an appropriately qualified person, any amendment to that management plan must also be undertaken by an appropriately qualified person. <i>Advice Note: Some management plans have ongoing annual review requirements which are required in order to avoid, remedy or mitigate effects. These specific review requirements are stipulated in the relevant conditions of this consent.</i> <i>Advice Note: Amendments to the Avian Management Plan may trigger the need for an updated Wildlife Act Authority.</i>
6.6	Any amended management plan must be provided to the Consent Authorities within 20 working days of its review, for recertification in accordance with Condition 6.1. <i>Advice Note: The Consent Authorities may engage an appropriately qualified person to peer review the amendments.</i>
6.7	A management plan may only be amended in a way that is consistent with, and does not contravene, the conditions of these resource consents.
6.8	<u>Within 20 working days of the date of submission of a management plan under Condition 6.6, the Consent Authorities must:</u> a. <u>confirm to the Consent Holder the management plan is certified; or if the Consent Holder has not received a response from the Consent Authorities within 20 working days of the date of any reviewed management plan submitted in accordance with Condition 6.6, the management plan must be deemed certified.</u> b. <u>If the response from the Consent Authorities is that respond that they are not able to certify the management plan and provide, the Consent Holder must consider any reasons and recommendations provided by the Consent Authorities, amend the management plan accordingly, and resubmit the management plan to the Consent Authorities Holder.</u> <u>Advice note: If a Consent Authority does not certify a management plan under Condition 6.8.b, the Consent Holder will need to resubmit the management plan under Condition 6.6.</u>

Appendix 1: Conditions of Consent (September 2024)

6.9	A copy of the latest version of the certified Management Plans must be kept on site at all times and all ~~staff and contractors~~ ~~personnel~~ must be made aware of each Plan and their responsibilities under each Plan.
6.10	Subject to any other conditions of these consents, all activities must be undertaken in accordance with the latest version of the certified Management Plans.
7.0 Method of Operations	
7.1	~~a.~~ The mine boundaries must be clearly marked on the ground before any earthworks take place, with ~~i.~~ a 20m setback from the northern property boundary <u>from the eastern extent of Rusty Pond to the eastern extent of the Mine Disturbance Area;</u> ~~ii.~~ A 30m setback from the northern property boundary <u>from the eastern extent of Rusty Pond to the western extent of the Mine Disturbance Area; and</u> ~~iii.~~ <u>and Collins Creek, a 40m setback from the</u> ~~coastal lagoon~~ <u>Canoe Creek Lagoon and its surrounding wetland and any wetland.</u> ~~i-iv.~~ A 20m setback from Collins Creek, and any other wetland. ~~a-b.~~ The extent of the wetlands within the site and ~~the the coastal lagoon~~ <u>Canoe Creek Lagoon</u> edge must be delineated by a suitably qualified and experienced ecologist <u>using the Ministry for the Environment Wetland delineation protocols</u> at least 20 working days prior to the site boundary being marked to determine the location of the setback and the ~~coastal lagoon~~ <u>Canoe Creek Lagoon</u> edge of the planting required by condition 19.0. ~~b-c.~~ A map showing the extent of delineated wetlands, the ~~coastal lagoon~~ <u>Canoe Creek Lagoon</u> edge, and the required setbacks from the northern property boundary and Collins Creek, <u>Canoe Creek Lagoon</u>~~the coastal lagoon~~, and any wetland must be provided to the Consent Authorities, at least 10 <u>working</u> days prior to the boundaries being marked. ~~c-d.~~ There must be no overhead power lines on the site. <i>Advice Note: Condition 18.1 requires a setback of 100m from the edge of ~~the coastal lagoon~~ <u>Canoe Creek Lagoon</u> during the bird breeding season.</i>
7.2	The maximum area of site disturbance must not exceed 8.0 hectares ~~at any one time~~. <i>Advice Note: The disturbed area includes the mine pit, water management infrastructure, processing plant area, active rehabilitation areas, <u>any lighted areas</u> and the access road.</i>
7.3	a. The Consent Holder must strip soil material ahead of mining operations and stockpile it for progressive and final mine closure rehabilitation purposes. b. Stockpiled soil must be protected from erosion caused by water and wind as far as practicable.
7.4	The Consent Holder must not bury any topsoil or soil material suitable as a growing medium or remove it from the site.
7.5	a. Prior to mining in each of panels 1, 4-9, and 10, the consent holder must engage a geotechnical engineer to carry out ground investigations and prepare a geotechnical report to: i. confirm the ground conditions within the panel, and determine appropriate pit wall geometry to ensure pit wall stability; and ii. identify any requirements for staff training to remediate a pit wall failure b. The geotechnical investigations informing the report must include monitoring of pit wall performance in earlier panels (where applicable), and involve the use of in ground inclinometers to measure slope deformation and piezometers to measure groundwater response. ~~c.~~ The Consent Holder must submit the geotechnical report to the Consent Authorities at least 20 working days prior to commencing each panel, for certification that the ground conditions are suitable and pit wall stability will be achieved with required water management mitigation infrastructure in place, such that there is less than 0.5m of modelled displacement in an Ultimate Limit State event (1 in 100 year earthquake) within 20m of the pit crest. ~~c-d.~~ <u>Where pit wall performance is not as anticipated and failure occurs, the consent holder must engage a geotechnical engineer to investigate the cause of failure, and implement any recommendations as soon as practicable.</u>
7.6	When mining first occurs within 100m of ~~the coastal lagoon~~ <u>Canoe Creek Lagoon</u>, Rusty Pond or the northern boundary in each of panels 4-8 and 10, the Consent Holder must: a. Commence filling the mining pit at the western pit wall within 6 weeks of commencing the panel;

Appendix 1: Conditions of Consent (September 2024)

	b. Complete filling the mining pit within 100m of ~~the coastal lagoon~~ <u>Canoe Creek Lagoon</u> within 8 weeks of commencing the panel.
7.7	The consent holder must use mains supplied electricity to operate the processing plant once it is commissioned. <i>Advice Note: During construction of the processing plant and mine infrastructure, on-site electricity generation via diesel powered generators may be required before a mains electric power supply is established.</i>
<u>7.8</u>	<u>The processing plant on the site may only be used to process materials extracted from the site at Lot 1 DP412689 and Rural Section 2847 on the Barrytown Flats, State Highway 6.</u>
8.0 Hazardous Substances	
8.1	a. Refuelling, lubrication and mechanical repairs of equipment and storage of hazardous substances and dangerous goods must be undertaken in such a manner that ensures spillages of hazardous substances or dangerous goods onto the land surface or into a waterbody do not occur, including that refuelling must not occur within 20 metres of a water body. b. Any accidental discharge of greater than 20 litres of fuel, oil or hazardous substances must be reported immediately to the Consent Authorities along with details of the steps taken to remedy and/or mitigate the adverse effects of the discharge.
8.2	All contractors and/or operators transporting or storing more than 20 litres of fuel, oil or hazardous substances must carry spill kits to contain any fuel, oil or hazardous substances discharges on-site.
8.3	A list of all hazardous substances and dangerous goods stored or used on site must be maintained on site at all times showing the location of the storage and use.
8.4	Diesel storage must be limited to 40,000 litres, and must be contained in a certified tank with full secondary containment. <i>Advice Note: hazardous substance storage is managed by the Hazardous Substances and New Organisms Act 2006, and must be certified under this legislation.</i>
8.5	The Consent Holder must undertake quarterly systematic testing of the heavy minerals concentrate from within the active mining area to confirm that the concentrate remains below the acceptable level of radioactivity concentration limits as specified in Schedule 2 of the Radiation Safety Act 2016. Copies of the independent test results must be submitted to the Consent Authority within 10 working days of receipt of the results. <i>Advice Note: If material meets the criteria in Schedule 2 of the Radiation Safety Act 2016, the extraction, processing and transport of heavy minerals concentrate will require a Source Licence under this Act, and may possibly require a radiation safety plan as per section 18 of the Act.</i>
8.6	In the absence of any extant and current New Zealand Code of Practice for handling naturally occurring radioactive materials, the Consent Holder must carry out all activities on site in accordance with the Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing Code of Practice and Safety Guide published by the Australian Radiation Protection and Nuclear Safety Agency. <i>Advice Note: The Code of Practice within this consent condition requires that if radiation levels exceed 1Bq/g, the relevant authority must be notified, which differs from state to state. In the New Zealand context, the relevant body to notify is the Office of Radiation Safety.</i>
8.7	a. The Consent Holder must maintain radiation monitoring devices in the locations specified in the Dust Management Plan. Data from the radiation monitoring devices must be collected and analysed once every three months. Copies of the test results must be submitted to the Consent Authorities with 10 working days of receipt of the results. b. If the radiation monitoring devices record radiation levels exceeding the equivalent of 1 mSv (millisievert) above background levels over 12 months (i.e., the sum of results from the past four device readings at each location minus background levels established prior to the activity commencing), then the Radiation Safety Act 2016 applies, and the Consent Holder must: i. inform and consult the Office of Radiation Safety, New Zealand Ministry of Health; and ii. carry out all activities on site in accordance with the Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing Code of Practice and Safety Guide published by the Australian Radiation Protection and Nuclear Safety Agency (or any subsequent revision).

Appendix 1: Conditions of Consent (September 2024)

8.8	a. The Consent Holder must undertake daily analysis of heavy minerals concentrate samples from the processed stockpile area using a hand-held X-Ray Fluorescence device. b. If a sample results in a calculated activity concentration of >1.0 Becquerel per gram (Bq/g) based on U+Th assay*, the Consent Holder must have the sample analysed by an independent laboratory for head-of-chain radioactivity concentration measurement. . c. If the independent assessment confirms that radiation levels in the heavy minerals concentrate exceeds 1 Bq/g, the Consent Holder must notify the Office of Radiation Safety and act as directed. d. If levels exceed 10 Bq/g on the hand-held device, the heavy minerals concentration process must stop, a sample must be submitted for independent testing, and the heavy minerals concentration material in question must be diluted with tailings material to reach <1 Bq/g and returned to the mining pit. e. If the independent test confirms a reading of greater than 10 Bq/g, the Office of Radiation Safety must be notified and a Radiation Safety Plan must be prepared by the Consent Holder and be submitted for approval by the Office of Radiation Safety within 10 working days of the reading. f. The heavy minerals concentration process must not resume until the Radiation Safety Plan is approved. g. If the independent test confirms a reading of greater than 1 Bq/g but less than 10 Bq/g, the Consent Holder must notify the Office of Radiation Safety and act as directed. h. Daily monitoring records must be made available to the Consent Authorities on request, and copies of any independent test results must be submitted to the Consent Authorities within 5 working days of receipt of the results. <i>* Activity Concentration (Bq/g) = U(ppm)× 0.01244 + Th(ppm)× 0.0042</i> <i>Advice Note: XRF devices are managed by the Office of Radiation Safety, and a Source Licence is required to possess and operate these devices.</i>
8.9	a. Prior to the commencement of HMC stockpiling, the Consent Holder must install an apparatus to measure Radon-222 activity concentration within the HMC stockpile building. b. If no Radon-222 readings of >300 Bq/m³ are detected within the first year of the heavy minerals concentration process, the apparatus may be decommissioned. c. Data from the apparatus must be supplied to the Consent Authorities at least once every 3 months for the first 12 months of the heavy minerals concentration process, and within 10 days of a reading of >300 Bq/m³ being registered. d. If the independent assessment confirms that Radon-222 levels in the HMC stockpile building exceeds 300 Bq/m³, the Consent Holder must notify the Office of Radiation Safety and act as directed. <i>Advice Note: The 300 Bq/m³ level of airborne radon derives from the IAEA Safety Standard No. GSR Part 3.</i>
9.0 Rehabilitation	
9.1	The Consent Holder must carry out progressive rehabilitation, to achieve the following requirements: a. Reinstatement of the productive pasture; b. Reinstatement of existing drainage patterns to reflect pre-mining catchment areas; c. Ensuring short and long term stability of the reinstated landform; and d. Protecting Canoe Creek, Canoe Creek Lagoon, Northern Drain, Rusty Pond, Collins Creek and surrounding wetlands from the effects of erosion and sediment generation. <i>Advice Note: Stability means an area inherently resistant to erosion such as rock, or rendered resistant by the application of aggregate, geotextile, vegetation, mulch or an approved alternative. Where vegetation is to be used on a surface that is not otherwise resistant to erosion, the surface is considered stabilised once an 80% vegetation cover has been established.</i>
9.2	At the completion of mining (final mine closure), the mine area must be fully rehabilitated, by reinstating the productive pasture in general accordance with a Rehabilitation Plan. The objectives of the Rehabilitation Plan are: a. To create a final landform with a similar contour and profile at final mine closure as that which existed prior to mining; b. To establish vegetation cover on all areas disturbed by mining activity;

Appendix 1: Conditions of Consent (September 2024)

	c. To protect freshwater values associated with Collins Creek, Canoe Creek, Canoe Creek Lagoon, Northern Drain, <u>Rusty Pond</u>, and surrounding wetlands; d. To reinstate the primary pre-mining catchment areas for the Northern Drain, <u>Rusty Pond</u>, Collins Creek and Canoe Creek Lagoon so that the contouring and surface drainage installed during mine rehabilitation does not increase the rate of groundwater drainage at the site; and <u>e.</u> To establish a wetland in the Clean Water Facility in accordance with the Wetland and Riparian Planting Plan. <u>e.</u> <i>Advice Note: Final mine closure is the completion of all mining and progressive rehabilitation works and removal of buildings.</i> <i>Advice Note: All Management Plans are required to adhere to the requirements of Condition 6.0.</i>
9.3	The Rehabilitation Plan must include the following: a. A programme of progressive rehabilitation of the pre-mining landform, adhering to maximum disturbed area limits. b. The original and final mine closure topography. c. Contouring of all post-mining landforms. d. Establishment of pasture cover over all disturbed land. <u>f.</u> Restoration of drainage discharge channels <u>that are compatible with the hydrology of the original and constructed wetlands.</u> <u>e.</u> <u>f.e.</u> Erosion and sediment runoff control measures. <u>g.f.</u> Removal of buildings, equipment, and structures; and <u>h.g.</u> Post-mining weed and pest control requirements.
9.4	If for any reason active mining ceases for more than 3 months, operational stockpiles must be removed and the stockpiled material returned to the mining area, and all disturbed areas must be rehabilitated as required by the conditions of these consents within 6 months from the date of the last mining activity.
10.0 Complaints and Non-Compliance	
10.1	The Consent Holder must maintain a complaints register for all aspects of operations in relation to these consents. The register must be available to the Consent Authorities at all times and must detail: a. the date, time and type of any complaint; b. the cause of the complaint; and c. any action taken in response to the complaint <u>(including any amendments to be pursued to the Management Plans required by Condition 6.0).</u>
10.2	Upon receipt of any complaint, the Consent Holder must promptly investigate the complaint, take action to remedy or mitigate the cause of the complaint and within 24 hours inform the Consent Authorities of the details of the complaint and any action taken.
10.3	Complaints which may infer non-compliance with the conditions of these consents, must be referred to the Consent Authorities within 48 hours of their receipt.
10.4	a. The Consent Holder must immediately notify the Consent Authorities upon becoming aware of any non-compliance with the conditions of these consents b. Within 5 working days thereafter the Consent Holder must provide written notification to the Consent Authorities which explains the cause of the non-compliance, and if the cause was within the control of the Consent Holder, steps which were taken to remedy the non-compliance and steps which will be taken to prevent any further occurrence of non-compliance with the conditions of these consents. <i>Advice Note: This consent condition does not replace the compliance and enforcement responsibilities of the Consent Authorities.</i>
11.0 Community Liaison Group	
11.1	a. Within 90 working days of commencement of these consents, the Consent Holder must establish a Community Liaison Group (CLG). b. An invitation must be extended to:

Appendix 1: Conditions of Consent (September 2024)

	i. ~~5-6~~ representatives of the Barrytown community which must include owners (<u>or their chosen representatives</u>) of Lots 2 and 3 DP 3375, RS 4884, <u>RS 5327, Lot 1 DP 3403</u>, and Lot 2 DP 3403; a member of the Coast Road Resilience Group; and a representative from the Barrytown School Board of Trustees. ~~ii. the Department of Conservation,~~ ~~iii.ii.~~ the West Coast Penguin Trust, and ~~iv.iii.~~ Te Runanga o Ngāti Waewae; c. The Consent Holder must ensure that members of the CLG are provided with the opportunity and facilities to meet at least once every three months for the first 12 months of mining operations, and thereafter as agreed with the CLG. d. Minutes of meetings held must be taken by the Consent Holder and submitted to the Consent Authorities within 10 working days of each meeting. e. The Consent Holder must provide reasonable support for the CLG by covering the costs of the meeting venue and an independent chair, organising meetings at a local venue, and inviting all members of the CLG at least 5 working days before the meeting is held. f. The Consent Holder must make a payment of \$500 each time a meeting is held to a local community group or charity, which is to be decided by attendees of each meeting. <i>Advice Notes:</i> i. Some examples of eligible groups are the Barrytown School, Barrytown Community Hall, Conservation Volunteers NZ, <u>West Coast Penguin Trust</u>. ii. The CLG is not a decision making body, but an important forum for the dissemination of information from the Consent Holder to interested parties. It also provides the opportunity for meaningful engagement between the parties, and for the CLG to comment on consent compliance and provide recommended changes to operations, monitoring and adaptive management. iii. Comments and recommendations from the CLG are to be given due consideration by the Consent Holder. iv. If it is not possible to establish or maintain a CLG through lack of interest or participation from the local community, <u>Department of Conservation</u>, the West Coast Penguin Trust, and Te Runanga o Ngāti Waewae then such failure to do so will not be deemed a breach of these conditions. v. Due to the large number of participants, it is expected that only one representative of the <u>Department of Conservation</u>, the West Coast Penguin Trust, and Te Runanga o Ngāti Waewae named in condition 11.1 will attend, to maintain the efficiency and effectiveness of the group.
11.2	The purpose of the CLG is to provide an ongoing means of communication between the Consent Holder and the local community, both through regular meetings and informal communication between the members and the Consent Holder. Matters to be discussed at CLG meetings may include, but are not limited to: a. Any complaints recorded and actions taken in response to the complaints as required by Condition 10.1 to 10.3; b. Any traffic safety complaints or concerns associated with the haulage of heavy metal concentrate on State Highway 6, including but not limited to driver behaviour; c. Any matters of concern with respect to State Highway 6 that should be reported to the West Coast Regional Council Land Transport Committee or NZTA (<u>e.g. road defects causing vibration effects</u>); d. <u>Prior to certification and thereafter, Any</u> proposed amendments to Management Plans including recommended changes to operations, monitoring, and adaptive management; <u>e.</u> The results of any surveys or monitoring undertaken in accordance with conditions of these consents. <u>e-f.</u> <u>Notification of activity schedules to inform the local community of upcoming activities at the site, particularly during construction.</u>

Appendix 1: Conditions of Consent (September 2024)

Grey District Council Conditions	
12.0 Hours of Operation	
12.1	Trucking, <u>loading of trucks</u>, mining, overburden and topsoil stripping, bund development and any related activities must not operate during the hours of darkness. For the purpose of this condition, hours of darkness are between ~~30 minutes after sunset~~ to ~~30 minutes before sunrise~~. <i>Advice Note:</i> sunrise and sunset times can be found here https://www.sunrise-and-sunset.com/en/sun/new-zealand/westport/2023/june <i>Advice Note:</i> In addition to condition 12.1, further restrictions on transport operations are contained in Condition 15.0 Transport, and further noise restrictions are contained in Condition 16.0 Noise.
12.2	a. Processing plant and maintenance activities within the processing plant area may operate 24 hours a day and 7 days a week. b. Processing plant shifts must operate 0700-1900 and 1900-0700. c. Mining shifts must operate only during the hours of daylight. <u>For the purpose of this condition, hours of daylight are between sunrise and sunset.</u>
12.3	Trucking activities must not occur on Sundays.
13.0 Buildings	
13.1	Buildings associated with the mining activity must be constructed and located generally in accordance with the site plan titled "TiGa Consent Application" stamped as approved by Grey District Council and dated <u>[insert date of stamp here]</u> and prepared by Tai Poutini Professional Services Ltd Schedule 1 and the building plans included as Schedule 2.
13.2	The colours to be used for all buildings and structures must be recessive and non-reflective and have a light reflectance value (LRV) of less than 20%, including but not limited to Colorcote colours <u>Karaka, Grey Friars, Lignite, and or Thunder Grey Mudstone (LRV 16%), Rivergum (18%), Permanent Green (LRV 10%) or Ironsand (9.5%).</u>
13.3	The Consent Holder must remove all buildings with the exception of the Heavy Mineral Concentrate Storage Shed and reinstate the processing plant area to pasture before the completion of the term of consent.
13.4	The processing plant building must be constructed without windows, to avoid light spill from the building.
14.0 Site Access	
14.1	At least 10 working days prior to the trucking of Heavy Mineral Concentrate from the site, the vehicle crossing for access to the site from State Highway 6 must be formed in accordance with the vehicle crossing layout plans submitted by the consent holder and labelled as "T1001: Barrytown Mine, TiGa Minerals and Metals Ltd, Indicative Access Arrangement" stamped as approved by Grey District Council and dated <u>[insert date of stamp here]</u> and attached as Schedule 3.
14.2	Prior to vehicle crossing formation works occurring, the consent holder must submit to the Grey District Council a copy of the Waka Kotahi NZ Transport Agency's approval to undertake works on the State Highway (as detailed in advice notes a - e). <i>Advice Notes:</i> a. It is a requirement of the Government Roadway Powers Act 1989 that any person wanting to carry out works on a state highway first gain the approval of Waka Kotahi NZ Transport Agency for the works and that a Corridor Access Request (CAR) is applied for and subsequently a Work Access Permit issued before any works commence. A CAR will be required for the vehicle crossing from the subject site to State Highway 6. b. Detailed design approval will be provided through the CAR process. c. A CAR is made online via www.beforeudig.co.nz and/or www.submitica.co.nz. The CAR needs to be submitted at least 15 working days before the planned start of works. d. A copy should also be sent to the Waka Kotahi NZ Transport Agency environmental planning team at environmentalplanning@nzta.govt.nz. e. The Corridor Access Request will need to include:

Appendix 1: Conditions of Consent (September 2024)

	i. The detailed design for the vehicle crossing. In developing the detailed design, the consent holder will need to consult the Waka Kotahi NZ Transport Agency, including the Regional Safety Engineer and Network Manager. ii. A Construction Traffic Management Plan that has attained approval from the Waka Kotahi NZ Transport Agency Network Manager. iii. A design safety audit which has been prepared, processed and approved in accordance with Waka Kotahi guidelines for Road Safety Audit Procedures for Projects (https://www.nzta.govt.nz/assets/resources/road-safety-audit-procedures/docs/road-safetyaudit-procedures-tfm9.pdf)
15.0 Transport	
15.1	a. Truck movements to and from the site associated with the removal of heavy mineral concentrate must only travel south of the site, and must be limited to 50 per day and 5 per hour and must only occur during the hours of daylight. b. Hours of daylight are between ~~30 minutes before~~ sunrise and ~~30 minutes after~~ sunset. <i>Advice Note: For the purpose of the Transport conditions, a movement is defined as being a movement either to or from the site. A truck and trailer unit entering and leaving the site is therefore 2 movements.</i> <i>Advice Note: Refer to Condition 12.0 for further restrictions on hours/days of operation.</i> <i>Advice Note: Truck and trailer units must comply with NZTA maximum load and speed limits.</i>
15.2	Truck movements associated with removal of heavy mineral concentrate must be limited to no more than 3 per hour between 0500 and 0700 each day so long as those truck movements are during the hours of daylight. <i>Advice Note: For the purpose of the Transport conditions, a movement is defined as being a movement either to or from the site. A truck and trailer unit entering and leaving the site is therefore 2 movements.</i>
15.3	a. The Consent Holder must operate a transport service for mining and processing plant staff shift workers, and require all shift workers to use this transport service during the hours of darkness. For the purpose of this condition, hours of darkness are considered to be between ~~30 minutes after sunset~~ ~~to 30 minutes before~~ and sunrise. b. The transport service must provide for staff living both north and south of the site, by running separate passenger vehicles in each direction. If there are less than 5 staff who arrive at site from either direction on any given shift, a passenger transport service is not required, provided that all staff arriving from that direction arrive and leave in the same vehicle. c. At least 10 working days prior to mining commencing, the Consent Holder must confirm to the Consent Authority how many staff are on each shift, their direction of travel, and what vehicles are proposed to cater for these staff movements. <i>Advice Note: The purpose of this condition to is minimise the number of vehicles arriving at and leaving the site, especially during hours of darkness, to avoid transport associated effects on the Westland Petrel. Some flexibility in the configuration of these vehicles is required, because it is not possible to know where future staff will live, and how this may change. It is intended that the company will run 1 to 2 minivan vehicles in each direction per shift, as required to ensure no staff are arriving by private passenger vehicle for shift work.</i>
15.4	Notwithstanding Condition 15.3, light vehicle movements must not exceed 140 light vehicles per day. <i>Advice Note: For the purpose of the Transport conditions, a movement is defined as being a movement either to or from the site. A truck and trailer unit entering and leaving the site is therefore 2 movements.</i>
15.5	A record of light and heavy vehicle movements must be kept by the Consent Holder and supplied to the Consent Authority on request monthly.
15.6	Any signage adjacent to or directed towards State Highway 6 must comply with the Waka Kotahi NZ Transport Agency policy manual for Third Party Advertising Signs (2022) and the Grey District Plan rules. <i>Advice Note: Signage will not be permitted within the state highway corridor, unless approved by Waka Kotahi.</i>

Appendix 1: Conditions of Consent (September 2024)

15.7	Truck movements must not leave or arrive at the site between the hours of 0800-0900 and 14:45-1600 each school day that the Barrytown Primary School bus is operating. <i>Advice Note: For the purpose of the Transport conditions, a movement is defined as being a movement either to or from the site. A truck and trailer unit entering and leaving the site is therefore 2 movements.</i> <i>Advice Note: School term dates can be found on the Ministry of Education's website, however exact dates each school operate will vary and should be confirmed with the Barrytown School directly.</i>
15.8	Northbound trucks must communicate with other trucks within the HMC fleet prior to the ~~passing bay~~<u>pull over bay immediately 925m</u> north of Nine Mile Creek, and must pull over and wait at the passing bay if there is a southbound truck approaching the tight road geometry section from Twelve Mile Bluff to the south side of Ten Mile Creek, and not progress further until the southbound truck has cleared the area. <u>Trucks shall not stop on accessways beside or opposite either residential entrances or intersections, including but not limited to that immediately north of Nine Mile bridge.</u>
15.9	The Consent Holder must conduct transport activities in general accordance a Transport Management Plan. The objective of the Transport Management Plan is to ensure all drivers operating vehicles associated with the mining activity demonstrate considerate and safe driver behaviour to: - contribute to the safe and efficient operation of the road transport network ; - avoid adverse effects on wildlife along the trucking route; - avoid adverse effects on pedestrian and cycle safety along the trucking route. <i>Advice Note: All Management Plans are required to adhere to the requirements of Condition 6.0.</i>
15.10	The Transport Management Plan must include: - A method of reporting <u>and responding to</u> encounters <u>(including near misses, injuries and fatalities)</u> with the Westland Petrel and other <u>indigenous</u> wildlife; - A method of reporting crashes involving a vehicle associated with the activity and any other road user and road defects, to the Consent Authority and the relevant Road Controlling Authority (where this is not the Consent Authority); - Hours of operation of various vehicle types to avoid adverse noise and traffic safety effects as dictated in the conditions of consent; - Procedures to avoid heavy vehicles ~~leaving or arriving at the site~~<u>travelling on the school bus route</u> between the hours of 0800-0900 and 14:45-1600 each school day that the Barrytown Primary School bus is operating, including safe locations to wait on SH6 during these times, if required; - A method for trucks to ~~display~~<u>carry</u> clear identification and a phone number for the Consent Holder or haulage company, for the purpose of enabling other road users to report driver behaviour to the Consent Holder. If the identification and phone number is for the haulage company, a process to ensure that any complaints are reported to the Consent Holder within 48 hours. - A method for the Consent Holder to record, investigate and advise truck and staff transport service drivers of any complaints received about driver behaviour, and <u>action taken</u> to provide this record to the Consent Authority <u>in accordance with the procedure for complaints in condition 10.0 when requested.</u> ~~A description of "locations of care" where drivers will need to take additional care, including but not limited to areas of tight road geometry, areas of greater pedestrian and cyclist concentration, and areas near schools.~~ ~~Methods to minimise amenity disturbance for residents, including but not limited to locations where use of <u>air-Jacob</u> brakes <u>and C-brakes</u> must be avoided, including the Cargill Road intersection, <u>9 Mile and 12 Mile residential areas.</u>~~ <u>The TMP must clearly, eq by GPS and reference to landmarks, identify laybys where it is feasible for truck drivers to pull off and let faster traffic through and/or communicate ahead to the fleet, using a means of radio contact which has been trialed and documented.</u>

Appendix 1: Conditions of Consent (September 2024)

	~~h.i.~~ A method of real time communication between truck drivers to avoid trucks passing each other at areas of tight geometry, and to alert other truck drivers to the presence of a cyclist, pedestrian (<u>e.g. students</u>) or other emerging safety hazard to minimise risks to other road users. ~~h.k.~~ Staff induction procedures, including regular ~~briefing (eg 'Toolbox Talks')~~<u>formal training</u> ~~off~~for drivers regarding the requirements of the TMP, considerate and safe driving behaviour around pedestrians and cyclists, identified locations of care, being alert for tourist drivers, and any other pertinent requirements regarding driver behaviour. ~~k.l.~~ A requirement for truck drivers to read and agree to any aspects of the TMP within their control as drivers. <u>m.</u> A requirement to regularly report to the West Coast Regional Land Transport Committee on any particular areas of concern with State Highway 6 (including those raised by the CLG); ~~l.n.~~ <u>A requirement to report road surface defects and maintenance issues with State Highway 6 to NZTA;</u> ~~m.o.~~ Procedures to notify drivers when alterations to the TMP have occurred.
15.11	a. In the event that any vehicle associated with the mining operation is involved in a crash, the Consent Holder must notify the Consent Authority and engage a suitably qualified transport engineer to review the Transport Management Plan within 5 working days to identify any further mitigation measures that can be implemented to avoid similar incidents occurring again. b. The review and recommendations of the transport engineer must be provided to the Consent Authority within 10 working days of the incident occurring, and the management plan amendment process in Condition 6.0 must be followed.
15.12	a. The Consent Holder must review the Transport Management Plan once every 12 months, and within 5 working days of any near miss with a pedestrian, cyclist or other vehicle, or <u>indigenous</u> wildlife incident, and communicate any updates to staff. b. The review must be provided to the Consent Authority within 10 working days of the incident occurring, and the management plan amendment process in Condition 6.0 must be followed.
15.13	a. The Consent Holder must ensure that GPS Monitoring Systems are installed on the trucks carrying Heavy Mineral Concentrate to facilitate the investigation of complaints about driver behaviour, near misses with a pedestrian, cyclist or other vehicle, wildlife encounters, accidents and compliance with Conditions 15.1, 15.2, 15.5 and 15.7. b. GPS Monitoring Records must be supplied to the Consent Authority on request.
16.0 Lighting	
16.1	Lighting must not exceed 2.0 lux spill (horizontal and vertical) of light onto any adjoining property, measured at any point more than 2m inside the boundary of the adjoining property or the closest window on the adjoining property whichever is the closest.
16.2	Without limiting Condition 16.3, lighting must be designed, installed and operated in a manner which adheres to the Australian Government's National Light Pollution Guidelines for Wildlife January 2023 (or subsequent revision); including but not limited to: a. Utilising the Seabird Light Mitigation Toolbox in Appendix G – Seabirds (Schedule 4); b. All fixed lighting must be directed downward, shielded to avoid light spill, with a lighting temperature of no more than 2000K, and be filtered to reduce blue and violet wavelengths; c. Lights must only illuminate the object or area intended; d. Fixed lights must be mounted as close to the ground as practicable; e. External lighting must be minimised on the seaward side of buildings to minimise light spill toward the coast; f. External lighting must use the lowest intensity lighting possible, while ensuring compliance with workplace health and safety requirements; g. External lighting must be equipped with light minimising technology, including motion sensors or timers; h. Any windows must have blackout blinds fitted and those blinds must be closed during the hours of darkness to avoid any light spill from internal lighting within buildings; <u>i.</u> The consent holder must ensure mobile lighting within the mine site adheres to the above principles, including dipping headlights of vehicles operating on site.

Appendix 1: Conditions of Consent (September 2024)

	<u>i.j. Any external doors in the building housing the process plant must be designed to prevent light escaping from the building.</u>
16.3	The consent holder must manage lighting on the site in accordance with a Lighting Management Plan (LMP), which has been prepared by a suitably qualified ecologist in consultation with a suitably qualified lighting professional, and provided to the Department of Conservation for comment prior to certification by the Consent Authority. The objectives of the LMP are: - To ensure adverse effects of artificial lighting on wildlife (specifically the Westland Petrel) are avoided. - To ensure fixed and mobile artificial lighting is managed in accordance with best-practice guidelines¹. - To enable ongoing use of the site and its environs by the birds which currently occur in the area. <i>Advice Note: All Management Plans are required to adhere to the requirements of Condition 6.0.</i>
16.4	As a minimum, the LMP must include: - A description of the wildlife that may be present on or around the site that may be sensitive to lighting; - A description of the potential lighting effects on identified wildlife; - Specific lighting management actions to protect identified wildlife; - Reporting requirements to enable the Consent Authority to confirm compliance with associated consent conditions; - Best practice lighting design principles to avoid lighting effects on wildlife; - A description of the proposed exterior and mobile lighting associated with the activity (including vehicle movements to and from the site); - Auditing requirements to ensure that lighting is installed and operated appropriately.
16.5	- The Consent Holder must provide a detailed lighting plan to the Consent Authority and the Department of Conservation at least 20 working days prior to the commissioning of the processing plant, with an accompanying design statement, prepared by a suitably qualified lighting professional, confirming compliance with conditions 16.1 and 16.2. - If the Department of Conservation considers that the detailed lighting plan does not comply with Condition 16.2, the Consent Holder must consider any reasons and recommendations provided by the Department of Conservation, amend the detailed lighting plan accordingly, and resubmit the plan to the Consent Authority and the Department of Conservation.
16.6	- Within 10 working days of the heavy minerals concentration processing plant being commissioned, the Consent Holder must engage a suitably qualified lighting professional to carry out a lighting audit, to confirm that the lighting has been installed in accordance with the detailed lighting plan required by Condition 16.3. - If the audit concludes that compliance with Conditions 16.1 and 16.2 is not achieved, the Consent Holder must instruct the auditor to determine what alterations are required to the external lighting to achieve compliance. - The Consent Holder must undertake any alterations recommended by the auditor within 5 working days of the receipt of those recommendations. - The audit report and the details of any lighting alterations intended or undertaken must be submitted to the Consent Authority and the Department of Conservation within 10 working days of receipt of the audit.
17.0 Noise	
17.1	The consent holder must ensure that all operational mining and processing activities on the site do not exceed the following noise limits at or within the notional boundary of any dwelling existing at the date consent is granted on any other site except 3261 Coast Road: - Daytime (0700-2200): 55 dB L_{Aeq}(15 min) - Night-time (2200-0700): 45 dB L_{Aeq}(15 min) and 75 dB L_{AFmax}

¹ National Light Pollution Guidelines for Wildlife (Australian Government, 2023).

Appendix 1: Conditions of Consent (September 2024)

	when measured and assessed in accordance with the latest New Zealand noise standards: NZS 6801:2008 “Acoustics – Measurement of environmental sound” and NZS 6802:2008 “Acoustics - Environmental Noise”. <i>Advice Note: ‘Notional boundary’ is defined as a line 20 metres from any side of a dwelling or the legal boundary where this is closer to the dwelling.</i>
17.2	Construction activities must be conducted in accordance with NZS 6803: 1999 “Acoustics - Construction Noise” and must comply with the “typical duration” noise limits contained within Table 2 of that Standard. <i>Advice Note: Construction activities include the formation of access roads, bunds, dams and final land contouring and planting, and the construction of the processing plant and load out area. For the avoidance of doubt, overburden stripping and topsoil removal associated with mining operations must not be considered construction activities.</i>
17.3	a. The consent holder must prepare a Noise Management Plan (NMP) to control day-to-day noise emissions from the site. This NMP must be submitted to the Consent Authority for certification 10 working days prior to commencement of the commencement of on-site works. b. As a minimum, the NMP must include: - The person responsible for implementing the NMP - Applicable noise conditions relating to noise - Training of staff relating to how to minimise noise and vibration - Maintenance schedule for site access road surfaces to avoid excessive noise and vibration - Mining and HMC processing risk analysis for noise generation - Method for handling noise complaints - Noise monitoring methodology, including frequency, duration, and location. <i>Advice Note: All Management Plans are required to adhere to the requirements of Condition 6.0.</i>
17.4	<u>a.</u> The Consent Holder must engage a suitability qualified and experienced independent person to undertake compliance noise monitoring: - <u>at two periods of high noise during construction activities (i.e. access road construction)</u> - within 30 days of mining or processing operations occurring and thereafter at 3 monthly intervals for the first 12 months of the mining operation. Thereafter, compliance noise monitoring must be undertaken on an annual basis. <u>a-b.</u> All noise monitoring must be submitted to the Consent Authority within two weeks of completion of each monitoring event. <u>b-c.</u> If compliance with Condition 17.1 is not achieved, the Consent Holder must: - investigate the reasons for non-compliance and within 20 working days implement additional mitigation measures to achieve compliance with those noise limits. - submit a report to the Consent Authority within 30 working days of the relevant monitoring event detailing the additional mitigation measures that were implemented. d. If additional mitigation measures are implemented, the Consent Holder must engage a suitability qualified and experienced independent person to undertake further compliance noise monitoring within 10 working days of any mitigation measure being implemented to determine the effectiveness of that mitigation. <u>e.</u> If compliance with Condition 17.1 is still not achieved the Consent Holder must repeat the requirements of c. and d. until compliance is achieved.
17.5	Mining operations must utilise the best practicable option to minimise noise at all times. This includes but is not limited to the replacement of worn machinery parts, <u>review of operational practices</u>, maintenance of vehicle and generator mufflers, lubrication of moving machinery to avoid squeaks and squeals, <u>access road maintenance, utilising sound insulation covers</u>, and appropriate operation of all equipment.
17.6	a. Vehicles or equipment must not be fitted with tonal reversing alarms. b. Where reversing alarms are required, broadband reversing alarms must be used.

Appendix 1: Conditions of Consent (September 2024)

18.0 Avian Management	
18.1	Mining, topsoil and overburden stripping and rehabilitation activities must not take place within 100m of the site's northern boundary, Canoe Creek Lagoon (as delineated in Condition 7.1) or any wetland between the months of August and December each year.
18.2	a. If a nest of a threatened or at risk bird species is detected within an area to be mined during the breeding detection surveys, the nest must be protected by establishing, physically marking and maintaining a 50m buffer between the nest and any works so as to minimise the risk of nest abandonment. All vehicles, machinery and people must be excluded from the area and local pest control implemented until either the nest is abandoned or any chicks fledged in accordance with the management set out in the Avian Management Plan (AMP). b. If a nest is abandoned, the AMP must be reviewed by a suitably qualified ecologist to investigate the reasons for abandonment and if there are any additional measures that should be undertaken to protect nests in future. <i>Advice Note: Conditions relating to the AMP are Conditions 18.11 to 18.14.</i>
18.3	Staff, contractors and visitors associated with the mining activity must not be permitted to bring dogs to the site at any time, except for conservation purposes.
18.4	The Consent Holder must establish a ring of traps and/or bait stations targeting rats and mustelids placed around the perimeter of the property and ~~the coastal lagoon~~ <u>Canoe Creek Lagoon</u> in accordance with the AMP. The network of traps must be installed prior to mining commencing and be serviced as required.
18.5	a. The Consent Holder must deploy wildlife cameras around the coastal perimeter of the mine disturbance area and other suitable locations as required to monitor for Kororā, and around the processing plant area and the access road to monitor for <i>Procellaria westlandica</i> (Westland Petrel). b. The cameras must be equipped with motion sensors, and be installed by a suitably qualified ecologist. c. 10 cameras to detect Kororā must be placed at suitable locations and set to record for at least 10 nights every month, with the location to be determined by the ecologist. d. 10 Cameras to detect Westland Petrel must be installed around the processing plant and the length of the access road, operating during the hours of darkness each night, with the location to be determined by the ecologist. ~~e. Imagery must be reviewed daily for wildlife interactions by a staff member; and Imagery~~ must be reviewed ~~for wildlife interactions~~ at least weekly by a suitably qualified ecologist, retained for a minimum of 6 months, and be made available to the Consent Authority or the Department of Conservation on request. ~~e.f. Monitoring for Westland Petrel shall also include nightly on-ground searches over the operational areas of the site for the first three months of operation, and throughout the fledging season of 14 November to 14 January for the first two seasons each year, and then as required as detailed in the AMP.~~
18.6	a. Any ~~interactions with sightings of Kororā wildlife and Westland Petrel~~ recorded as a result of the monitoring requirements in the AMP including the wildlife cameras required by Condition 18.5, must be reported to the Consent Authority and the Department of Conservation on a weekly basis from 1 November to 31 January each year, and on a monthly basis from 1 February to 31 October. ~~b.~~ Footage must be made available to the Department of Conservation and the consenting authority as set out in Condition 18.5.
18.7	a. If a Westland Petrel interaction is detected, the Consent Holder must follow the procedure set out in the AMP including contacting the Department of Conservation as soon as possible and transfer of any birds found alive to their care as soon as the Department can take them. ~~b.~~ Within 20 workings days of the interaction the Consent Holder must have the AMP and Lighting Management Plans reviewed by a suitably qualified ecologist and a suitably qualified lighting professional in consultation with the Department of Conservation to determine what additional measures can be taken to avoid any further interactions with Westland Petrel.

Appendix 1: Conditions of Consent (September 2024)

	c. <u>The additional measures identified in 18.7(b) must take account of the findings of any previous reviews; and</u> d. <u>The Consent Authority must be advised of any recommendations, and these recommendations must be implemented as soon as practicable.</u> <i>Advice note: An interaction is defined as the presence of a <u>grounded</u> bird or birds within <u>the Site</u>, close proximity to the mining infrastructure, including buildings, vehicles and plant where they are or could be put at risk.</i>
18.8	a. If two <u>or more</u> Westland Petrel interactions are detected <u>within any three month period</u>~~a four-week period~~, all activities during the hours of darkness must cease until a further review of the AMP and Lighting Management Plan by a suitably qualified ecologist and a suitably qualified lighting professional has been carried out, in consultation with the Department of Conservation, to determine the possible causes and additional mitigation measures that can be employed to avoid further interactions with Westland Petrel <u>(such review to include consideration of changes to the operating hours specified in conditions 12.1 and 12.2 and the lighting requirements in conditions 16.1 and 16.2).</u> b. Mining and processing activities may only recommence following the completion of investigations <u>that demonstrates, to the satisfaction of Grey District Council:</u> i) <u>that the interaction was not likely to have been caused by the consented activities; or</u> ii) <u>that changes to night time operations are implemented to ensure that further interactions with Westland Petrel are avoided</u>~~(such review to include consideration of changes to the operating hours specified in conditions 12.1 and 12.2 and the lighting requirements in conditions 16.1 and 16.2);~~ <u>and certification of revisions to the AMP and Lighting Management Plan; and/or variation of conditions 12.1, 12.2, 16.1 and 16.2) are completed in accordance with the outcomes of the review in clause a above.</u> ~~b-c. and the implementation of any further mitigation measures recommended by the ecologist or suitably qualified lighting professional.~~ <i>Advice Note: Any amendment to the AMP will be required to comply with the certification process under Condition 6.0, and any Wildlife Act Authority requirements.</i>
18.9	a. The Consent Holder must engage a suitably qualified <u>ecologist or ornithologist expert</u> to carry out annual penguin surveys <u>in the period 1 August – 30 November to detect the presence of Kororā. The survey area is that land within 500m of the mining disturbance area including Pakiroa beach. A certified conservation dog will be used where practicable.</u>~~of Pakiroa beach and the mine area using a certified conservation dog within 500m of the mining disturbance area to detect the presence of Kororā.~~ b. The first survey must be conducted within the first 12 months of the commencement date of the resource consent, and at least two annual surveys must be completed before mining commences. c. If penguins or burrows are detected the location must be mapped and the Consent Holder must undertake the following management actions: i. If penguins are detected using the mining area to access other habitats, any existing access ways must be maintained and/or works affecting that accessway must be completed in the period April – June (outside the breeding and moult period). ii. Any potential penguin burrows identified must be investigated, including use of a burrowscope, to determine whether Kororā are using them. iii. Where any penguin burrows are compromised by mining (i.e. there are direct effects), replacement artificial burrows or nest boxes must be installed at a rate of 2:1. Any additional nest boxes provided must be located within the vegetated coastal foreshore habitat associated with any identified accessways. iv. If penguins are found within the mine site, a specific Penguin Management Plan must be developed by a suitably qualified and experienced ecologist on behalf of the applicant in consultation with the West Coast Penguin Trust. The West Coast Penguin Trust must be

Appendix 1: Conditions of Consent (September 2024)

	reimbursed for reasonable time and expenses associated with consultation on the Penguin Management Plan. v. Any deceased penguins found on or near the mine site must be provided to the Department of Conservation for necropsy.
18.10	<u>a. If</u> i. <u>Kororā are detected within 500m of the mine disturbance area; and</u> ii. <u>no Kororā are detected within the mine disturbance area; and</u> iii. <u>no access tracks are detected beyond the coastal margin in the pre-mining surveys required by Condition 18.9.</u> The Consent Holder must erect a penguin fence along the length of the Canoe Creek Lagoon boundary, from Collins Creek to the northern boundary of the mine disturbance area, on the landward side of ~~the the coastal lagoon~~ <u>Canoe Creek Lagoon</u> planting so as to exclude Kororā from entering the mine disturbance area.: i. ~~if Kororā are detected within 500m of the mine disturbance area; and~~ ii. ~~no Kororā are detected within the mine disturbance area; and~~ iii. ~~no access tracks are detected beyond the coastal margin in the pre-mining surveys required by Condition 18.9.~~ <u>a-b.</u> The penguin fence must be comprised of <u>dark grey or black</u> geosynthetic mesh to a height of at least 900mm above ground and buried at least 300mm below the ground and with posts no greater than 4m apart. <u>b-c.</u> The fence installation must be certified as preventing the ingress of Korora to the mine disturbance area by a suitably qualified ecologist. <u>e-d.</u> The certification must be supplied to the Consent Authority prior to mining commencing. <i>Advice Note: The requirement to erect a penguin fence only applies if Kororā are detected within 500m proximity of the mine disturbance area but are not within the site. If no Kororā are detected near the mine disturbance area, a penguin fence is deemed unnecessary.</i>
18.11	The Consent Holder must conduct activities on site in ~~general~~ accordance with an Avian Management Plan (AMP) prepared by a suitably qualified ecologist or ornithologist, <u>in consultation with Department of Conservation</u>. The objectives of the AMP are: a. To ensure adverse effects on the threatened and at risk birds present in the vicinity of the site and any other threatened and at risk species detected by subsequent monitoring are avoided. b. To ensure significant adverse effects on the rushland, flaxland and other important bird habitats adjoining the mining site including Canoe Creek Lagoon, Rusty Pond and the coastal margin are avoided. c. To ensure safe ongoing use of the site and its environs by the birds which currently occur in the area. <i>Advice Note: All Management Plans are required to adhere to the requirements of Condition 6.0.</i> <i>Advice Note: Threatened or at-risk bird species refers to the Conservation Status according to the Department of Conservation's Threatened Classification System</i>
18.12	The AMP must detail: a. A description of the site and surrounding avian habitats b. A description of the threatened and at risk indigenous birds likely to be present in these habitats and which species require specific mitigation measures c. A description of the mitigation measures that are required to be implemented to avoid effects on threatened and at risk indigenous birds, <u>which may include the use of a specially trained Westland Petrel detection dog (if available)</u>. d. A procedure for managing and responding to Westland Petrel or other wildlife being found on the mine site; e. A description of the monitoring requirements to assess the effectiveness of the AMP
18.13	The AMP must be reviewed annually by the Consent Holder. Any proposed amendments to the AMP must be submitted to Council for certification and must: a. achieve the AMP's objectives including avoiding effects on any threatened or at-risk indigenous bird species (including specifically the Westland Petrel); b. comply with the conditions of this resource consent;

Appendix 1: Conditions of Consent (September 2024)

	c. have been reviewed by an appropriately qualified and experienced ecologist or ornithologist; d. have been provided in advance to Te Runanga o Ngāti Waewae and the Buller/Kawatiri office of the Department of Conservation for comment (and feedback received collated and submitted with the amendments to be provided to Council); and e. follow the certification process set out in Condition 6.0. <i>Advice Note: any disturbance or relocation of avifauna may require a permit from the Department of Conservation under the Wildlife Act (1953).</i>
18.14	a. The Consent Holder must engage a suitably qualified expert(s) to undertake all monitoring of avian species from the commencement of consent until at least one year following the cessation of mining activities on this site. b. The monitoring must be carried out in accordance with the monitoring requirements in the AMP.
18.15	An annual bird management report must be provided to the Consent Authority, Te Runanga o Ngāti Waewae, the Buller/Kawatiri office of the Department of Conservation in Westport, the West Coast Penguin Trust, Paparoa Wildlife Trust, the Community Liaison Group and Waka Kotahi NZ Transport Agency Environment and Sustainability Team (via:environment@nzta.govt.nz), no later than 30 June each year. The report must include the following matters: a. The timing and duration of any mining within 100m of ~~the coastal lagoon~~ <u>Canoe Creek Lagoon</u> vegetation and SNA Site PUN-W034; b. Results of seasonal bird surveys at the site; c. Timing of nest detection surveys and observations relating to nesting or other behaviours observed within the area to be mined; d. Efforts to deter any attempts at nesting within the area to be mined and the outcome of those efforts; e. Species attempting to nest within the area to be mined (including threatened and at risk species); f. Date of first nesting attempts (if any) for threatened and at risk species within the area to be mined; g. Number and location of nesting attempts by threatened and at risk species within the area to be mined; h. Date any pest control commenced, the location of traps and bait stations, the number of pest captures, the amount of bait consumed and any relevant observations; i. Outcome of individual nesting attempts by threatened and at risk species within the area to be mined; j. Results of annual kororā surveys on Pakiroa Beach, the implications for mine operations and any management actions undertaken; k. Number and location of any grounded Westland Petrel and any birds found dead on site; l. Management undertaken and the outcome for any grounded Westland Petrel collected; m. Number, dates and location of any mining operation or MHC haulage vehicle strikes or near misses involving the Westland Petrel or Korora; n. Autopsy outcomes for any dead Westland Petrel or Kororā collected;; o. The findings of any lighting audits undertaken during the year and steps taken to resolve any issues identified; p. A summary of any revisions made to the AMP and the reasons for the changes; q. The date and duration of any operational shut-downs; and r. The results of the quarterly walk-through surveys of birds using the lagoon area.
19.0 Planting	
19.1	a. As soon as practicable following the commencement date of this consent, and prior to the commencement of mining, the Consent Holder must construct bunds and complete planting and fencing in <u>general</u> accordance with the “Landscape Mitigation Planting Plans” prepared by Glasson Huxtable Landscape Architects dated January (Schedule 5); including: i. a 1.8m high, 13.0m wide permanent bund with planting along the bund’s crest and eastern side, parallel to State Highway 6 for visual screening;

Appendix 1: Conditions of Consent (September 2024)

	ii. a ~~156.0m~~ wide planting strip with fencing adjacent to the ~~coastal lagoon~~ <u>Canoe Creek Lagoon</u> edge; iii. a 10.0m wide band of planting along the open coastline with fencing in the south-west corner; iv. planting of the western and northern edges of the Clean Water Facility, between the <u>Canoe Creek Lagoon</u> ~~coastal lagoon~~ and Clean Water Facility ponds, v. a minimum 3.0m wide strip of planting with fencing along the northern bank of Collins Creek, and the southern bank of Collins Creek (except where the Creek is directly adjacent to the southern site boundary or riparian planting already exists); vi. a 3.0m wide strip of planting with fencing along the southern bank of the northern drain; vii. a planted strip along the north-eastern boundary of the site and adjacent to the neighbouring property at 3323 Coast Road; ~~and-~~ viii. <u>A minimum 10.0m wide strip of planting on the northern boundary from the eastern extent of Rusty Pond to the western extent of the Mine Disturbance Area.</u> b. All planting must be fenced to exclude livestock from the planted areas. Temporary fencing may be erected around the planting in Condition a(iv) for the duration of mining, and stock must be permanently excluded when the additional planting is undertaken under Condition 19.4.
19.2	As soon as practicable following the construction of the temporary stockpile near the processing plant, the Consent Holder must complete planting of the stockpile area as shown in the "Landscape Mitigation Planting Plans" prepared by Glasson Huxtable Landscape Architects dated January 2024 (Schedule 5). <i>Advice Note: Planting may not be able to be undertaken during dry periods of the year, and as soon as practicable may be the start of the planting season following the stockpile construction. Disturbed area and erosion and sediment control practices will require this area to be stabilised if not planted immediately.</i>
19.3	Within 12 months of (but not prior to) the completion of mining, the processing plant and buildings must be removed with the exception of the Heavy Mineral Concentrate Storage Shed, and the bund areas rehabilitated into pasture.
19.4	No later than 12 months after the completion of mining, the remaining areas of the proposed wetland area (Clean Water Facility and Future Wetland Extension) shown in the "Landscape Mitigation Planting Plans" prepared by Glasson Huxtable Landscape Architects dated January 2024 (Schedule 5) must be constructed and planted.
19.5	The Consent Holder must source plants required for the planting and wetland area from within the Punakaiki Ecological District or North Westland Ecological Region in order of preference. Where this is unable to be achieved, the Consent Holder must notify the Consent Authority and work with the Consent Authority and a suitably qualified practitioner to determine an appropriate alternative plant source.
19.6	a. The wetland construction, (<i>Clean Water Facility and Future Wetland Extension</i>), ~~coastal lagoon~~ <u>Canoe Creek Lagoon</u> edge and Collins Creek and Northern Boundary Drain riparian planting must be undertaken and managed in accordance with a Wetland Construction and Riparian Planting Plan (WRRP) prepared by a suitably qualified ecologist. The WRRP must distinguish between those areas to be planted prior to mining, and areas to be planted at the completion of mining. b. The objectives of the WRRP are: - To create or enhance habitat for indigenous species along the Site's existing coastal edge and within Canoe Creek Lagoon; - Encouraging natural regeneration of indigenous species by fencing off planted areas and having effective weed and animal pest management; - To vegetate the constructed wetland in the Clean Water Facility, both banks of Collins Creek (except where Collins Creek is directly adjacent to the southern site boundary or riparian planting already exists), the Northern Drain, and the coastal planting with ~~ecologically appropriate~~ <u>eco-sourced</u> species and restore indigenous vegetation to at least 50% cover at 1m height as demonstrated in plots across the planted areas; - Manage exotic pest plants (particularly woody weeds identified in this plan) over the planted areas to a level of less than 5% cover as demonstrated by monitoring plots

Appendix 1: Conditions of Consent (September 2024)

	across the planted areas; v. Improve terrestrial and wetland habitat quality and create corridors for wildlife movement; vi. Encourage natural ecosystem processes including the regeneration and dispersal of indigenous fauna and flora; vii. Improve water quality and aquatic habitats in Collins Creek and the Northern Drain. <i>Advice Note: All Management Plans are required to adhere to the requirements of Condition 6.0.</i>
19.7	The WRRP must include: a. A description of the site; b. A description of the riparian planting required by Conditions 19.1; c. A final wetland design that, when the planting required in Condition 19.1(a)(iv) and 19.4 are combined, achieves an area of 1.9ha with the following habitats: i. An island of 2,000m² ii. At least 5,000m² open water up to 2m deep iii. At least 5,000m² of shallow water (0.5m deep) iv. At least 5,000m² of water 0.5 m – 2 m deep planted primarily in raupō v. At least 1,000m² of wet edge planting comprised primarily of rushes and sedges (<i>Juncus</i> spp., <i>Carex</i> spp.) and shrubs such as mikimiki (<i>Coprosma propinqua</i>) vi. A plant density of no less than 5,000 stems per hectare. d. Wetland construction methodology, including details of the pre-mining and post-mining areas of the constructed wetland; e. Site preparation requirements for the wetland and riparian planting; f. Planting methodology for planting wetland, riparian and coastal areas; g. Monitoring and maintenance requirements to ensure the survival and ecological functioning of the constructed wetland, including pest and weed control to achieve Condition 19.8; h. A timeline for the planting which aligns with conditions 19.1 to 19.4.
19.8	All planting must be maintained for the duration of the consent. Any plants that are dead, diseased, fail to thrive or are damaged, including by a storm event, must be replaced with a same or similar eco-sourced plant species within the following planting season.
19.9	Notwithstanding Conditions 19.1-19.8 above, the plant species <i>Metrosideros umbellata</i> (southern rata), and <i>Laurelia novae-zelandiae</i> (pukatea) must not be used on site.
19.10	The existing mature flax located adjacent to the stock stand-off pad which is located in the northeastern part of the Site must be retained for the duration of mining activity for visual screening purposes.
19.11	At the completion of mining and before the expiry of this consent, the consent holder must arrange for a section 108(2)(d) Resource Management Act 1991 covenant in favour of Grey District Council which is to be registered on the Certificate of Title 447182 (RS 2847) affecting the area shown as Proposed Covenant Area identified on the Planting Covenant Area Plan enclosed as Schedule 6. The covenant must provide for the following: a. In respect of the Proposed Covenant Area (2.88ha) identified on the Planting Covenant Area plan prepared by Tai Poutini Resources dated 15 March 2024, the area must be fenced to exclude livestock, and no pastoral farming must occur within the wetland area.
20.0	Water supply
	Sufficient water supply must be provided on the site in accordance with the NZ Fire Service Firefighting Water Supplies Code of Practice SNZ PAS 4509:2008.
21.0 Accidental Discovery Protocol	
21.1	In the event of any disturbance of Koiwi Tangata (human bones) or Taonga (artefacts, including pounamu) the Consent Holder must: a. Cease any further excavation within 50m of the disturbance for a period of at least 24 hours; and b. Immediately advise Consent Authority of the disturbance; and c. Immediately advise the Te Rūnanga O Ngāti Waewae, or their authorised representatives of the disturbance; and d. Immediately advise Heritage New Zealand Pouhere Taonga and the New Zealand Police.

Appendix 1: Conditions of Consent (September 2024)

21.2	If the Consent Holder identifies any archaeological discoveries or potential areas or sites of historic value, the Consent Holder must immediately notify the Consent Authority and a representative of Heritage New Zealand Pouhere Taonga.
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Appendix 1: Conditions of Consent (September 2024)

General Conditions to Apply to all WCRC Consents	
22.0 Method of Mining	
22.1	The consent holder must only carry out mining activities within the mining area shown on the attached map titled "TiGa Consent Application" prepared by Tai Poutini Professional Services Ltd dated 18 January 2024 attached as Schedule 1.
22.2	The maximum combined surface area of un-rehabilitated disturbed land in the application area must not exceed 8.0 hectares <u>at any one time</u> .
22.3	The mining and associated activities under this consent must not cause or induce erosion or slope instability outside the application area.
22.4	Mining activities must not occur within 100m of the Canoe Creek Lagoon within the first 12 months of mining operations commencing.
23.0 Erosion and Sediment Control Plan	
23.1	The Consent Holder must operate in general accordance with the Erosion and Sediment Control Plan labelled 'Barrytown Mineral Sand Operation Erosion and Sediment Control Plan and Water Management' (ESCP) prepared by Ridley Dunphy Environmental Ltd, dated January 2024. The objectives of the ESCP are: - To use established guidelines and practices to minimise sedimentation of waterbodies adjacent to the mining area; - To assist with compliance with the water quality parameters in Condition 25.0.
23.2	A Site Specific Erosion and Sediment Control Plan (SSESCP) must be prepared and reviewed annually and submitted to the Consent Authority with the Annual Work Programme, reflecting the water management measures proposed for construction and mining for the following 12 months, and adhering to principles of the Erosion and Sediment Control Plan in Condition 23.1 above. The SSESCP must include: - Location of the work; - Contour information; - Erosion and Sediment Controls (ESCs); - Chemical treatment requirements, design and details; - Internal catchment boundaries; - Details of earthworks and ESC construction methods; - Contingency measures; - ESC design details; - A programme for managing non-stabilised areas; - The identification staff who will manage ESCs; - The identification of staff who monitor compliance with consent conditions; - A chain of responsibility for managing erosion and sediment control issues; and - Methods and procedures for decommissioning ESCs (if applicable)
24.0 Water Management Plan	
24.1	The Consent Holder must ensure: - Pre-mining median water levels in piezometers PZ-19, PZ-02, PZ-03, PZ-04 and PZ-05 are maintained when mining <u>(including abstracting water)</u> is occurring within 100m of the southern boundary - Pre-mining median water levels in piezometers PZ-08, PZ-09, PZ-17, PZ-10, PZ-11 and PZ-12 are maintained when mining <u>(including abstracting water)</u> is occurring within 100m of the northern boundary - Pre-mining median water levels in Canoe Creek Lagoon are maintained by ensuring pre-mining median water levels in PZ-06, PZ-07, and PZ-08 are maintained when mining <u>(including abstracting water)</u> is occurring within 100m of the western boundary - The flow in Collins Creek is not reduced by more than 10% of the MALF as the creek approaches low flow condition. <i>Advice Note: Pre-mining median water levels are determined by calculating the median water level over the previous 12 months.</i> <i>Advice Note: Collins Creek MALF may be determined as follows:</i> - Estimated MALF as obtained from the New Zealand Rivers Maps, or

Appendix 1: Conditions of Consent (September 2024)

	~~Hydrologically calculated MALF from the Collins Creek Downstream measurement site following the acquisition of 5 complete hydrological years of verified data.~~
24.2	Mining must not commence until 12 months of groundwater monitoring data has been obtained in order to determine the pre-mining median water flows and levels required to be achieved under condition 24.1.
24.3	If water monitoring required by Condition 26.0 detects a reduction in groundwater levels or surface water flows below the thresholds in Condition 24.1, the Consent Holder must investigate the cause of the reduction to determine whether it is a result of mining, and immediately follow the actions set out in the MMP to rectify the change.
24.4	Mining must not occur within 100m of any surface water body or wetland until the Consent Holder has demonstrated through the provision of an Annual Hydrological and Water Quality Report, as required by Condition 26.5, that it can successfully employ management and mitigation methods outlined in the WMP and MMP to avoid adverse effects on surrounding water bodies and groundwater levels.
24.5	a. The Consent Holder must establish all water management infrastructure, and operate the mine in ~~general~~ accordance with a Water Management Plan (WMP) and Monitoring and Mitigation Plan (MMP) prepared by a suitably qualified hydrologist. The objectives of the Water Management Plan are: i. Pre-mining median water levels in boundary piezometers PZ-02, PZ-03, PZ-04, PZ-05, PZ-06, PZ-07, PZ-08, PZ-09, PZ-10, PZ-11, PZ-12, PZ-17, and PZ-19 must be maintained; ii. The rate of surface water inflow to Canoe Creek Lagoon from Collins Creek is not reduced by more than 10% of the Collins Creek Mean Annual Low Flow (MALF); iii. The flow in Collins Creek is not reduced by more than 10% of the MALF as the creek approaches low flow conditions; iv. Flow consistent with the drain's intermittent hydrological function and with dry weather flows is maintained in Northern Boundary Drain downstream of piezometer PZ-10 during periods when Collins Creek approaches within 120% of its MALF; v. The quality of water discharged to receiving waters will not cause adverse impacts on instream ecology or visual clarity; vi. The rate of take of water from Canoe Creek is not greater than 10% of the Creek's MALF; vii. Potential adverse ecological impacts associated with discharge of naturally present toxic metals and phosphorus in downgradient surface waters are avoided; viii. The pre-mining surface drainage patterns are restored such that the catchment areas for the Northern Boundary Drain and Canoe Creek Lagoon are not changed significantly; ix. The soil profile restoration, land contouring and surface drainage installed during mine rehabilitation does not increase the rate of groundwater drainage at the site. b. The objectives of the Monitoring and Mitigation Plan are to: i. Ensure that adverse effects on ground and surface water levels in adjacent water bodies are avoided, by employing monitoring and mitigation methods at or within the boundary of the mining disturbance area. ii. Ensure that potential water quality impacts associated with mining activities are identified as quickly and clearly as possible via monitoring. iii. Identify actions that will be undertaken to avoid, remedy or mitigate water quality effects through implementation of appropriate actions in a timely manner where required. <i>Advice Note: All Management Plans are required to adhere to the requirements of Condition 6.0.</i>
24.6	The WMP must include a description of the water management methods for the site, including: a. A description of the baseline monitoring and the receiving environment; b. The proposed mine disturbance area; c. A description of all site activities with the potential to cause hydrological impacts;

Appendix 1: Conditions of Consent (September 2024)

	d. The water management actions that will be implemented to avoid hydrological effects, including: i. The Canoe Creek water intake ii. The mine pit dewatering system iii. The water treatment train, including settling infrastructure, and other mitigation measures to achieve the required water quality outcomes in Condition 26.0 iv. The mine infiltration system to return treated mine water to groundwater and maintain groundwater levels, including infiltration trenches and/or injection wells as required v. The discharge from the water treatment ponds to surface waters vi. The design, construction and operation of the Canoe Creek infiltration basin e. Operational water level and water quality monitoring requirements for the duration of the activity; f. Groundwater level thresholds and actions to be taken should these thresholds be exceeded; g. Surface water body flow threshold for Collins Creek and actions to be taken should that threshold be exceeded; h. Actions to be taken if water quality thresholds are exceeded; i. Final Rehabilitation requirements to avoid adverse hydrological impacts on waterbodies post-mining; j. Audit checklists; k. An organisational chart showing staff and contractor positions and responsibilities for plan implementation; and l. Relevant training and induction procedures and schedules.															
24.7	The WMP must be updated on an annual basis and must be submitted to the Consent Authority for certification in accordance with condition 6.0. The annual update is required to: a. reflect the proposed mining operations for the following 12 months; and b. provide any additional or amended monitoring and mitigation requirements in order to reduce the potential for adverse hydrological and/or water quality effects.															
Conditions to Apply to WCRC Discharge Permit																
25.0 Method of Discharge during mining activity																
25.1	During mining, all contaminated stormwater and other contaminated site water within the site must be directed into the Mine Water Facility, and either recirculated for use in the processing plant, or discharged to the 'Central Drain' for further treatment in the Clean Water Facility in the northwestern corner of the application site.															
25.2	During mining, treated mine water is only permitted to be discharged directly to the drain beyond Pond 4, or to Collins Creek or the Northern Drain or to the Canoe Creek infiltration basin if: a. metal and metalloid water quality parameters in Table A below are complied with at the Pond 4 monitoring sites (as required by Condition 26.2) and the sites shown in Schedule 8: Canoe Creek Lagoon, Collins Creek Downstream, N Boundary Drain and Canoe Creek Downstream. ; and b. the non-metal water quality parameters in Table B below are complied with at the Pond 4 monitoring sites (as required by Condition 26.2) and the locations defined in Table B; and c. in the circumstances of Condition 25.5 below.															
Table A - metals and metalloids																
<table><tr><th>Parameter</th><th>Threshold mg/L</th><th>Dependency</th></tr><tr><td>Aluminium</td><td>0.62^B</td><td>Hardness, pH, Dissolved Organic Carbon</td></tr><tr><td>Arsenic</td><td>0.013</td><td>As arsenic (V)</td></tr><tr><td>Boron</td><td>0.94</td><td>NA</td></tr><tr><td>Cadmium</td><td>0.0002^D</td><td>Hardness</td></tr></table>		Parameter	Threshold mg/L	Dependency	Aluminium	0.62 ^B	Hardness, pH, Dissolved Organic Carbon	Arsenic	0.013	As arsenic (V)	Boron	0.94	NA	Cadmium	0.0002 ^D	Hardness
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Boron	0.94	NA														
Cadmium	0.0002 ^D	Hardness														

Appendix 1: Conditions of Consent (September 2024)

Chromium	0.0033 ^D	Hardness, as chromium (III)
Copper	0.0039 ^E	Hardness, pH, Dissolved Organic Carbon
Iron	1.0	As total fraction
Lead	0.0034 ^D	Hardness
Manganese	1.9	NA
Nickel	0.011 ^D	Hardness
Zinc	0.008 ^D	Hardness

^A dissolved fraction, unless stated

^B at hardness = 25 g/m³, pH = 7.0, Dissolved Organic Carbon = 1.0 g/m³

^C 95%-ile trigger value

^D at hardness = 30 g/m³

^E at hardness = 25 g/m³, pH = 7.0, Dissolved Organic Carbon = 2.0 g/m³

Table B – Non-metals

Parameter	Threshold	Notes/Monitoring Location
Total Suspended Solids	20 mg/L	Applies to discharges to Collins Creek, Northern Boundary Drain or to the overland flow path to Canoe Creek Lagoon. Does not apply to the discharge from Canoe Creek infiltration basin. Monitoring locations are Canoe Creek Lagoon, Collins Creek Downstream, Northern Boundary Drain, shown in Schedule 8.
Turbidity	20 NTU	Applies to discharges to Collins Creek, Northern Boundary Drain or to the overland flow path to Canoe Creek Lagoon. Does not apply to the discharge from Canoe Creek infiltration basin. Monitoring locations are Canoe Creek Lagoon, Collins Creek Downstream, Northern Boundary Drain, shown in Schedule 8.
Visual clarity	Conspicuous visual change	In the receiving water bodies above based on visual inspection at the upstream and downstream monitoring sites (see advice note 3 below). Monitoring locations are Canoe Creek Lagoon Upstream, Canoe Creek Lagoon, Collins Creek Upstream, Collins Creek Downstream, Northern Boundary Drain Upstream, Northern Boundary Drain Downstream shown in Schedule 8.
	Relevant NPS-FM (2020) attribute state for visual clarity	No change in the attribute states of the receiving surface water bodies, as an annual median and a 95%-ile, versus the baseline states. See advice note 2 below. Monitoring locations are Canoe Creek Lagoon, Collins Creek Downstream, Northern Boundary Drain, Canoe Creek Downstream shown in Schedule 8.
Dissolved Reactive Phosphorus (DRP)	Relevant NPS-FM (2020) attribute state	No change in the attribute states of the receiving surface water bodies, as an annual median and a 95%-ile, versus the baseline states. See advice note 2 below. Monitoring locations are Canoe Creek Lagoon, Collins Creek Downstream, Northern Boundary Drain, Canoe Creek downstream shown in Schedule 8.

Advice Notes:

a. *Water quality monitoring conditions to establish the ability to discharge under this condition are contained in Condition 26.0 below.*

Appendix 1: Conditions of Consent (September 2024)

	b. The attribute state for visual clarity and DRP must be either a) defined via at least 12 months of baseline monitoring in Collins Creek, Northern Boundary Drain, Canoe Creek and Canoe Creek Lagoon; or b) assumed to be of pristine water quality (A Band). In the case of a), the monitoring data and attribute state assessment must be submitted to WCRC for approval at least 4 weeks prior to the start of mining operations.															
25.3	The Consent Holder must ensure that discharges to surface and groundwater do not contain any contaminants other than suspended sediments, naturally occurring elements and metals, and water treatment chemicals in accordance with Conditions below: a. The use of any water treatment chemical(s) is/are permitted provided they are used in accordance with its Material Safety Data Sheet(s) (MSDS), <u>and are confirmed as appropriate for the receiving environment by a suitably qualified ecotoxicologist.</u> b. The Consent Holder must notify the Consent Authority in writing and provide the respective MSDS of any water treatment chemical(s) used in accordance with the above condition before it is used.															
25.4	The Consent Holder must take all practicable measures to prevent uncontaminated stormwater entering the mine workings and disturbed areas to reduce the volume of water passing through the mining pond/settling pond system, and to improve the efficiency of the water reticulating system.															
25.5	Treated mine water is only permitted to be discharged overland from the Canoe Creek infiltration basin to Canoe Creek if the following rainfall events take place, as taken from the <u>West Coast Regional Council rainfall gauge at the Westport Aerodrome or a weather meteorological</u> station erected on site: a. The rainfall exceeds 50 mm in any 24-hour period immediately prior to the discharge (https://cliflo.niwa.co.nz/pls/niwp/wstn.stn_details?cAgent=7342); b. The rainfall exceeds 100 mmm in any contiguous 7-day period immediately prior to the discharge. ↗															
26.0 Water Monitoring																
26.1	a. The Consent Holder must visually inspect the Mine Water Facility, Clean Water Facility and Central Drain at least once daily. b. Visual inspections must identify any significant sediment build up in the Mine Water Facility or Clean Water Facility, and any noticeable change in the water clarity in the Central Drain or Clean Water Facility which would indicate further erosion and sediment control mitigation measures are required to improve discharge water quality. c. A record of daily inspections must be kept on site and made available to the Consent Authority if requested.															
26.2	The Consent Holder must carry out water monitoring at the locations shown in the ESCP Overview Concept Plan (Schedule 7) and the Proposed Monitoring Network (Schedule 8), and as listed in the table below: <table><tr><th>Location</th><th>Parameter(s)</th><th>Frequency</th></tr><tr><td>Pond 2 discharge</td><td>Turbidity</td><td>Continuous Automated</td></tr><tr><td>Pond 4 discharge</td><td>Turbidity</td><td>Continuous Automated</td></tr><tr><td>Pond 4 discharges to Canoe Creek Lagoon</td><td>Flow</td><td>Daily</td></tr><tr><td>Pond 4 discharges to: 1. infiltration system 2. Infiltration basin 3. Collins Creek augmentation 4. Northern Boundary Drain augmentation</td><td>Flow</td><td>Continuous Automated</td></tr></table>	Location	Parameter(s)	Frequency	Pond 2 discharge	Turbidity	Continuous Automated	Pond 4 discharge	Turbidity	Continuous Automated	Pond 4 discharges to Canoe Creek Lagoon	Flow	Daily	Pond 4 discharges to: 1. infiltration system 2. Infiltration basin 3. Collins Creek augmentation 4. Northern Boundary Drain augmentation	Flow	Continuous Automated
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Appendix 1: Conditions of Consent (September 2024)

	Central Drain – upstream of mining activity	Turbidity	Weekly
	Central Drain – upstream of Pond 3	Turbidity	Weekly
	Pond 2/4 discharge****	Monitoring Suite A*	Quarterly (metals) Monthly (Others)
	Canoe Creek Lagoon Upstream**	Monitoring Suite A* Visual clarity Surficial benthic sediment sampling for metals	~~Quarterly~~ Monthly (metals) Monthly (Others)
	Canoe Creek Lagoon	Monitoring Suite A* Visual clarity Surficial benthic sediment sampling for metals	~~Quarterly~~ Monthly (metals) Monthly (Others)
	Collins Creek Upstream	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others)
	Collins Creek Downstream	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others)
	Northern Boundary Drain Upstream**	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others)
	Northern boundary Drain Downstream	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others)
	Canoe Creek Upstream	Monitoring Suite A*	Quarterly (metals) Monthly (Others) (only if discharging to Canoe Creek Infiltration Basin)
	Canoe Creek Downstream	Monitoring Suite A*	Quarterly (metals) Monthly (Others) (only if discharging to Canoe Creek Infiltration Basin)
	Collins Creek Upstream	Flow	Hourly
	Collins Creek Downstream	Flow	Hourly
	PZ01, 02, 03, 04, 05, 06, 07, 09, 10, 11, 12, 13, 18 and 19	Water level	6 hourly
	Canoe Creek Intake	Flow	15 minutes
	Canoe Creek Infiltration Basin	High Water Level	Hourly
*Monitoring Suite A includes the following water quality indicators:			
		<i>Dissolved metals</i>	<i>Others</i>

Appendix 1: Conditions of Consent (September 2024)

	<table> <tr><td>Aluminium (Q)</td><td>EC (M)</td></tr> <tr><td>Arsenic (Q)</td><td>pH (M)</td></tr> <tr><td>Boron (Q)</td><td>Turbidity (M)</td></tr> <tr><td>Cadmium (Q)</td><td>TSS (M)</td></tr> <tr><td>Chromium (Q)</td><td>Hardness (Q)</td></tr> <tr><td>Copper (Q)</td><td>Sulphate (Q)</td></tr> <tr><td>Iron (Q)</td><td>Amm-N (M)</td></tr> <tr><td>Nickel (Q)</td><td>NO₃-N (M)</td></tr> <tr><td>Lead (Q)</td><td>Dissolved Reactive Phosphorus (M)</td></tr> <tr><td>Manganese (Q)</td><td></td></tr> <tr><td>Zinc (Q)</td><td></td></tr> </table> <i>** The Canoe Creek Lagoon upstream observation location must be upstream of the Collins Creek inflow and the inflow from the Pond 4 discharge, but may change over time, given the dynamic nature of the lagoon.</i> <i>*** The Northern Drain upstream site must be the lowest point in the stream which is a) upstream of any discharge and b) at which visible flow is occurring on the day of the observation. If there is no visible flow in the drain, no upstream discharge sample can be taken.</i> <i>*** With additional water treatment infrastructure installed, water may be discharged directly from Pond 2 instead of Pond 4, if water quality parameters are met.</i>	Aluminium (Q)	EC (M)	Arsenic (Q)	pH (M)	Boron (Q)	Turbidity (M)	Cadmium (Q)	TSS (M)	Chromium (Q)	Hardness (Q)	Copper (Q)	Sulphate (Q)	Iron (Q)	Amm-N (M)	Nickel (Q)	NO ₃ -N (M)	Lead (Q)	Dissolved Reactive Phosphorus (M)	Manganese (Q)		Zinc (Q)	
Aluminium (Q)	EC (M)																						
Arsenic (Q)	pH (M)																						
Boron (Q)	Turbidity (M)																						
Cadmium (Q)	TSS (M)																						
Chromium (Q)	Hardness (Q)																						
Copper (Q)	Sulphate (Q)																						
Iron (Q)	Amm-N (M)																						
Nickel (Q)	NO ₃ -N (M)																						
Lead (Q)	Dissolved Reactive Phosphorus (M)																						
Manganese (Q)																							
Zinc (Q)																							
26.3	Notwithstanding Condition 26.2, all discharges associated with the mining operations authorised under these consents must not cause any of the following effects within any receiving waterbody measured at the downstream water quality monitoring sites in Condition 26.2: - Any conspicuous oil or grease films, scums or foams, or floatable or suspended materials, - Any conspicuous change in the colour or visual clarity, - Any emission of an objectionable odour, - Any significant adverse effects on aquatic life, or - The rendering of fresh water unsuitable for consumption by farm animals.																						
26.4	Sampling required under the conditions of this consent must be undertaken and analysed by suitably qualified personnel and the results supplied to the Consent Authority annually as part of the annual works programme.																						
26.5	An Annual Hydrological and Water Quality Report must be submitted to the Consent Authority with the Annual Work Programme in accordance with Condition 5.2 for review and evaluation of compliance. The report must be prepared by a suitably qualified and experienced person and include the following information: - A summary of the monitoring undertaken over the preceding 12 months. The summary must: - Reference the specific consent conditions under which the monitoring has been undertaken to show how the conditions have been complied with; - Provide tables of the water quality data collected in accordance with Condition 26.2. - Discussion and evaluation of the monitoring data in relation to the relevant conditions including a summary of compliance with conditions; - A summary of the actions that have been undertaken in response to any exceedance(s) of water quality limits; - Records of the visual inspections that have been undertaken in accordance with Condition 26.1 and condition 26.3.																						
26.6	- The Consent Holder must engage a suitably qualified aquatic ecologist to carry out annual macroinvertebrate and fish surveys in Collins Creek, the Northern Boundary Drain and Canoe Creek. - The proposed survey methodology, including the locations where macroinvertebrate (taxa number and composition) and fish sampling will be undertaken, the timing of the sampling,																						

Appendix 1: Conditions of Consent (September 2024)

	the methods that will be used to undertake the sampling, the name of the authorised person who will undertake the monitoring and reporting methods must be submitted to the Consent Authority 20 working days prior to the survey being undertaken, for the Consent Authority to certify the survey methodology. <i>Advice Note: If the Consent Authority refuses to certify the survey methodology, it is expected to give reasons in writing</i> c. If the Consent ~~Authority~~<u>Holder</u> refuses certification the Consent Holder must resubmit the survey methodology for certification addressing any concerns of the Consent Authority. d. Surveys must not be undertaken until certification is achieved. e. The results of the survey must be submitted to the Consent Authority within 10 working days of the results being received. <i>Advice Note: The surveys required by this condition are to inform baseline information about aquatic biota present within the waterbodies around the consent area, and monitor long term trends in species diversity and prevalence, <u>and inform any necessary review of conditions under Condition 3.1.</u></i>
26.7	a. Macroinvertebrate monitoring required by Condition 26.6 must be conducted using Protocol P2 and C1 from the Ministry for the Environment Macroinvertebrate Guidelines and the samples must be analysed by an aquatic ecologist experienced in macroinvertebrate sampling and identification. b. Monitoring must be undertaken on a day on which there has been no major flood event in the preceding week. Whenever practicable, sites that have been sampled in the past must be used.
Conditions to Apply to WCRC Air Discharge Permit	
27.0 Dust Management Plan	
27.1	The Consent Holder must operate the site in general accordance with a Dust Management Plan. The objective of the Dust Management Plan is to detail the best practicable option to avoid dust nuisance being caused by construction and mining works and to mitigate any such effects should they occur.
<u>27.2</u>	The Dust Management Plan must include, <u>as a minimum</u>: a. Potential sources of dust that may be created during the mining project, <u>including a description of the classes of particulate matter present.</u> b. <u>A description of the receiving environment, and identification of Sensitive receptors within 250m of in the vicinity of identified potential sources of dust for targeted dust management.</u> c. Dust management and mitigation methods <u>including management of stockpiles, and details of any flocculant to be used for dust reduction.</u> d. <u>Dust monitoring methods, including the location of dust monitoring devices with a minimum of three to be located along the north eastern boundary of the site.</u> ~~d-e.~~ <u>Monitoring instrumentation methodology, setup requirements, maintenance and calibration procedures (for meteorological and particulate matter instruments), and the frequency of review of the location of monitoring equipment and calibration.</u> ~~f.~~ <u>Procedures for responding to dust and wind-condition based trigger levels and associated follow up investigations, actions and recording of findings.</u> ~~e-g.~~ <u>Training of staff and contractors in relation to dust management; and</u> ~~f-h.~~ <u>Methods for recording and managing complaints regarding discharges of dust, including recording the source of dust, meteorological conditions at the time the dust was observed.</u> ~~g-i.~~ <u>Keeping of compliance records.</u>
~~27.32~~	Vehicles travelling within the site must not exceed 15 km/hr on site at all times.
~~27.43~~	If wind measured at the meteorological station on site exceeds 20km/hr, the Consent Holder must: a. limit activities that generate dust ~~downwind of~~<u>toward</u> sensitive receptors identified in the Dust Management Plan; b. conduct frequent visual inspections of exposed earthwork areas; and

Appendix 1: Conditions of Consent (September 2024)

	c. assess the need for additional controls such as increase water application rates.
28.0 Air Quality Management and Monitoring	
28.1	There must be no offensive or objectionable discharge of dust into air from the minerals extraction, processing and loading operations that result in an adverse effect beyond the legal boundary of the site. <i>Advice Note: For the purpose of Condition 28.1 the Consent Authority will consider an effect that is offensive or objectionable to have occurred if an Enforcement Officer of the Consent Authority deems it so having regard to</i> a. The frequency, intensity, duration, amount, effect and location of the suspended or particulate matter; and/or b. Receipt of complaints from neighbours or the public; or c. Relevant written advice or a report from an Environmental Health Officer of a territorial authority or health authority.
28.2	Prior to the commencement of site preparation activities, a meteorological station must be installed at the site with instruments capable of continuously monitoring, logging in real time and reporting agreed representative meteorological data for the site.
28.3	a. The Consent Holder must install, operate and maintain ~~six~~^{four} Dust Deposition Gauges ~~in the locations shown in the Dust Management Plan.~~ b. Dust recorded in the gauges must not exceed a value of 4g/m²/30 days above background levels. ~~b-c.~~ <u>Records of the dust values must be kept for the duration of the Consent and provided to the Consent Authority upon request.</u> <i>Advice Note: Background levels are to be determined by data collected prior to the commencement date of this consent.</i>
28.4	a. If a breach of Condition 28.3.b is detected, the Consent Holder must notify the Consent Authority within two working days of the breach being detected. b. The Consent Holder must investigate possible reasons for the breach and take all necessary steps to achieve compliance in the following 30-day period.
Conditions to Apply to WCRC Water Take Permit	
29.0 Groundwater and surface water abstraction outcomes	
29.1	Mine pit dewatering and associated mitigation measures must achieve the following outcomes: a. Pre-mining median water levels in piezometers PZ-19, PZ-02, PZ-03, PZ-04 and PZ-05 are maintained when mining is occurring within 100m of the southern boundary; b. Pre-mining median water levels in piezometers PZ-08, PZ-09, PZ-17, PZ-10, PZ-11 and PZ-12 are maintained when mining is occurring within 100m of the northern boundary; c. Pre-mining median water levels in Canoe Creek lagoon are maintained by ensuring pre-mining median water levels in PZ-06, PZ-07, and PZ-08 are maintained when mining is occurring within 100m of the western boundary; d. The pre-mining median and lower flows in the Northern Drain are not reduced. e. The median and lower flows in Collins Creek are not reduced by more than 2 L/s; f. The rate of take of water from Canoe Creek is not greater than 10% of the Mean Annual Low Flow; g. The pre-mining surface drainage patterns are restored such that the catchments areas for the Northern Boundary Drain and Canoe Creek Lagoon are not changed significantly. <i>Advice Notes:</i> <i>Compliance with conditions 29.1.a to 29.1.d must be deemed to have occurred under the following circumstances:</i> a. At least 12 months of groundwater level monitoring has been undertaken at representative locations around the site boundary and a pre-mining median groundwater level has been defined for monitoring wells PZ01, 02, 03, 04, 05, 06, 07, 09, 10, 11, 12, 13, 18 and 19

Appendix 1: Conditions of Consent (September 2024)

	b. The above wells are monitored on a minimum daily frequency for the duration of any mining activity below the water table c. The monitoring results for each well show that the average monthly water level is greater than or equal to the pre-mining median for that well. Compliance with condition 29.1.e must be deemed to have occurred under the following circumstances: a. The average natural difference between the upstream and downstream flow in Collins Creek has been defined through at least one year of monitoring of flows upstream and downstream of the mineral sand excavation area. b. Upstream and downstream flow monitoring occurs at the locations shown in Schedule 8 for the duration of any mining activity below the water table. c. The average monthly flow in the downstream site is no more than 2 L/s less than the upstream site +/- the average natural difference between the upstream and downstream sites, taking into account the normal accuracy limitations of flow monitoring equipment. Compliance with condition 29.1.f must be deemed to have occurred if the maximum rate of take from the creek (or an adjacent infiltration gallery) is no more than 63 L/s Compliance with condition 29.1.g must be deemed to have occurred if the excavation area is contoured to re-establish the existing distribution of drainage such that the catchment area draining to the Northern Boundary Drain does not change by more than 15% (i.e. 1 ha).
30.0 Canoe Creek water take	
30.1	The instantaneous surface water take from Canoe Creek must not exceed 63 litres per second.
30.2	The Consent Holder must undertake monitoring of the surface water take from Canoe Creek at 15 minute intervals and supply this information electronically to the Consent Authority every day, or at the interval instructed in writing by the Consent Authority. <i>Advice Note: the Resource Management (Measurement and Reporting of Water Takes) Amendment Regulations 2020 applies to this water take.</i>
30.3	The Consent Holder must maintain auditable records and provide data in the format of date, time and rate that is suitable for electronic storage.
30.4	a. The Consent Holder must maintain the measurement device(s) in good working order so as to maintain a measurement accuracy of within $\pm 5\%$ for a fully pressurised pipe or $\pm 10\%$ for a partially pressurised pipe. b. The Consent Holder must provide the Consent Authority with initial written verification of accuracy from a suitably qualified person that the measurement device measures the volume of water taken to within $\pm 5\%$ for a fully pressurised pipe or $\pm 10\%$ for a partially pressurised pipe, and thereafter every five years for the term of the consent.
30.5	The Consent Holder must provide the following information to the Consent Authority no later than ten working days prior to the water being taken under this consent: a. The type of measurement device(s) used to undertake the continuous monitoring together with the manufacturer's statement for that device; and b. The location of the measurement device(s) in relation to the water take point(s).
30.6	Upon notice to the Consent Holder the Consent Authority may require the Consent Holder to cease water abstraction for a period not exceeding 48 hours, in order to undertake monitoring of natural water flows.
30.7	A fish screen on any direct surface water take must be maintained to ensure, as far as practicable, that eels, fish and fry are prevented from passing through the intake or being trapped against the screen.
30.8	The water take from Canoe Creek must only be used for operational water supply purposes, and must not be used to augment surface water flows in Collins Creek or the Northern Boundary Drain.

Appendix 1: Conditions of Consent (September 2024)

31.0 Breach of Conditions	
31.1	The Consent Holder must inform a Compliance Officer of the Consent Authority immediately if a breach of Consent Condition(s) takes place, or when they believe that a breach may take place.
32.0 Reporting of monitoring information	
32.1	<u>The meteorological and monitoring data collected under conditions 26.2, 28.2 and 30.2 must be made available to the WCRC telemetrically. If this method is not at first feasible, the data must be provided to the WCRC at a frequency and a form advised by the WCRC until such a time as it is technically feasible to telemeter the data.</u>



Grey District Plan LU3154-23

TiGa Minerals and Metals

Review – Terrestrial Ecology

12 December 2023

Evidence of

Mike Harding

Environmental Consultant

Contents

List of Abbreviations	3
List of Submitters Referred to in this Evidence	3
Introduction.....	4
Scope of Evidence.....	5
Terrestrial Ecological Values at the Location	5
Assessment of Ecological Values	7
Terrestrial Ecological Values of Adjacent Areas	9
Potential Adverse Effects of the Activity.....	10
Potential Adverse Effects at the Location	10
Potential Adverse Effects adjacent to the Location	11
Potential Adverse Effects on the Ecosystem	16
Adequacy of Information	16
Analysis of Ecological Issues Raised by Submitters.....	17
Summary.....	25
References Cited.....	27
Attachment 1: Schedule 97 Taonga Species.....	29

List of Abbreviations

DOC	Department of Conservation
EEA	Barrytown Mineral Sand Mine Ecological Effects Assessment (Bramley et al, 2023)
EIANZ	Ecological Institute of Australia and New Zealand
GDC	Grey District Council
NPSFM	National Policy Statement for Freshwater Management 2020
NPS-IB	National Policy Statement for Indigenous Biodiversity, 2023
NZCPS	New Zealand Coastal Policy Statement 2010
RMA	Resource Management Act 1991
SNA	Significant Natural Area

List of Submitters Referred to in this Evidence

Submitter Number	Full Submitter Name
60	Michael Frederick Spruce
61	West Coast Penguin Trust
80	Suzanne Hills
84	Conservation Volunteers New Zealand (Gemma Thomson)
87	Sophia Josephine Allan
101	Dr Susan Waugh
141	Anne Inwood
179	Chanelle van Rooyen
208	NZ Penguin Initiative
223	Dr Roseanna Gamlen-Greene
241	Director General of Conservation
309	Fiona McDonald
317	Graham Wood

Introduction

1. My full name is Michael Arthur Coupland Harding. I am an independent Environmental Consultant based at Nelson. I hold a Diploma in Parks and Recreation Management (with Distinction) from Lincoln University (1986) and papers in Botany and Geology from Otago University (1980). I have seven years' experience in national park management and conservation advocacy, and a subsequent thirty years' experience as an independent ecologist.
2. My work as an independent ecologist has included field surveys of indigenous vegetation and habitat, assessments of ecological significance, assessments of priorities for protection of indigenous ecosystems, and advice on management of indigenous ecosystems, throughout New Zealand. Consultancy work relevant to this application is:
 - a. Preparation of a West Coast Plant Pest Control Strategy (DOC contract, 1994);
 - b. Provision of advice on priorities for protection of indigenous forest on the West Coast (Forest Heritage Fund contract, 1994);
 - c. Assessment of conservation values of Timberlands West Coast Ltd Indigenous Forests (Ministerial Contract, 2000);
 - d. Peer review of West Coast SNA project (Ministry for the Environment contract, 2002);
 - e. Assessment of terrestrial ecology for upgrades of State Highway 73 (Arthur's Pass) and State Highway 6 (Haast Pass) (Opus contracts, 1994; 1998; 2000; 2009; 2011, and 2015);
 - f. Review of Mt Davy SNA BLA-P002 (Grey District Council contract, 2017);
 - g. Ecological Assessment of GDC lands at Mt Buckley, Taylorville, and Cashmere Bay (DOC contract, 2017);
 - h. Survey and assessment of SNAs at more than 1000 sites in Nelson, Tasman, Ashburton, Timaru, Mackenzie, and Waitaki districts (2000 to 2023);
 - i. Provision of ecological advice to the Biodiversity Collaborative Group for development of the National Policy Statement for Indigenous Biodiversity (2020); and,
 - j. Review of recommendations of the National Panel on Stewardship Land on the West Coast (EDS contract, 2022).
3. I have been engaged by Perspective Consulting, on behalf of Grey District Council (GDC), to review terrestrial ecological matters related to the application (LU3154-23) by TiGa Minerals and Metals for mining at Barrytown Flats.
4. I confirm that I have read the code of conduct for expert witnesses contained in the Environment Court's Practice Note 2023. I have complied with it in preparing this evidence. I confirm that I have considered all the material facts that I am aware of that might alter or detract from the opinions that I express, and that this evidence is within my area of expertise, except where I state that I am relying on the evidence of another person.

5. In preparing this evidence I have been aware of and viewed the following material:
 - Barrytown Mineral Sand Mine Ecological Effects Assessment (Bramley et al, 2023).
 - Attachment E - Ecological Response Memorandum (Bramley, 2023).
 - Wetland Construction and Riparian Planting Plan (Bramley & Bodley, 2023a)
 - Barrytown Mineral Sand Mine Avian Management Plan (Bramley & Bodley, 2023b)
6. This evidence benefitted from a four-hour site visit in May 2023 in the company of the applicant's ecologist (Gary Bramley).
7. The first part of this evidence (review of terrestrial ecology matters) was prepared in September 2023; the second part (analysis of submissions) was prepared in November 2023.

Scope of Evidence

8. This evidence is prepared in accordance with s42A of the Resource Management Act 1991 (RMA). It provides a review of terrestrial ecology matters relevant to the application.
9. The following matters are reviewed in this evidence:
 - Terrestrial ecology values at the location of the proposed activity¹.
 - Assessment of ecological values.
 - Terrestrial ecology values of adjacent areas.
 - Potential adverse effects of the activity.
 - Adequacy of Information.

Terrestrial Ecological Values at the Location

10. A description of terrestrial ecological values is presented in the applicant's Ecological Effects Assessment (hereafter called the **EEA**).² That report describes terrestrial vegetation and habitat at the site as farmland that has been modified and maintained as grassland (pasture) for dairy farming. The proposed mine location is at the lower-altitude part of the site close to the coastal lagoon.
11. The EEA describes indigenous vegetation at the location as: three isolated kahikatea (*Dacrycarpus dacrydioides*) trees, with epiphytes; and sedges and rushes along drains. Otherwise, the area affected by the proposed mine (the "location") is described in the EEA as

¹ In this evidence the "location" is the area directly affected by the proposed activity (the mine footprint), and the "site" is the land parcel within which the proposed activity is located.

² Bramley et al, 2023.

supporting exotic pasture. That description is consistent with my observations at the location during my site visit.

12. Indigenous vegetation elsewhere at the site (outside the mine footprint) is described in the EEA as: riparian vegetation along Collins Creek; and, flaxland-sedgeland around the margins of Canoe Creek Lagoon. I did not survey that vegetation closely during my site visit. However, the EEA description of that vegetation is consistent with my observations.
13. Other indigenous vegetation at the site – and not described in the EEA – is a small area of indigenous forest alongside the Coast Road (State Highway 6), near the proposed entrance/access to the mine. I checked this vegetation briefly during my site visit. Dominant canopy species are tarata/lemonwood (*Pittosporum eugenioides*), mahoe (*Melicytus ramiflorus*), pigeonwood (*Hedycarya arborea*), mapou (*Myrsine australis*), and pohuehue (*Muehlenbeckia australis*). A single northern rata (*Metrosideros robusta*) tree is present at the southern end of the forest patch.
14. The method employed by the applicant for survey of avifauna was four seasonal surveys over a one-year period (April 2022 to January 2023). The EEA lists 27 native bird species recorded within or near the site during seasonal surveys,³ seven of which are listed as ‘threatened’ or ‘at risk.’⁴ Survey data are complemented by a list of 26 birds of conservation interest⁵ recorded within 10km of the site, from the on-line eBird database.
15. I did not undertake a bird survey during my brief site visit. Robust assessments of avifauna require repeated surveys at different seasons, and during the full range of climate/weather conditions. Specialised methods are sometimes required to detect cryptic or discreet bird species.
16. The EEA avifauna survey data are constrained by the duration of the survey (one year), and the lack of surveys of adjacent habitats. Recorded observations – such as those on eBird – cannot be assumed to be comprehensive; the absence of observations of species does not necessarily mean those species are absent. Further, some species – such as matuku/Australasian bittern or crane – can be difficult to detect.
17. Examples of the difficulty of comprehensive bird surveys are: the observation of an additional ‘threatened’ bird species – Pacific reef heron (*Egretta sacra*) – by the applicant’s ecologist during a separate site visit; and, observation of a kotuku/white heron (*Ardea modesta*) at the site on the day of my visit.⁶
18. The EEA proposes that none of the eight bird species of conservation interest that were recorded at the site are likely to “rely on the pasture habitat within the site.”⁷ The EEA provides insufficient data to support that assumption. It is possible that the open-pasture habitat provides an important seasonal or occasional resource for mobile (migratory) bird species, such as South Island pied oystercatcher (*Haematopus ostralegus*).

³ Bramley et al, 2023, Table 8, p26.

⁴ Robertson et al, 2021.

⁵ ‘Threatened’ and ‘at risk’ species, as determined by Robertson et al (2021).

⁶ Mark Geddes, pers.comm.

⁷ Bramley et al, 2023, p26.

19. Nevertheless, I concur with the contention in the EEA that higher quality – and more natural – habitats for birds are present at the wetland, lagoon, and forest habitats on adjacent land. The adequacy of the avifauna data for those habitats is discussed below.
20. The applicant’s survey of herpetofauna appears to have been limited to a search of the Department of Conservation’s Bioweb database. The EEA concludes that the grazed pasture at the location does not provide suitable habitat for indigenous herpetofauna (lizards). I do not have specialist expertise in herpetofauna. However, as an ecologist, that assumption appears reasonable, considering the very modified condition of the habitat.
21. The applicant does not appear to have undertaken any survey – or investigation – of terrestrial invertebrate fauna. The very modified nature of the habitat at the location suggests that sedentary invertebrate fauna will be substantially depleted: naturally-occurring vegetation has been lost; and, the land has been modified to facilitate drainage for pasture development. However, mobile invertebrates – such as Lepidoptera (moths and butterflies) – will be present in the vicinity, and may utilise habitats at the location.
22. The EEA states that “any original wetlands within the site have been reclaimed by ‘humping and hollowing’ for agricultural purposes” and that “these modifications have resulted in a near complete loss of wetland ecosystem types from the area” and that “ecosystem services provided by wetland systems including flow attenuation and water quality improvement have also been lost.”⁸ I concur that any original wetlands at the site have been modified. However, it may be that hydrological processes across the site are still sufficiently intact to contribute to the integrity of wetland ecosystems. The application provides insufficient data to support the statement that wetland ecosystem services have been lost.

Assessment of Ecological Values

23. Ecological values of indigenous biodiversity at the site are assessed in the EEA by the method proposed in the Environmental Institute of Australia and New Zealand (EIANZ) Guidelines.⁹ The EIANZ Guidelines are non-statutory, and are not endorsed by the Ministry for the Environment, Department of Conservation, nor Ecological Society of New Zealand.
24. The EIANZ Guidelines have two important limitations for the assessment of ecological value: the baseline for assessing representativeness; and, the separating and averaging of component values to provide an “overall” ecological value. The guidelines state that combining values should be done in a way that avoids suppressing project impacts on individual features or components.¹⁰ However, the method – as applied in the EEA – has that effect.
25. Recent hearing decisions expressed concern that use of the EIANZ Guidelines can result in wide differences in assessed ecological value and magnitude of effect, and noted that use of the

⁸ Bramley et al, 2023, p27.

⁹ Roper-Lindsay et al, 2018.

¹⁰ *ibid*, p69.

guidelines is problematic.¹¹ I believe that use of the EIANZ Guidelines to assess ecological value at this site is inappropriate. Notable points of disagreement are summarised below.

26. The EEA assesses the representativeness value of the shrubland along Collins Creek as 'low' because "it is not representative of any former forest or other vegetation type." This assessment arises from the use of an 1840 baseline in the EIANZ Guidelines for assessment of representativeness. This baseline has its origins in the Reserves Act 1977; one of the purposes of which is to protect vegetation that gave New Zealand its original character. It is an inappropriate baseline for assessment of an application under the Resource Management Act 1991 (RMA).
27. The RMA requires the protection of indigenous vegetation and habitat, and the maintenance of indigenous biodiversity; not the protection of "former" vegetation. If there was any doubt, this has been dispelled by the National Policy Statement for Indigenous Biodiversity (NPS-IB). The NPSIB states – as a key assessment principle – that assessments of representativeness are of "the indigenous vegetation of the ecological district in the present-day environment."¹²
28. Therefore, the representativeness value of the shrubland along Collins Creek is at least 'moderate;' not 'low.' And, the representativeness value of the rushland and flaxland surrounding Rusty Pond and Canoe Creek Lagoon are – in my assessment – 'high;' not 'moderate.' I concur that the representativeness value of the areas of open pasture that will be directly affected by the proposed activity (the mine footprint) is 'low.'
29. The EEA assesses the ecological context values of the shrubland along Collins Creek, and the rushland and flaxland surrounding Rusty Pond and Canoe Creek Lagoon, as 'low' and 'moderate' respectively. The ecological context criterion includes values such as buffering, linkages, and networks of habitat. These shrubland, rushland, and flaxland communities clearly buffer Collins Creek, Rusty Pond, and Canoe Creek Lagoon. And, these communities are very likely to link areas of habitat, or contribute the network of fauna habitat in the wider area.
30. Therefore, the ecological context values of the shrubland along Collins Creek, and the rushland and flaxland surrounding Rusty Pond and Canoe Creek Lagoon, are – in my assessment – 'moderate' and 'high' respectively. The ecological context values of the area of open pasture that will be directly affected by the proposed activity are more difficult to assess, due to the absence of complete data on fauna habitat.
31. An ecological context value of the proposed mine location – and the wider site – is its position as an enclave of developed land within a landscape of largely undeveloped land: indigenous vegetation and wetlands to the north; extensive forest on the Paparoa Range to the east; Canoe Creek and the Langridge Scenic Reserve to the south; and, Canoe Creek Lagoon and the beach/sea to the west.

¹¹ Report and Decision of the Hearing Commissioners, Bathurst Coal Limited v Canterbury Regional Council and Selwyn District Council, 17 June 2022; Joint Report and Decision of the Hearing Commissioners, Simpson v Mackenzie District Council and Canterbury Regional Council, 8 November 2023.

¹² NPS-IB, Appendix 1, A (2).

Terrestrial Ecological Values of Adjacent Areas

32. The EEA descriptions of adjacent areas of indigenous vegetation and habitat appear to be derived from existing documents, records, and observations. There is no indication that the ecological values of adjacent areas – or the wider Barrytown Flats coastal-plain ecosystem – were surveyed during the preparation of the EEA. Adjacent areas of indigenous vegetation and habitat are summarised below.
33. The coastal plain (Barrytown Flats) within which the proposed activity is located supports numerous – ecologically interconnected – areas of lagoon, wetland, flaxland, shrubland and forest. It is bordered by beach, foredune, and lagoon systems, all of which are part of a dynamic and fast-changing coastal environment. And, there is extensive forest-bird habitat nearby in the foothills of the Paparoa Range.
34. An extensive wetland-lagoon complex – Barrytown Flats-Canoe Creek Lagoon – is present to the north and west of the site. The northern part of this complex is scheduled as a Significant Natural Area (SNA) (Site PUN-W034) in the Proposed Te Tai o Poutini Plan. The southern part (Canoe Creek Lagoon) was originally included in this SNA, but has since been omitted from the presently-proposed SNA.
35. Vegetation at Canoe Creek Lagoon is described in the EEA, and illustrated in Figure 16 of the EEA¹³. I viewed the vegetation adjacent to the lagoon at two locations during my site visit. Canoe Creek Lagoon, and its surrounding riparian vegetation and habitat, is ecologically significant; it should be regarded as an SNA.¹⁴
36. Other areas of indigenous vegetation and habitat – including natural wetlands – are present on the property on the northern side of the site, adjacent to the PUN-W034 SNA. Further north, a wetland/forest sequence is protected as three areas of public conservation land (Lawson Creek Scenic Reserve; Coast Road Barrytown Scenic Reserve; and, Barrytown Flat Conservation Area).
37. An area of indigenous forest on the adjacent property to the south of the site – across Canoe Creek – is protected as public conservation land (Langridge Scenic Reserve). A narrow strip of land along Canoe Creek is also protected as public conservation land (Canoe Creek Conservation Area), linking Langridge Scenic Reserve with an extensive area of public conservation land on the Paparoa Range (Paparoa Range South Conservation Area).
38. The proposed mine location lies between areas of protected land to the north and south; and between the coast to the west, and forested slopes of the Paparoa Range to the east. Ecologically, it is an enclave within areas of indigenous vegetation and habitat, substantial portions of which are protected as public conservation land.
39. The site lies only a few kilometres south of the only known breeding habitat for tāiko /Westland petrel (*Procellaria westlandica*). The EEA notes that tāiko have a threat status of ‘at risk; naturally uncommon,’ with the qualifiers OL (one location) and St (population stable). The threat status of this species has two other qualifiers: CD (conservation dependent) and CR

¹³ Bramley et al, 2023, p28.

¹⁴ The Canoe Creek Lagoon vegetation/habitat meets the NPS-IB Appendix 1 SNA criteria.

(conservation research needed).¹⁵ The CD qualifier means that the species is likely to move to a higher threat category if current management ceases.¹⁶ The CR qualifier means that the causes of decline and/or solutions for recovery are poorly understood, and research is required.¹⁷

40. The EEA states that access to the property north of the site was not available, but assumes that natural wetlands are present on that property and within 100m of the site.¹⁸ There are areas of indigenous vegetation/habitat on that property, including areas outside the SNA. I concur that there are very likely to be natural wetlands present.
41. The year-long avifauna survey at the site would have detected the presence of some bird species at habitats immediately adjacent to the site, and some mobile species that are present in the wider area. However, this survey method and duration may not detect all cryptic or secretive bird species that utilise adjacent habitats, especially those species which make only seasonal or occasional use of those habitats.
42. Bird species that are difficult to detect and may be present in the area – if only briefly – include: South Island fernbird (*Bowdleria punctata punctata*); Australasian bittern (*Botaurus poiciloptilus*); reef heron (*Egretta sacra sacra*); southern blue penguin (*Eudyptula minor minor*); marsh crake (*Porzana pusilla affinis*); and, spotless crake (*Porzana tabuensis tabuensis*).

Potential Adverse Effects of the Activity

43. Assessment of the potential adverse effects of the activity on terrestrial ecology is constrained by the lack of information in the EEA on indigenous biodiversity values on adjacent properties. It is further constrained by our limited understanding of ecological processes in the wider Barrytown Flats coastal-plain ecosystem.
44. Three types of potential adverse effects on terrestrial ecology are reviewed below: effects at the location; effects adjacent to the location; and, effects on the wider ecosystem.

Potential Adverse Effects at the Location

45. The EEA assessment of potential adverse effects of the activity uses the method proposed in the EIANZ Guidelines. The limitations of these guidelines are discussed above. Additional limitations – for the assessment of effects – are the separating and averaging of component effects to provide an “overall” ecological effect; and, ambiguity in criteria for assessing the magnitude of effects.
46. The EEA summarises the magnitude and level of each effect with and without mitigation.¹⁹ The level of effect is derived from the ecological value of the affected vegetation/habitat and a ‘magnitude of effect’ ranking. The ecological values ascribed to some vegetation/habitats are – in my assessment – too low (see earlier discussion). Therefore, some of the level of effect rankings in the EEA are also too low.

¹⁵ Robertson et al, 2021.

¹⁶ Townsend et al, 2008.

¹⁷ Rolfe et al, 2019.

¹⁸ Bramley et al, 2023, p15.

¹⁹ Bramley et al, 2023, Table 22, p67-68.

47. The level of effects on terrestrial ecology at the mine location proposed in the EEA may be realistic, if the ecological values of the location are accurately documented. Areas of uncertainty are the importance of habitats at the location for mobile/migratory bird species, and for mobile invertebrate fauna (e.g., Lepidoptera).
48. The Avian Management Plan proposes how the location will be managed to avoid adverse effects on mobile avifauna at the location of mining activity, in particular banded dotterel (*Charadrius bicinctus*), little blue penguin (*Eudyptula minor*), and South Island pied oystercatcher (*Haematopus ostralegus finschi*).²⁰ The proposed management will likely mitigate – but will not necessarily avoid – adverse effects on nesting avifauna at the mine location.
49. The applicant’s response to the request for further information on the local populations (and habitat use) of cryptic/secretive bird species was provided in Attachment E²¹. It concludes that all six bird species – if present – are likely to have been detected during the avifauna survey at the site, and that none of these species would be expected to utilise the exotic pasture within the mine footprint. The duration of the avifauna survey was one year, so cannot be relied upon to conclude that these species will not be present during the 12-year period of mining activity.
50. I understand that the proposed access to the mine from State Highway 6 has been revised so that it will no longer affect a strip of indigenous forest alongside the Coast Road (State Highway 6).²² The composition or significance of this forest does not appear to have been assessed in the application. In the absence of advice to the contrary, it should be assumed that the forest is significant, or at least contributes to indigenous biodiversity values in the area.

Potential Adverse Effects adjacent to the Location

51. Potential adverse effects of the activity on terrestrial ecological values at adjacent areas are:
 - Disturbance of birds (and possibly invertebrates) by noise and artificial light.
 - Modification or loss of vegetation/habitat by altering hydrology (ground-water levels and recharge rates).
 - Modification or loss of vegetation/habitat through erosion and/or inundation caused by catastrophic land movement (earthquake) or storm events.

Disturbance of Fauna

52. The possible effects of the activity on avifauna at habitats directly adjacent to the mine location are described as “noise, human activities and vehicle movements near their habitats, particularly during the breeding season.”²³ Management actions proposed to address these effects include: maintaining buffers; planting; and, avoiding mining adjacent to high-quality habitat during the breeding season.

²⁰ Bramley & Bodley, 2023 (b), p7-10.

²¹ Bramley, 2023.

²² Att F Revise Site Plan 20.06.23.

²³ *ibid*, p19.

53. The proposed buffer of 20m is narrow, especially as at the Canoe Creek Lagoon margin – and probably elsewhere – the adjacent vegetation/habitat is ecologically significant (an SNA).²⁴ It is likely that a 20m separation between mining activities and fauna habitat will be insufficient to avoid adverse effects on sensitive species using that habitat.²⁵ A wider buffer should be provided to reduce this risk. The earlier hearing decision noted that there was evidence that a buffer of 100m would be required to mitigate effects on avifauna.²⁶
54. One species that is sensitive to disturbance, and is known to utilise habitats in the area, is matuku/Australasian bittern. The earlier hearing decision noted that there was evidence that the mining activity may cause the displacement of matuku from what is regarded as the best habitat in the ecological district, and that the loss of one individual would affect the matuku population.²⁷
55. The applicant's response to the request for further information notes that matuku have been observed previously in "the lagoon area" and that suitable habitat is present. It cannot be assumed – from the data presented – that the vegetation may not be sufficiently dense to provide breeding habitat, as stated by the applicant.²⁸
56. The other proposed management actions appear appropriate to mitigate adverse effects on avifauna at habitats adjacent to the site. However, the limited period of data collection (one year) and the possibility that other – discreet or cryptic species – may be occasionally present, mean that it is not possible to be certain that all adverse effects on avifauna utilising habitats directly adjacent to the site will be avoided.²⁹
57. The applicant's response to the request for further information on the local populations (and habitat use) of cryptic/secretive bird species provides further information on the distribution, records, and habitat use of the six listed bird species. It indicates that the risk of adverse effects on these species is low. It cannot be assumed that adverse effects will be completely avoided.
58. An important potential adverse effect is that of disturbance (notably light) on tāiko/Westland petrel, of which the only known breeding colony is located near (3.6km from) the site. Management actions are proposed to avoid the risk of tāiko being disoriented by artificial light, including: specifying the type of lighting at the mine location; restricting operating hours; and, restricting truck movements past the breeding colony to daylight hours.³⁰
59. It is difficult to determine whether those actions would avoid – or only mitigate – the adverse effects of the proposed activity on tāiko. In the absence of certainty, it would be prudent to at

²⁴ These areas are not scheduled as SNAs, but meet the NPS-IB Appendix 1 criteria.

²⁵ NPSIB Clause 3.10 (2)(e) a new activity to avoid a "reduction in the size or occupancy of Threatened or At Risk (declining) species that use an SNA for any part of their lifecycle" (NPSIB Clause 3.11 lists exceptions, including "mineral extraction that provides significant national public benefit").

²⁶ Joint Report and Decision of the Hearing Commissioners Applications WCRC RC-2020-0159 and GDC LUN 29226/20, para 105.

²⁷ Joint Report and Decision of the Hearing Commissioners Applications WCRC RC-2020-0159 and GDC LUN 29226/20, para 197.

²⁸ Bramley, 2023, p4.

²⁹ For example: Att E (Bramley & Bodley 2023 (b)) states (on page 4) that "a pair of reef heron was seen on the beach near the coastal lagoon in 2020 during field work for this project." This species is not listed in the EEA.

³⁰ *ibid*, p10-17.

least restrict mine operations (including truck traffic) to daylight hours, during November to January (inclusive), to reduce the risk of artificial light disorienting young tāiko.³¹

60. The avoidance of adverse effects on tāiko is especially important considering the species has a threat status of 'at risk; naturally uncommon,' with the qualifiers OL (one location), CD (conservation dependent) and CR (conservation research needed). The NZ Coastal Policy Statement requires that adverse effects on "indigenous taxa that are listed as threatened or at risk" are avoided.³² Tāiko (and South Island pied oystercatcher) are listed as 'at risk' species.³³
61. The NZ Coastal Policy Statement 2010 (NZCPS) also requires that activities avoid significant adverse effects on vulnerable coastal ecosystems, including "lagoons" and "coastal wetlands;" and "habitats, including areas and routes, important to migratory species."³⁴ Information provided by the applicant is insufficient to determine whether those any significant effects will be avoided.

Modification of Vegetation/Habitats by Altered Hydrology

62. The application proposes that ground and surface water levels will "be managed to avoid effects on wetland values"³⁵ adjacent to the site. Adequate assessment of potential adverse effects on ecological values at adjacent areas requires robust data on the indigenous biodiversity values of those areas. Any assessment of effects should consider the sensitivity of vegetation, habitats, and species in the receiving environment.
63. The applicant's response to the request for further information repeats the descriptions of vegetation at the Canoe Creek Lagoon, and provides further analysis of the vulnerability of the plant communities on a scale of low-medium-high. It states that the magnitude of effects is "at the lower end of the scale" but effects will vary between species and locations.³⁶
64. The response discusses those varying effects in theoretical terms, noting that small wetland herb and turf species may be threatened by competition from exotic plants if changing water levels result in more prolonged exposure.³⁷ It concludes that species' populations are not considered vulnerable because there are no species of conservation concern in the Canoe Creek Lagoon, and that the proposed water management plan will avoid effects by maintaining water levels.³⁸
65. It is not clear that the Canoe Creek Lagoon and its margins have been surveyed comprehensively for species of 'conservation concern.' And, the obligation to avoid adverse effects is not confined to such species; there is a wider obligation to protect and maintain indigenous biodiversity.³⁹

³¹ Note that vehicle movements on the Coast Road may need to be restricted for a longer period to reduce the risk of mortality to kororā/little penguin (see paragraphs 112 and 117).

³² NZ Coastal Policy Statement 2010, Policy 11 (a)(i).

³³ Robertson et al, 2021.

³⁴ NZ Coastal Policy Statement, Policy 11 (b).

³⁵ Bramley, 2023, p2.

³⁶ Bramley, 2023.

³⁷ Bramley, 2023, p2.

³⁸ *ibid*, p7.

³⁹ NPS-IB, Policy 7 and Policy 8.

66. The EEA states closer survey of vegetation on the property adjacent to the northern boundary of the site is not necessary because the proposed activity will not affect biodiversity beyond the location of the activity and its buffer area. That is an optimistic assumption. It is also inconsistent with the obligations that “A precautionary approach is adopted when considering adverse effects on indigenous biodiversity,”⁴⁰ and to “Adopt a precautionary approach towards proposed activities whose effects on the coastal environment are uncertain, unknown, or little understood, but potentially significantly adverse.”⁴¹
67. A precautionary approach is appropriate for this application because: the incomplete information about indigenous biodiversity at adjacent habitats means the effects on indigenous biodiversity are “uncertain;”⁴² and, those effects could cause “significant or irreversible damage” to indigenous biodiversity.⁴³
68. I cannot analyse the possible effects of altered hydrology on adjacent wetlands without better information on the character and composition of the plant communities at those wetlands. If there is any mining-induced alteration to hydrology (especially water levels) at adjacent wetlands, there remains a risk that there will be adverse effects on indigenous biodiversity.

Modification of Vegetation/Habitats by Land Movement

69. A possible adverse effect on adjacent vegetation and habitats is collapse of the wall of the excavated pit, if the proposed mitigation (injection wells) fails. Pit-wall stability is beyond my area of expertise. However, the expert hydrological review notes that “the question remains as to what injection pressures can be sustained without leading to pit wall instability.”⁴⁴
70. If a pit wall close to the site boundary did collapse, there could be significant adverse effects on adjacent vegetation/habitat through erosion and dewatering of the Canoe Creek Lagoon and other wetlands. The EEA provides insufficient information to assess the magnitude of that potential effect; vegetation and habitat on the property north of the site have not been surveyed as part of this application.
71. To address the risk of pit-wall collapse, and to protect nearby waterbodies, a 100 metres wide buffer was proposed at the earlier application hearing.⁴⁵
72. Another potential effect is modification or loss of adjacent vegetation/habitat in the event of catastrophic land movement (earthquake) or a storm event. The applicant’s response to the risk of the excavated mine pit causing or exacerbating erosion/dewatering of the coastal lagoon and other adjacent lagoons/wetlands following a catastrophic earthquake or coastal-inundation event is summarised in a letter from Tai Poutini Resources.⁴⁶ This letter quotes from the geotechnical assessment.

⁴⁰ NPS-IB, Policy 3.

⁴¹ NZ Coastal Policy Statement 2010, Policy 3 (1).

⁴² NPS-IB, Clause 3.7 (1)(a).

⁴³ NPS-IB, Clause 3.7 (1)(b).

⁴⁴ WGA211239-MM-HG-0002_A Consent application review, p7.

⁴⁵ Joint Report and Decision of the Hearing Commissioners Applications WCRC RC-2020-0159 and GDC LUN 29226/20, paras 55 & 143.

⁴⁶ Letter from Tai Poutini Resources to Grey District Council, 29 July 2023, p8.

73. The first quote is “The open pit is expected to be stable for the proposed configuration with no substantial ground displacement due to instability expected > 5m from the pit crest based on this study. The coastal lagoon, Collins Creek, Northern Drain and property boundaries are at low to very low risk of being adversely affected due to mining during operations and for the finished landform.”⁴⁷
74. The second quote is “The pit will be only open at the mining front and gets backfilled as the mining voids advances. The void (that facilitates lateral spread) is exposed for a very short duration. Combined with the very low likelihood of a “catastrophic” event, the potential for extensive damage away from the pit is intuitively Very Low.”⁴⁸
75. I do not have specialist expertise on likelihood of catastrophic land movement or erosion, but the likelihood of their occurrence does not appear to have been adequately addressed by the applicant. The information provided by the applicant, in response to my request, appears to only repeat statements made in the application.
76. The West Coast is a geologically dynamic environment; its contemporary landforms result from recent (in geological terms) land movement, erosion, and deposition. An important influence has been earthquake-induced movement. Rupture events on the Alpine Fault – the South Island’s major seismic hazard – have a recurrence interval of around 300 years. The last event was in approximately 1717, which implies that the Alpine Fault is late in its current seismic cycle.⁴⁹
77. The risk of an Alpine Fault rupture occurring during the proposed 12-year consent period for mining may be low.⁵⁰ However, if it did occur, the effects on the mine location – and adjacent areas – could be dramatic. The occurrence risk, and possible effects, do not appear to have been adequately addressed in the application.
78. Another important influence is storm events, notably intense rainfall and – at the Barrytown coastal plain – high seas (storm surges). This risk was discussed in the Commissioners’ decision on an earlier application: “Barrytown Beach is located to the west of the site and is identified in the operative West Coast Regional Coastal Plan (RCP) as a coastal hazard area having farmland and natural values of wetlands and coastal vegetation threatened by beach erosion and wave inundation and vulnerable to sea level rise effects.”⁵¹
79. Climate change is predicted to alter rainfall patterns, increase the frequency and severity of storm events, increase mean temperatures, and raise the sea level.⁵² The risk of storm events leading to inundation of the mine, and consequent erosion and/or dewatering of adjacent areas does not appear to have been adequately addressed in the application.

⁴⁷ Wylie, 2023.

⁴⁸ I cannot locate the source of this quote.

⁴⁹ Orchiston et al, 2018.

⁵⁰ It could be as high as 12%. See discussion under Analysis of Submissions.

⁵¹ Joint Report and Decision of the Hearing Commissioners Applications WCRC RC-2020-0159 and GDC LUN 29226/20, para 33.

⁵² Keegan et al, 2021.

Potential Adverse Effects on the Ecosystem

80. The proposed mine location is part of a coastal-plain ecosystem. The location is connected to other components of the ecosystem by hydrological and ecological processes, such water flows, movement of species, and habitat use. Examples are the hydrological connections with adjacent wetlands, and the flight paths of birds such as tāiko.
81. The application contains detailed information about the hydrology and ecological values of the mine location. Ecological values of adjacent areas – and the wider coastal-plain ecosystem – are less well documented. The risk of activities at the mine site having unexpected adverse effects on the coastal-plain ecosystem may be low. However, the application contains insufficient information on the values and functioning of that ecosystem to conclude that there will be no adverse effects and, if there were any adverse effects, that those effects would be minor.

Adequacy of Information

82. Three matters requiring further information were identified in May 2023:
 - i. Information on the vegetation at the coastal lagoon, PUN-W034 SNA, and any other adjacent indigenous vegetation/habitat, including an assessment of the vulnerability of plant communities (or individual species' populations) to hydrological changes.
 - ii. Information on the local populations (and habitat use) of cryptic/secretive bird species that are hard to detect and therefore may have been missed by on-site surveys, in particular: fernbird; bittern; reef heron; little blue penguin; marsh crane; and spotless crane.
 - iii. An assessment of the risk of the excavated mine pit causing or exacerbating erosion/dewatering of the coastal lagoon and other adjacent lagoons/wetlands following a catastrophic earthquake or coastal-inundation event.
83. The applicant's responses to these requests are discussed in the preceding paragraphs under the heading 'Potential Adverse Effects of the Activity' (above), and in the analysis of submissions (below).
84. Additional data that would assist in the assessment of potential adverse effects of the proposed activity are:
 - i. Descriptions of plant communities, including a comprehensive list of indigenous species in each plant community/vegetation type, at locations adjacent to the site (the property) that may be affected by hydrological changes.
 - ii. Avifauna surveys at habitats adjacent to the site, with a particular focus on cryptic or secretive species, such as matuku and fernbird. Subsequent, ongoing monitoring of avifauna at locations adjacent to the site – in addition to those at the site - may provide useful information for the future assessment of effects.
 - iii. Inventory of mobile invertebrate fauna at and in the vicinity of the site.

Analysis of Ecological Issues Raised by Submitters

85. Following the preparation of this evidence (above), submissions to the application were read. Information and views on terrestrial ecological values potentially affected by the proposed activity, and that are not already addressed in this evidence, are analysed below. In this analysis, the information/views are referenced to submission numbers; referenced submissions are listed in the table on page 3 of this evidence.

Tāiko/Westland petrel

86. A considerable number of submitters outline the potential adverse effects of the activity on the tāiko/Westland petrel population, principally the effects of artificial light. One submitter (101: Dr Susan Waugh) has undertaken extensive research on tāiko, and should be considered an expert on this species.
87. Tāiko are endemic to New Zealand, breed only in the Paparoa Range between the Fox and Grey rivers, and the largest and best-studied colony is behind the Barrytown Flats (101). Individuals are long-lived (up to 37 years), typically breed at 10 years of age, form long-term monogamous pairs, and are mostly nocturnal on land. The tāiko breeding season is from March to November, with adults typically returning to the colony at dusk. Fledglings leave the colony from November.⁵³
88. The main tāiko flyway is between the breeding colony and the sea (101), though birds have been recorded along the coast between Mokihinui and Hokitika,⁵⁴ and tāiko do not always fly straight to the sea; they are known to follow the coastline (317).
89. The population of tāiko is estimated to comprise 2800 (101) or 4000⁵⁵ breeding pairs. There is evidence the tāiko population has slowly increased since the 1970s,⁵⁶ but a range of threats have the potential to reduce population growth.⁵⁷
90. The main threats to the tāiko population are: landslips/extreme climate events that degrade nesting habitat; bycatch mortality in fisheries; attraction of fledglings to light; and potential encroachment of feral pigs into breeding areas. Storm events in 2014 severely reduced habitat quality, destroyed large parts of some colonies, and increased the likelihood of further landslips and erosion for 75% of the breeding population.⁵⁸ Vehicle movements and light disturbance are among the most important threats (101).
91. Less well understood are the threats posed by rapid increases in sea surface temperatures. The consistent use by tāiko of one marine area for foraging across varying times and conditions increases the risk of adverse effects on the population from climate or human-induced changes to sea temperatures and food supplies.⁵⁹

⁵³ NZ Birds Online

⁵⁴ Ibid.

⁵⁵ Ibid.

⁵⁶ Waugh et al, 2017.

⁵⁷ Waugh & Wilson, 2017.

⁵⁸ Ibid.

⁵⁹ Waugh et al, 2018.

92. These threats result in the present listing of the species as ‘at risk; naturally uncommon.’⁶⁰ Importantly, this listing has qualifiers that acknowledge that the threat status of tāiko would be higher if conservation management ceased and/or further species’ data were available. One submitter (101) notes that tāiko are now listed as ‘endangered’ by the International Union for Conservation of Nature and Natural Resources (IUCN). An NZCPS policy is to avoid adverse effects of activities on taxa that are listed by the IUCN as threatened.⁶¹ (In addition to avoiding adverse effects of activities on indigenous taxa listed as at-risk or threatened in the NZ Threat Classification System lists).
93. The principal threat posed to tāiko by the proposed activity is distraction/disorientation of birds (especially fledglings) by artificial light associated with activities at the mine location and by trucks transporting the mined material along the Coast Road. Birds grounded by light disturbance cannot easily fly away (due to their wing structure), so become vulnerable to mortality from traffic, predation, starvation, and dehydration (101). Grounded tāiko have been retrieved from locations between Hokitika and Westport (61). Groundings are most likely to occur between November and January.⁶²
94. The loss of additional individual tāiko through light disturbance or vehicle collision would make the population more vulnerable to decline and eventual extinction, especially if such losses coincided with other disturbances such as storm events. This risk is exacerbated by the increased frequency and severity of storm events that are predicted to result from human-induced climate change. The magnitude of the effect on the tāiko population from additional mortality will also be influenced by the resources available for protection and management of the breeding colony.
95. There appears to be no dispute between the applicant and submitters that increased light disturbance from mining and vehicle movements will increase the risk of tāiko mortality. The applicant’s response to this risk is to minimise lights and light-intensity at the mine location, restrict the hours of mining operations, and restrict the number and period of truck movements on the Coast Road, as set out the Avian Management Plan.
96. The proposed actions are expected to reduce – but not eliminate – the risk of tāiko mortality. The Avian Management Plan proposes that encounters with tāiko will be monitored and reported. If tāiko collision with a mine-related vehicle occurs, the plan will be reviewed “with a view to avoiding any further mortality.”⁶³ The Plan also proposes that TiGa staff will be trained to implement an “accidental discovery protocol.”
97. I proposed in my Review (para 59, above) that the risk to tāiko could be reduced by restricting mining operations and vehicle movements to daylight hours during November to January (inclusive). Further research in response to the information presented by submitters, leads me to conclude that it would be prudent to further reduce the risk of light disturbance to tāiko by ensuring all activities associated with the mine operation (including vehicle movements) are restricted to the hours and weather conditions during which no lights of any form are required.

⁶⁰ Robertson et al, 2021.

⁶¹ NZ Coastal Policy Statement 2010, Policy 11 (a)(ii).

⁶² Bramley & Bodley, 2023 (b). p11.

⁶³ Bramley & Bodley, 2023 (b). p13; p14

98. If a restriction such as that outlined above does not eliminate the risk of tāiko mortality, there is no certainty that the activity will avoid adverse effects on tāiko. The precarious state of the tāiko population means that the loss of any individual from the population should be considered an adverse effect. Avoidance of such an adverse effect is required by the NZCPS.
99. A further issue raised by submitters (e.g., 60; 241) is the effectiveness and reliability of the mine operator reporting tāiko mortality. If conditions of a consent for the activity require the modification or cessation of mine operations in the event of grounded tāiko, there will be little incentive for staff at the mine location or truck drivers to report such incidents. A more reliable method of tāiko monitoring should be considered.

Matuku/Australasian bittern

100. One submitter (87) states that they have observed matuku at Canoe Creek Lagoon. The submission of the Director General of Conservation (241) notes that vegetation at Canoe Creek Lagoon (particularly raupo) is a key feature of the habitat of shy wetland species, including matuku.
101. Matuku are extremely cryptic and rarely seen: their secretive behaviour, inconspicuous plumage, and inaccessible habitats mean they are frequently overlooked. Matuku are found throughout the country, and in Australia. Favoured habitats in New Zealand are raupo-fringed lakes, spring-fed creeks with vegetative cover, and rank grass along paddock/drain edges. Birds typically utilise a network of habitats, seasonally.⁶⁴
102. Matuku can travel long distances; the longest recorded flight in New Zealand is 140km. The estimated population size in New Zealand in the 1980s was 900 individuals, though there has been a steep decline in the population since that time. There is a similarly low population, and steep decline, in Australia.⁶⁵ Matuku are listed as threatened/nationally critical, with the qualifiers: CR (conservation research needed); DPT (data poor trend); RF (recruitment failure); Sp (sparse); and, TO (threatened overseas).⁶⁶ Matuku are extremely sensitive to disturbance.⁶⁷
103. The applicant notes that matuku were “identified as being present within 10 km of the site, but not confirmed as present during the surveys of the site,” and that efforts will be made to detect and monitor matuku “prior to the commencement of mining and continue until mining is completed.”⁶⁸ The applicant provides further information on matuku observations on the West Coast, noting there are five records within 10km of the site, and that “the rāupo, flaxland and other foraging habitat on the fringes of the lagoon is very suitable for bittern, but may not be sufficiently dense for breeding.”⁶⁹
104. There appears to be no dispute that matuku are present – probably only occasionally – and that vegetation at Canoe Creek Lagoon provides favourable matuku habitat. It is also evident that matuku are difficult to detect, and sensitive to disturbance. I proposed in my Review (para 53, above) that the risk to matuku could be mitigated by providing a buffer of 100m (instead of

⁶⁴ NZ Birds Online.

⁶⁵ Ibid.

⁶⁶ Robertson et al, 2021; Townsend et al, 2008.

⁶⁷ NZ Birds Online.

⁶⁸ Bramley & Bodley 2023 (b). p4 & p17.

⁶⁹ Bramley, 2023. p4.

20m) between the lagoon margin and mining operations. The analysis in the preceding paragraphs affirms the need for an adequate buffer.

105. If a restriction such as that outlined above does not eliminate disturbance of matuku, there is no certainty that the risk of adverse effects on this threatened species will be avoided. The population size and threat status of matuku means that displacement of any individual by disturbance should be considered an adverse effect. Avoidance of such an adverse effect is required by the NZCPS.

Royal spoonbill and kotuku/white heron

106. Three submitters (45, 87, 103) note that royal spoonbill (*Platalea regia*) and kotuku/white heron (*Ardea modesta*) use the Canoe Creek Lagoon habitat. A kotuku was observed at the site on the day of my visit. Kotuku are listed as threatened/nationally critical, with the qualifiers: CR (conservation research needed); OL (one location); SO (secure overseas); and, St (stable).⁷⁰ Royal spoonbill is listed as at risk, naturally uncommon, with the qualifiers: Inc (increasing); RR (range restricted); SO (secure overseas); and, Sp (sparse).⁷¹
107. These two species appear to be occasional users of the lagoon habitat. They are not known to breed at the lagoon: the only recorded breeding location of kotuku in New Zealand is near Okarito Lagoon; royal spoonbill breed at several coastal locations throughout the country.⁷² Disturbance of these species by mining activities would be an effect; it is less clear whether the magnitude of any adverse effects on the species (instead of on individuals) would be more than minor.
108. The NZCPS also requires that activities must avoid significant adverse effects on vulnerable coastal ecosystems and habitats, including lagoons. There are insufficient data to confidently determine whether any adverse effects on royal spoonbill and kotuku habitat at the lagoon would be significant.

Kororā/little penguin

109. Submitters express concern at the potential effects on kororā/little penguin (*Eudyptula minor*). Annual surveys (2011-2015) recorded kororā tracks on the Barrytown Beach (between Razorback Point and 17 Mile Bluff), and kororā are present in the vicinity of the proposed mine (61). Kororā nest along the Barrytown Flats north and south of the proposed mining area (84), and there are recent records of kororā at buildings and rock stacks inland from the beach within 2km of the mine location (208).
110. Kororā mortality from collisions with vehicles on the Coast Road have been recorded north and south of the location of the proposed mine (223). Observations over a ten-year period (2000 to 2010) recorded “around about 100 kororā over this ten year period deceased on the highway after vehicle collisions” (309). Several submitters note the lack of consideration of kororā in the application documents.

⁷⁰ Robertson et al, 2021; Townsend et al, 2008.

⁷¹ Robertson et al, 2021; Townsend et al, 2008.

⁷² NZ Birds Online.

111. Kororā are locally common along the New Zealand coast. They are primarily nocturnal on land, returning to nesting areas on dusk. Nests comprise burrows or cavities, including under or within artificial structures such as buildings and rock-stacks. Many adult kororā are hit and killed by cars where coastal roads run between nesting areas and the sea, such as in north Westland.⁷³
112. Kororā nest between July and December, with peaks in August and November. Both sexes incubate, with short shifts of 1-2 days, until the eggs hatch after 33-43 days.⁷⁴ Kororā adults are therefore at risk of mortality from vehicles from mid-winter (July) to early summer (December).
113. Kororā are listed as at risk/declining, with the qualifiers: CI (climate impact); CR (conservation research needed); DPS (data poor size); and, DPT (data poor trend).⁷⁵ The main threats to kororā are predation, risk of entanglement in nets, collision with vehicles, and encroachment on or displacement from breeding habitat.⁷⁶ Other threats are changes to the abundance and distribution of food supply by climate change/marine heatwaves (61).
114. Consideration of kororā in the Avian Management Plan are: listing the species as present within 10km of the mine site; inclusion as a species to managed at the mine site; and, discussion of kororā distribution and habitat use.⁷⁷ Additional data on kororā are provided in response to the request for further information, including records of kororā in the vicinity of the mine location. The only reference to road mortality is a dead kororā “observed at the end of Burke Road during the field work for this project in 2020.”⁷⁸
115. A significant potential adverse effect of the mine operation is mortality of kororā caused by mine traffic on the Coast Road. There are insufficient data in the application documents to determine the potential magnitude of this effect. Information provided by submitters indicates that the magnitude of this effect may be high. Kororā are an at-risk species, so avoidance of such an adverse effect is required by the NZCPS.
116. Annual average daily traffic on State Highway 6 at Canoe Creek is 786 vehicles, 11% (88) of which are heavy vehicles.⁷⁹ The proposed mining activity will generate 50 heavy vehicle movements (30 tonnes per truck) per day.⁸⁰ The activity will generate other – light vehicle – traffic. The heavy vehicles alone will increase traffic on the Coast Road by 6.3%, and will increase heavy vehicle traffic by 57%.
117. To help avoid adverse effects on kororā, it would be prudent to restrict mine traffic on the Coast Road to hours of daylight, outside the dawn and dusk periods, for the July to December period.

⁷³ Ibid.

⁷⁴ Heather & Robertson, 1996.

⁷⁵ Robertson et al, 2021; Rolfe et al, 2021.

⁷⁶ NZ Birds Online.

⁷⁷ Bramley & Bodley, 2023 (b).

⁷⁸ Bramley, 2023. p5.

⁷⁹ Annual Average Daily Traffic (AADT) data, Waka Kotahi/NZ Transport Agency.

⁸⁰ Bramley et al, 2023. p5.

Buffering to avoid effects of the activity on avifauna

118. One component of the avoidance of adverse effects on avifauna discussed in the preceding paragraphs is provision of a buffer between the activity and avifauna habitat on adjacent properties, notably Canoe Creek Lagoon. Determining the distance required for an adequate buffer is difficult; there are no published standards of which I am aware. The distance required to avoid disturbance of avifauna will depend on factors including the sensitivity of the affected species, the ambient disturbance levels, the type and frequency of the activity, and timing.
119. The Avian Management Plan proposes an initial buffer of 100m,⁸¹ though provides no data to justify that distance. The Commissioners' decision on an earlier application for this activity also proposed a 100m buffer, based on the evidence presented at that hearing.⁸²
120. The main potential adverse effects of the activity on adjacent avifauna habitats appear to be noise, artificial light, and movement/activity. With respect to noise, the Assessment of Noise Effects⁸³ prepared for the applicant is of limited use for assessing effects on avifauna. The sampling sites used for that assessment were all east of the proposed mine (near the Coast Road), and were selected for the purpose of assessing effects of noise on residents at nearby dwellings.⁸⁴
121. I am unaware of any assessment of ambient noise, or the effects of noise, at adjacent areas of wildlife habitat, such as Canoe Creek Lagoon. The Assessment of Noise Effects indicates that ambient noise levels near residences are between 50 and 60 dB. The assessment does not appear to provide comparable noise levels from machinery and equipment near the wildlife habitat.⁸⁵
122. The Avian Management Plan proposes parking "earthworks machinery" and "starting the engine from time to time" as a method for discouraging bird-nesting at the mine location.⁸⁶ The effectiveness of this method is unclear. However, it indicates an expectation that machinery noise will disturb avifauna.
123. An example of noise effects on avifauna was provided on the day of my site visit. A kotuku/white heron that had landed at the site took flight in response to a loud bang nearby.⁸⁷ The type of noise, and perhaps the frequency at which the noise levels change, may be important determinants of adverse effects on avifauna.
124. The potential adverse effects of the noise of mine machinery and vehicles on avifauna at adjacent habitats, and the buffering required to avoid those effects, do not appear to be adequately addressed in the application.

⁸¹ Bramley & Bodley 2023 (b). p7.

⁸² Joint Report and Decision of the Hearing Commissioners Applications WCRC RC-2020-0159 and GDC LUN 29226/20, paras 55 & 143.

⁸³ Marshall Day, 2023.

⁸⁴ Ibid, Fig.2, p7.

⁸⁵ I understand that the noise levels cited for machinery and vehicles (Marshall Day, 2023, Table 5, p14) are sound power levels, so cannot be directly compared with the cited ambient noise levels (measured sound pressure level data) (Darran Humpheson, pers.comm.).

⁸⁶ Bramley & Bodley 2023 (b). p10.

⁸⁷ Mark Geddes, pers.comm.

Avian Management Plan

125. Components of the Avian Management Plan are discussed in the preceding paragraphs. Additional components relevant to issues raised by submitters are the management of avifauna at the mine location, and monitoring of avifauna at adjacent habitats.
126. The Avian Management Plan notes that “site works and other activity is likely to deter birds (except dotterel) from establishing nests near that activity, forcing them nest elsewhere.”⁸⁸ If the mining activity does not discourage birds from nesting at the mine location, three methods are proposed for species management to “reduce the need to disrupt mining activities.” These methods are: “completing a disruptive site walkover;” “installing streamers/tapes that flutter in breeding habitats to deter birds from nesting;” and, “parking earthworks machinery in future stage locations, starting the engine from time to time, but not moving equipment.”⁸⁹
127. The methods proposed to discourage nesting do not avoid effects. Instead, the purpose of the actions is to have an effect: displacement of birds from potential nest sites. It is unclear from the data provided in the application – and from our limited knowledge of avifauna habitat use in the area – whether these actions would have adverse effects on ‘at risk’ or ‘threatened’ taxa (instead of effects only on individual birds) and whether the magnitude of any adverse effects would be more than minor.
128. A more appropriate response to the presence of ‘at risk’ or ‘threatened’ avifauna at the mine location would be to cease mining activity, and not recommence the activity until that habitat use ceases.
129. The Avian Management Plan proposes monitoring of avifauna at the mine location, and at locations adjacent to the site (the property), and annual reporting of the results of that monitoring.⁹⁰ This monitoring will provide information about birds present at the site, and at areas immediately adjacent to the site. Over time (many years) it will provide valuable data on the avifauna of the area.
130. The monitoring proposed in the Avian Management Plan may provide adequate data on the effects of the activity on avifauna at the mine location. However, it will not provide adequate data on the effects of the activity on avifauna at habitats adjacent to the site. The provision of data sufficient for robust (scientific) analysis would require: better baseline data; monitoring of other variables (e.g., natural climate fluctuation and disturbance); and, monitoring at a control site (undisturbed by the mining activity).
131. The difficulty of monitoring the effects on avifauna is compounded by the fact that adjacent areas (notably Canoe Creek Lagoon) may provide critical habitat for species that are present only occasionally or sporadically. The open-freshwater, wetland, and beach habitats of the Barrytown Flats represent the only extensive habitats of these types along a long – and otherwise steep and rocky – coastline. The significance of these habitats – even if used only occasionally – may be greater than suggested by their size and condition.

⁸⁸ Bramley & Bodley 2023 (b). p9.

⁸⁹ Ibid. p10.

⁹⁰ Bramley & Bodley 2023 (b). p17-18.

Hydrology and wetlands

132. The potential effects of the activity on wetlands and lagoons in the vicinity of the mine location are also raised by some submitters. The submission of the Director General of Conservation (241) notes that the “coastal lagoon immediately west and north of the application area is dominated by native plant species and has high ecological values.” And, “both the excavations and water extraction have the potential to change the hydrology of the lagoon and therefore potentially change the lagoon vegetation” (241).
133. The submission of the Director General of Conservation further notes that “records dating back to 1881 clearly show the area as coastal lagoon, north and south of Canoe Creek” and that the area is therefore subject to the provisions of the National Policy Statement Freshwater Management Regulations 2020, contrary to the applicant’s statement that the coastal lagoon is manmade.
134. These submissions affirm the importance (discussed above, in the review of terrestrial ecology matters) of providing certainty that mine operations will not affect the hydrology of adjacent areas.

Ecosystem effects

135. Several submitters note that the area supports remnants of a formerly-extensive sandplain forest ecosystem, and that it represents the best remaining coastal lowland habitat on the Barrytown Flats. Submitters state that the mine site provides critical habitat connectivity to other remnant habitats and the forested Paparoa Range (80), and note the importance of protection of the mountains to sea forest corridor and restoration of the sandplain forest ecosystem (84).
136. As discussed above (para 80-81) the application contains insufficient information on the values and functioning of that ecosystem. It is therefore difficult to conclude that there will be no ecosystem-wide adverse effects arising from the activity and, if there were any adverse effects, whether those effects would be minor.
137. The NZCPS requires that activities avoid adverse effects on “indigenous ecosystems and vegetation types that are threatened in the coastal environment, or are naturally rare.”⁹¹ Remnants of the sandplain ecosystem (forest and wetlands/lagoons) are depleted to an extent that they should be considered “rare.”

Coastal erosion

138. Several submissions contain observations of regular coastal erosion. For example: observation of “significant coastal erosion” at the Conservation Volunteers NZ restoration site (84); “As a frequent beach user around Barrytown, I have seen the coastal erosion taking place and the effects of storms and high tides on the shoreline” (141); and, “The erosion of the land along the beach is clearly visible with clumps of dirt/land being washed away with every high or big tide” (179). These statements are consistent with my own observation of recently-deposited driftwood on a paddock at the mine site.

⁹¹ NZ Coastal Policy Statement 2010, Policy 11 (a)(iii).

139. The West Coast Proposed Coastal Plan describes the coastal hazard for the area between Burke Road and 17 Mile Bluff as “Loss of farmland, residential sections at risk due to long term erosion from longshore drift of beach material from south to north, and wave washover flooding. Erosion, flooding risk around creek mouths from mouth migration or blockage.” The risk priority ranking is ‘medium.’⁹² Lower (coastal) parts of the proposed mine location lie within a ‘coastal inundation’ zone in the Te Tai o Poutini Plan.⁹³
140. As discussed above (para 79), there is a risk of storm events leading to inundation of the mine, and consequent erosion and/or dewatering of adjacent areas. This risk does not appear to have been adequately addressed in the application.

Earthquake risk

141. Several submissions articulate the likelihood of a major earthquake, and the risk of catastrophic land disturbance at the mine. Submitters note that there is a 75% chance of a major rupture of the Alpine Fault occurring within the next 50 years, and an 82% likelihood of that event being magnitude 8 (or greater). One submitter (80) calculates that over the 12-year term of the mine consent, the probability of such an event occurring is approximately 12%.
142. The risk of catastrophic failure of the mine – and the consequent risk of coastal erosion and sea-water incursion – are discussed above (para 74-77). The likelihood of catastrophic land movement or erosion has not been adequately addressed in the application. The applicant’s assessment is that “Combined with the very low likelihood of a “catastrophic” event, the potential for extensive damage away from the pit is intuitively Very Low.”⁹⁴ This assessment appears optimistic; prediction of risk should be based on data, not intuition.

Summary

143. The applicant’s description of vegetation at the location (the proposed mine footprint) is consistent with my observations during a site visit. The description of avifauna is limited by the duration of surveys (one year). Additional notable bird species observed at the location since the surveys are pacific reef heron and kotuku/white heron. No data are provided on invertebrate fauna.
144. The applicant’s assessments of indigenous biodiversity values at the site, and of the potential effects of the activity, are constrained – and the values and effects inappropriately reduced – by use of the non-statutory (EIANZ) Guidelines.
145. Assessment of the wider ecological effects of the proposed activity is constrained by the lack of vegetation and avifauna surveys of adjacent sites, and further constrained by our limited understanding of ecological processes in the wider Barrytown Flats coastal-plain ecosystem.
146. Potential adverse effects of the activity on terrestrial ecology at the mine location are displacement of mobile fauna (such as South Island pied oystercatcher) from feeding – and possibly breeding – habitat, and grounding (and subsequent mortality) of birds (such as tāiko)

⁹² West Coast Proposed Coastal Plan 2016. p110.

⁹³ Te Tai o Poutini (TTPP) Draft Coastal Hazard Mapping Variation for Consultation, November 2023.

⁹⁴ Letter from Tai Poutini Resources to Grey District Council, 29 July 2023, p8.

distracted by artificial light or other mining activities. Potential adverse effects on invertebrate fauna are unknown.

147. Potential direct adverse effects of the activity on terrestrial ecology at adjacent sites are disturbance of avifauna through mine operations, notably artificial light, movement, and noise. Adjacent areas are known – despite lack of formal survey – to provide habitat for threatened and at-risk bird species.
148. The applicant’s proposals to address these potential adverse effects on terrestrial ecology may minimise the risk – and mitigate the effects – but will not provide certainty that adverse effects on threatened and at-risk taxa will be avoided (as required by the NZ Coastal Policy Statement).
149. A potential indirect effect is loss of indigenous vegetation and habitat – notably at wetlands and lagoons – through a reduction in ground-water levels following collapse of the pit wall and/or inadequate recharge of the water table. Similar – and more catastrophic – adverse effects on terrestrial ecology at adjacent sites may occur in the event of sea-water incursions/storm surges.
150. Predicted effects of climate change are increased intensity and frequency of storm events, and consequent coastal erosion, which increase the risk of catastrophic landform failure at the mine location. Storm events, and changes in sea-surface temperatures, make the species potentially affected by the activity (notably tāiko) more vulnerable to population declines and extinction.
151. Historic data suggest that significant land displacement along the Alpine Fault, and a consequent high-magnitude earthquake, are overdue. There is insufficient information in the application to assess the risk – and consequences for terrestrial ecology – of catastrophic land movement resulting from a high-magnitude earthquake.
152. An important potential adverse effect of the activity on terrestrial ecology away from the mine location is grounding and subsequent mortality of tāiko/Westland petrel following distraction by vehicle lights and/or collision with mine-traffic on the Coast Road. A further potential adverse effect away from the mine location is mortality of kororā/little penguin on the Coast Road, when birds moving between nest sites and the sea are struck by vehicles. The potential adverse effects on kororā have not been adequately addressed in the application.

Mike Harding

12 December 2023

References Cited

- Bramley, G.; Carter, N.; Fitzpatrick, M. 2023. Barrytown Mineral Sand Mine Ecological Effects Assessment. Ecological Solutions report to TiGa Minerals and Metals Limited. 82p.
- Bramley, G. 2023. Att E – Ecological Response Memorandum, 8p.
- Bramley, G.; Bodley, R. 2023 (a). Wetland Construction and Riparian Planting Plan. Ecological Solutions Report. 25p.
- Bramley, G.; Bodley, R. 2023 (b). Barrytown Mineral Sand Mine Avian Management Plan. Ecological Solutions Report. 27p.
- Bramley, G.; Carter, N.; Fitzpatrick, M. 2023. Barrytown Mineral Sand Mine Ecological Effects Assessment. Ecological Solutions Report. 82p.
- Marshall Day, 2023. Barrytown Mineral Sand Mine Assessment of Noise Effects. Marshall Day Acoustics Report No. Rp 002 R03 20191310. 32p.
- Heather, B.D.; Robertson, H.A. 1996. *Field Guide to the Birds of New Zealand*. Viking.
- Orchiston, C.; Mitchell, J.; Wilson, T.; Rob Langridge, Davies, T.; Bradley, B.; Johnston, D.; Davies, A.; Becker, J.; McKay, A. (2018) Project AF8: developing a coordinated, multi-agency response plan for a future great Alpine Fault earthquake, *New Zealand Journal of Geology and Geophysics*, 61:3, 389-402, DOI: [10.1080/00288306.2018.1455716](https://doi.org/10.1080/00288306.2018.1455716)
- Robertson, H.A.; Baird, K.; Elliot, G.P.; Hitchmough, R.A.; McArthur, N.J.; Makan, T.D.; Miskelly, C.M.; O'Donnell, C.F.J.; Sagar, P.M.; Scofield, R.P.; Taylor, G.A.; Michel, P. 2021. Conservation status of birds in Aotearoa New Zealand, 2021. *New Zealand Threat Classification Series* 36. Department of Conservation, Wellington.
- Rolfe, J.; Makan, T.; Tait, A. 2019. Supplement to the New Zealand Threat Classification System manual; New qualifiers and amendments to qualifier definitions 2021.
- Rolfe, J.; Makan, T.; Tait, A. 2021. Supplement to the New Zealand Threat Classification System manual 2008; New qualifiers and amendments to qualifier definitions.
- Roper-Lindsay, J.; Fuller, S.A.; Hoosen, S.; Sanders, M.D.; Ussher, G.T. 2018. Ecological Impact Assessment. EIANZ guidelines for use in New Zealand: terrestrial and freshwater ecosystems. 2nd edition.
- Townsend, A.J.; de Lange P.J.; Duffy, C.A.J.; Miskelly, C.M.; Molloy, J.; Norton, D.A. 2008. *New Zealand Threat Classification System Manual*. Department of Conservation, Wellington.
- Waugh, S.M.; Barbraud, C.; Adams, L.; Freeman, A.N.D.; Wilson, K-J.; Wood, G.; Landers, T.J.; Baker, G. B. 2015. Modelling the demography and population dynamics of a subtropical seabird, and the influence of environmental factors. *The Condor* 117: 147-164.
- Waugh, S.M.; Wilson, K-J. 2017. Threats and threat status of the Westland petrel (*Procellaria westlandica*). *Marine Ornithology* 45: 195-203.

Waugh, S.M.; Griffiths, J.W.; Poupart, T.A.; Filippi, D.P.; Rogers, K.; Arnould, J.Y.P. 2018. Environmental factors and fisheries influence the foraging patterns of a subtropical seabird, the Westland Petrel (*Procellaria westlandica*), in the Tasman Sea. *The Condor* 120: 371-387.

Wylie, C.A. 2023. Geotechnical Assessment Tailings Operations and Storage. Barrytown Mineral Sands Tailings. TiGa Mineral and Metals Ltd. 29p + appendices.

Attachment 1: Schedule 97 Taonga Species

Taonga species⁹⁵ recorded at or in the vicinity of the site:

Bird species recorded at or adjacent to the site by the applicant:⁹⁶

kāhu	Australasian harrier	<i>Circus approximans</i>
kōau	black shag	<i>Phalacrocorax carbo</i>
matuku moana	reef heron	<i>Egretta sacra</i>
pākura/pūkeko	swamp hen	<i>Porphyrio porphyrio</i>
pārera	grey duck	<i>Anas superciliosa</i>
pīpīwharau	shining cuckoo	<i>Chrysococcyx lucidus</i>
pīwakawaka	South Island fantail	<i>Rhipidura fuliginosa</i>
poaka	piebald stilt	<i>Himantopus himantopus</i>
riroriro	grey warbler	<i>Gerygone igata</i>
ruru kōkō	morepork	<i>Ninox novaeseelandiae</i>
pūtakitaki	paradise shelduck	<i>Tadorna variegata</i>
tara	white-fronted tern	<i>Sterna striata</i>
tūi	tūi	<i>Prothemadera novaeseelandiae</i>
weka	western weka	<i>Gallirallus australis australis</i>

Additional taonga bird species recorded at or adjacent to the site by other observers:

karoro	black-backed gull	<i>Larus dominicanus</i>
kotuku	white heron	<i>Ardea modesta/Egretta alba</i>

Additional taonga bird species of conservation interest recorded (on eBird) within 10km of the site:⁹⁷

kakariki	yellow-crowned parakeet	<i>Cyanoramphus auriceps</i>
karearea	New Zealand falcon	<i>Falco novaeseelandiae</i>
kororā	little/blue penguin	<i>Eudyptula minor</i>
kōau	little shag	<i>Phalacrocorax melanoleucos brevirostris</i>
kōau	piebald shag	<i>Phalacrocorax varius varius</i>
pihoihoi	New Zealand pipit	<i>Anthus novaeseelandiae</i>
tītī	sooty shearwater	<i>Puffinus griseus</i>
tītī	tāiko/Westland petrel	<i>Procellaria westlandica</i>
mātā	South Island fernbird	<i>Bowdleria punctata punctata</i>
roroa	great spotted kiwi	<i>Apteryx haastii</i>
tara	black-fronted tern	<i>Chlidonias albobristatus</i>

Other taonga bird species likely to utilise habitats in the vicinity of the site:

korimako	bellbird	<i>Anthornis melanura</i>
kōtare	kingfisher	<i>Halcyon sancta</i>
kūkupa/kererū	New Zealand pigeon	<i>Hemiphaga novaeseelandiae</i>

⁹⁵ Ngai Tahu Claims Settlement Act 1998.

⁹⁶ Bramley et al, 2023, Table 8; Bramley, 2023.

⁹⁷ Bramley et al, 2023. Table 7.

Plant species recorded at or immediately adjacent to the site by the applicant:

harakeke	flax	<i>Phormium tenax</i>
kahikatea	white pine	<i>Dacrycarpus dacrydioides</i>
kāpuka	broadleaf	<i>Griselinia littoralis</i>
raupo	raupo	<i>Typha orientalis</i>
tī kōuka	cabbage tree	<i>Cordyline australis</i>

Additional taonga plant species recorded at or immediately adjacent to the site by other observers:

akatorotoro	white rata	<i>Metrosideros perforata</i>
aruhe	fernroot/bracken	<i>Pteridium esculentum</i>
koromiko	koromiko	<i>Veronica salicifolia</i>
tarata	lemonwood	<i>Pittosporum eugenioides</i>

**BEFORE THE HEARING COMMISSIONERS APPOINTED BY GREY
DISTRICT COUNCIL AND WEST COAST REGIONAL COUNCIL**

Under

The Resource Management Act 1991

And

In the matter of

**Applications by TiGa Minerals and Metals Ltd
to establish and operate a mineral sand mine on
State Highway 6, Barrytown (RC-2023-0046;
LUN3154/23)**

**Supplementary Statement of Mike Harding
on behalf of Perspective Consulting/Grey District Council
Terrestrial Ecology
Dated: 18 March 2024**

Table of Contents

Background	3
Purpose and Scope	3
Effects at the location (mine footprint).....	4
Effects at adjacent habitats.....	7
Effects of mine vehicles on fauna along State Highway 6	10
Catastrophic events	10
Coastal plain ecosystem	11
Commissioner Minute No.6.....	11
Avian Management Plan.....	12
Proposed Consent Conditions.....	13
Conclusion.....	15

Background

1. My name is Mike Harding.
2. I prepared terrestrial ecology evidence on behalf of Perspective Consulting/Grey District Council dated 12 December 2023. My qualifications and experience are set out in that evidence. I confirm that I have complied with the code of conduct for expert witnesses (Environment Court's Practice Note 2023) when preparing this statement.

Purpose and Scope

3. This statement supplements the advice provided in my 12th December 2023 review of terrestrial ecology. It considers the additional information provided in the applicant's evidence (January 2024), supplementary statements (February 2024), material presented by expert witnesses and submitters at the hearing (February 2024), and post-hearing documents (March 2024).
4. This supplementary statement addresses outstanding terrestrial ecology issues under the following headings. It then responds to questions raised in Commissioner Minute 6, and provides comments on the Avian Management Plan and proposed Conditions of Consent:
 - a) Effects at the location (mine footprint).
 - b) Effects at adjacent habitats.
 - c) Effects of mine vehicles on fauna along State Highway 6.
 - d) Catastrophic events.
 - e) Coastal plain ecosystem.
 - f) Commissioner Minute 6.
 - g) Avian Management Plan.
 - h) Proposed Conditions of Consent.

Effects at the location (mine footprint)

Taiko

5. An important potential effect of the proposed activity at the mine location is the presence of artificial light which may cause grounding of taiko/Westland petrel. Expert evidence and submissions confirm this risk.
6. For example, the evidence of Dr Waugh states that taiko “come into land in the early evening, and generally fly out to sea before dawn,” “don’t fly in a direct line from the sea to the colonies, and they spend up to 1 hr circling above the land/sea and colony boundaries before landing.”¹ It also states that taiko flight paths can vary depending on wind and weather conditions.
7. The revised application restricts most mining activities – including transport of material – to daylight hours (30 minutes before sunrise to 30 minutes after sunset). It is unclear, from the evidence of which I am aware, whether that time restriction is sufficient to avoid adverse effects on taiko. It may be prudent for the restriction to include “weather conditions that require external lighting” as noted by Dr Waugh² and Kate Simister.³
8. The revised application proposes to restrict artificial light in accordance with a Lighting Management Plan (LMP). The restricted operating hours and lighting will reduce – but may not eliminate – the risk of taiko groundings.
9. Kate Simister notes that the LMP was prepared by Dr Bramley, “who states no qualifications, or experience in designing, implementing lighting mitigation at operational mine sites.”⁴ I concur that such a plan should be prepared by an appropriately qualified lighting practitioner in consultation with an appropriately qualified ecologist.
10. Ceri Warnock raises the concern that the proposed LMP may be incompatible with mine health and safety requirements.⁵ The suitability and effectiveness of the LMP remains uncertain until that issue is resolved.

¹ Statement of Evidence, Dr Susan Waugh, 25 January 2024 [50].

² *ibid* [70]

³ Summary Statement of Oral Evidence, Kate Simister, 26 February 2024 [6]

⁴ Supplementary Statement, Kate Simister, 15 March 2024 [7]

⁵ Legal Submission from Counsel on behalf of the Director-General of Conservation, Ceri Warnock, 15 March 2024.

11. The frequency and extent of “maintenance of equipment supporting the WCP plant which cannot be deferred until daylight is required, or when staff are moving between buildings”⁶ is unclear. If this is a commonly occurring activity, the risk of taiko grounding may be high.
12. Submissions and evidence indicate the difficulty detecting grounded taiko. Grounded birds seek cover, are dark-coloured, and remain quiet. Observations at night, without artificial light, by mine staff, are unlikely to be a reliable method of detecting grounded birds. Grounded taiko appear more likely to be observed when they emerge from shelter during daylight hours, by which time the birds are weak and unlikely to survive regardless of intervention.
13. The revised Avian Management Plan (AMP) proposes installation of ten trail cameras to record (continuously at night) any grounded birds.⁷ The reliability of trail cameras to record birds in the dark is unclear. Operation of the cameras during daylight hours (as well as night-time) may help detect the emergence from cover of any grounded taiko. Nevertheless, the cameras will not ensure that adverse effects on taiko are avoided; instead, they will help ensure that this effect is more likely to be detected.
14. Dr Bramley states that the camera footage will be reviewed by an independent ecologist.⁸ This requirement is not clearly stated in the consent conditions.⁹
15. I advised earlier that the loss of an individual taiko would have an adverse effect on the taiko population.¹⁰ Expert evidence of Dr Susan Waugh¹¹ and Kate Simister¹² concurs that the loss of individual taiko would have a population-level effect. The evidence I have heard affirms my view that the loss of an individual taiko would likely be a significant (more than minor) adverse effect.

⁶ Supplementary Statement, Gary Bramley, 8 March 2024 [11]

⁷ Avian Management Plan v5, p30.

⁸ Supplementary Statement, Gary Bramley, 8 March 2024 [19]

⁹ Consent Condition 18.5, as presented in the Avian Management Plan v5, p11.

¹⁰ Terrestrial Ecology Review, Mike Harding, 12 December 2023 [94]

¹¹ Statement of Evidence, Dr Susan Waugh, 25 January 2024 [37 & 63]

¹² Statement of Evidence, Kate Simister, 26 January 2024 [67-68]; Summary Statement of Oral Evidence, Kate Simister, 26 February 2024 [11]

Kororā

16. Since the preparation of my earlier review, further evidence has been presented which indicates a greater likelihood that kororā may use – or traverse – the mine location.¹³ The revised AMP acknowledges the possible presence of kororā.¹⁴
17. The revised AMP proposes monitoring of kororā prior to commencement of mining and eliminating cavities under buildings (potential nest sites). These measures, along with restricted operating hours and lighting will reduce – but may not eliminate – the risk of kororā disturbance or mortality.
18. The revised AMP proposes that actual response to the presence of kororā will be determined by a – yet to be prepared – “response” plan” or “management plan.”¹⁵ The AMP states that the response plan may include “relocation” of nesting kororā. Displacement of kororā from favoured nesting sites may have a significant adverse effect, and therefore be inconsistent with the goal of the AMP.

Displacement of other nesting birds

19. A further potential effect of the activity is disturbance or displacement of birds that forage or nest at the mine location, such as South Island pied oystercatcher and possibly banded dotterel, or traverse the mine location, such as kororā.
20. The revised AMP proposes surveys of the proposed mining area during the bird breeding season to detect “breeding behaviour or nesting.” Proposed species’ management “comprises discouraging nesting before it occurs and managing any established nests once they are discovered.”¹⁶ Bird nesting will be discouraged to “reduce the need to disrupt mining activities by having to place a 50m buffer around any nests.”¹⁷
21. Such management actions will not avoid adverse effects on avifauna, as birds would be displaced from favoured forage or breeding sites. The magnitude of the adverse effects of any displacement is unclear.

¹³ Oral submission of New Zealand Penguin Initiative.

¹⁴ Avian Management Plan v5, p20.

¹⁵ *ibid* p27

¹⁶ *ibid* p24

¹⁷ *ibid* p25

22. Dr Bramley responds to the evidence of Dr Waugh at paragraph 85 (which supports my evidence at paragraphs 126-127) “that the methods proposed to deter dotterel and pipit are unproven.”¹⁸ Dr Bramley then describes in detail the efficacy of different methods for displacing birds from potential nest sites.¹⁹
23. My primary evidence at paragraphs 126-127 is not about the effectiveness of different displacement methods. Instead, my evidence stated that because the purpose of the methods is to displace birds from potential nest sites, it will not avoid adverse effects on indigenous fauna.
24. As stated in my earlier evidence: It is unclear whether these actions would have adverse effects on ‘at risk’ or ‘threatened’ taxa and whether the magnitude of any adverse effects would be more than minor.²⁰ Dr Bramley’s supplementary statement does not address this concern.

Invertebrate fauna

25. My terrestrial ecology review noted the lack of data on the presence of or effects on mobile invertebrate fauna such as Lepidoptera (e.g., moths) at the mine location.²¹ No further data have been provided. However, the proposed restrictions on artificial light will reduce the potential for adverse effects on night-flying invertebrates.

Effects at adjacent habitats

Adequacy of information

26. Two of the matters requiring further information identified in my terrestrial ecology review were the vegetation/habitat and the presence/habitat use by cryptic/secretive bird species at areas adjacent to the mine site.²²
27. No comprehensive recent data on vegetation and habitat – and habitat use – on the property north of the site have been provided by the applicant or submitters. This lack of data constrains the assessment of adverse effects. Indigenous vegetation and habitat are present

¹⁸ Supplementary Statement, Gary Bramley, 8 March 2024 [24]

¹⁹ *ibid.* [24-26; Table 1; Figure 1]

²⁰ Terrestrial Ecology Review, Mike Harding, 12 December 2023 [127]

²¹ *ibid* [47]

²² *ibid* [82]

along that property boundary; I expect that vegetation/habitat to be ecologically significant.²³ In the absence of information to the contrary, it must be assumed that significant ecological values – including natural wetlands – are present.

28. Six previously unrecorded cryptic/secretive bird species were listed in my review as possibly using habitats adjacent to the mine location.²⁴ The presence of three of these species – fernbird, kororā and reef heron – has since been confirmed. A fourth species (marsh crake) has possibly been recorded at Barrytown. And a further notable species (little shag) was recorded at the site in January 2024.²⁵
29. These recent bird observations illustrate the risk of relying upon existing (e.g. eBird database) records and short-term surveys. It also reaffirms my view that the adjacent lagoon-wetland ecosystem has ecological value greater than its size and condition may suggest.

Disturbance of fauna

30. The potential adverse effects of the activity on avifauna at habitats adjacent to the mine location include artificial light, noise, and movement/activity. Restricting mine operations to daylight hours and restrictions on artificial light will reduce potential adverse effects on avifauna at habitats adjacent to the mine location.
31. The potential adverse effects of noise on avifauna at adjacent habitats remain unclear. The applicant's evidence indicates that the noise of mine operations will be the same as or slightly greater than the background noise (principally wave action/surf) at adjacent habitats, depending on location.²⁶
32. I am unaware of any applicable data on the disturbance effects of noise on avifauna. In my experience, birds are disturbed by unusual and/or abrupt noise, rather than by a continuous background noise such as that generated by processing equipment or water pumps (or surf). A single or occasional loud noise from machinery or vehicles is more likely to frighten a bird.
33. It is unclear whether the presence (visibility of) of machinery, vehicles and people would discourage birds from using adjacent habitats or disturb birds at those habitats. Mining

²³ Grey District Plan criteria (s5.4, p27); National Policy Statement for Indigenous Biodiversity 2023, Appendix 1.

²⁴ Terrestrial Ecology Review, Mike Harding, 12 December 2023 [82ii]

²⁵ Summary Statement and Rebuttal Evidence, Gary Bramley, 2 February 2024 [6]

²⁶ Statement of Evidence, Jon Farren, 19 January 2024 [38-39; Figure E3]

would be an intensive land disturbance activity in a rural environment. At any one time the excavation will extend across an area 300m long by 100m wide.²⁷ In my experience, some bird species are tolerant of such disturbance and other species are not. Species that are likely to be intolerant of disturbance include mātā/fernbird, matuku/bittern, and grey duck.²⁸

34. Mitigation proposed by the applicant includes buffer planting adjacent to the mine, and setbacks during the bird breeding season. Proposed plantings will take several years to effectively screen the mine activity from adjacent habitats. The effectiveness of such screening is unclear. Setbacks are discussed below.

Buffering of adjacent habitats

35. The applicant's assessment of effects assumes that the activity will not have adverse effects on bird species using habitats adjacent to the site. Insufficient data have been provided to support that assumption. It remains unclear whether the presence of machinery, vehicles and people, and the noise generated by their use, will disturb avifauna at adjacent habitats.
36. To address these potential adverse effects the revised AMP proposes to avoid mining within 100m of Canoe Creek Lagoon during the first year of mining and during the bird breeding season (August to December inclusive) in following years, and to establish buffer plantings.²⁹ At other times mining is proposed within 20m of Canoe Creek Lagoon.
37. The 100m distance is somewhat arbitrary; there are no data of which I am aware that define 100m as an appropriate buffer distance. However, 100m is the distance defined in the Resource Management (National Environmental Standard for Freshwater) Regulations 2020, is the distance recommended in the Commissioners' decision for an earlier application at the site, and is the distance proposed by the applicant for the bird breeding season.
38. I concur that 100m is a minimum distance for buffering adjacent habitats from the adverse effects of the activity. However, it is unclear whether a 100m buffer will be sufficient to avoid all adverse effects on avifauna at adjacent habitats; there are insufficient data to provide that certainty.

²⁷ Statement of Evidence, Stephen Miller, 19 January 2024 [39]

²⁸ Displacement of matuku may have a population-level effect.

²⁹ Avian Management Plan v5, p17

39. Any agreed buffer must apply to the boundary of the mining activity adjacent to Canoe Creek Lagoon and to the boundary of the property adjacent to the northern site boundary. The 100m buffer must apply all year (12 months).

Effects of mine vehicles on fauna along State Highway 6

40. Increased traffic resulting from the mine poses an additional risk to taiko and kororā. The application has been revised so that “Truck movements to or from the site associated with removal of heavy mineral concentrate must only travel south of the site, and must be limited to 50 per day and 5 per hour and must only occur during the hours of daylight.”³⁰
41. These provisions will reduce – but may not eliminate – the risk of taiko groundings or kororā roadkill. The risk of vehicle-induced bird grounding or mortality may be further reduced if there was no trucking in weather conditions that require external lighting.
42. The magnitude of the effect on birds – notably kororā – of increased traffic on State Highway 6 is unclear.

Catastrophic events

43. Evidence presented by the applicant proposes that beach erosion is unlikely, due to the composition of the beach material and elevation of the site above sea level.³¹ That evidence appears inconsistent with the West Coast Regional Coastal Plan, which places the site within a coastal hazard area threatened by beach erosion and wave inundation,³² the Review of West Coast Region Coastal Hazard Areas, which identified beach erosion as a hazard at Barrytown Beach,³³ and the proposed Te Tai Poutini Plan which places the adjacent lagoon in a ‘coastal alert’ zone.³⁴ It is also inconsistent with the evidence of James Renwick³⁵ and submitters’ observations of the effects of storm events.
44. A potential adverse effect is that a storm event and/or high seas may inundate the mine pit, scouring or collapsing the pit wall, and adversely affecting the landform and ecological values at adjacent lagoons or wetlands. The applicant’s evidence is that the risk of uncontrolled pit

³⁰ Draft Lighting Management Plan v2 (consent condition 15.1), p11

³¹ Summary Statement and Rebuttal Evidence, Gary Teear, 2 February 2024 [5-7]

³² West Coast Proposed Coastal Plan 2016, p110.

³³ Measures, M; Rouse, H. 2022. Review of West Coast Region Coastal Hazard Areas, Version 2. NIWA Client Report CHC2012-081, p41.

³⁴ Proposed Te Tai Poutini Plan, Natural Hazards Map 39.

³⁵ Statement of Evidence, James Renwick, 12 January 2024 [28]

wall collapse is very low.³⁶ It is unclear if this evidence gives due consideration to a coastal inundation event.

45. A major seismic event (earthquake) may have similar effect. The applicant's evidence is that the likelihood of a "magnitude 8 Alpine Fault earthquake impacting this Proposal within in any one year period is 0.001%"³⁷ This appears inconsistent with evidence that major seismic events on the Alpine Fault have a recurrence interval of 300 years.³⁸ The risk of a seismic event causing pit failure and subsequent effects on the coastal lagoon appear uncertain.

Coastal plain ecosystem

46. Existing and recent (new) avifauna records are consistent with my earlier advice that the coastal plain ecosystem at this location, of which Canoe Creek Lagoon is an integral part, has an ecological value greater than its size and condition would suggest. Dr Waugh attributes the richness and abundance of the bird fauna to "the mix of relatively undisturbed wetland, coastal, forest, and marine habitats occurring within a small area, as well as the open-fields and low-intensity nature of the farming activity in the area."³⁹
47. The application contains little analysis of the value of the coastal plain ecosystem (ecological context) of the proposed mine site. And, in fairness, it would be difficult to survey, research and document those ecosystem-level values in a period of just a year or two. Nevertheless, intact parts of the coastal plain ecosystem at this location are regionally significant, as they provide the most favourable habitat of this type along a long stretch of an otherwise steep and rocky coastline.

Commissioner Minute No.6

48. In response to paragraph 7(b): I confirm my opinion⁴⁰ that vegetation and habitat at Canoe Creek Lagoon that lies outside the SNA identified as PUN-W034 is ecologically significant and has high ecological value.
49. In response to paragraph 7(d): the ecological values have been adequately characterised for the purpose of assessing ecological significance but have not been adequately characterised

³⁶ Summary Statement, Cam Wylie, 2 February 2024 [14]

³⁷ Supplementary Evidence, Cam Wylie, 6 February 2024 [3a]

³⁸ Orchiston et al, 2018., *New Zealand Journal of Geology and Geophysics*, 61:3, 389-402, DOI: [10.1080/00288306.2018.1455716](https://doi.org/10.1080/00288306.2018.1455716)

³⁹ Statement of Evidence, Dr Susan Waugh, 25 January 2024 [16]

⁴⁰ Terrestrial Ecology Review, Mike Harding, 12 December 2023 [35]

for a full and robust assessment of sensitive fauna. The very recent (January 2024) discovery of a further notable bird species (little shag) indicates that the habitat values of the lagoon are not yet fully understood.

Avian Management Plan

50. Components of the Avian Management Plan (AMP) have been addressed in the preceding paragraphs. Additional advice is provided below.
51. The first goal of the AMP is to avoid adverse effects on ‘threatened’ and ‘at risk’ birds in the vicinity of the site. The second goal is to avoid during the breeding season, and minimise at other times, adverse effects on habitats adjoining the mine site.⁴¹ The distinction between ‘in the vicinity of’ and ‘adjoining’ is unclear to me.
52. Adjoining habitats lie in the coastal environment, within which there is a NZCPS obligation to avoid adverse effects on ‘at risk’ and ‘threatened’ taxa (which are present), and to avoid significant adverse effects on indigenous vegetation and habitats.⁴² The AMP goals should more clearly reflect the NZCPS obligations.
53. The AMP proposes that the goals will be achieved by avoiding “effects on birds and important habitats identified” and by monitoring.⁴³ Two types of monitoring are proposed in the AMP: monitoring to detect bird species on and adjacent to the mine site; and monitoring of the effects of the mining activity. The first type of monitoring is essential, as it will provide valuable information on habitat use and may help enable any mining operation to avoid adverse effects.
54. The second type of monitoring has limited value. Monitoring adverse effects will not ensure those effects are avoided; instead, it will simply mean those effects are more likely to be detected.
55. Further, it may not be possible to clearly attribute those detected effects to the mining activity. To draw that conclusion – to the level of certainty required for enforcement – would require monitoring of ‘control’ sites unaffected by the mining activity. Otherwise, a legitimate

⁴¹ Avian Management Plan v5, p15

⁴² New Zealand Coastal Policy Statement 2010, Policy 11(a) (i) and Policy 11 (b), respectively

⁴³ Avian Management Plan v5, p16

explanation may be that the cause of the effect was an unrelated ‘background’ event, such as extreme weather or a general population decline.

56. The AMP “will be updated in the event of tāiko being detected using the site” and “updated annually.”⁴⁴ The interrelationship between the AMP and consent conditions is explained by Dr Bramley.⁴⁵ The consent conditions must provide for independent review of any updates or revisions of the AMP and any other management plans (to ensure those changes are consistent with the consent conditions), and must require certification/approval by the consent authority.

Proposed Consent Conditions

57. The consent conditions assessed here are those in the Proposed Conditions of Consent dated 14 March 2024. Only those conditions relevant to terrestrial ecology are assessed, and advice is provided only where the conditions are inadequate for the protection and maintenance of indigenous biodiversity.

Condition	Issue	Advice	Reference ⁴⁶
6	Management Plans	All management plans, and reviews of those plans, must be certified by the consent authority (Grey District Council). Certification must include written approval of the plan or plan revision by the consent authority.	
7.1	Mine boundaries	The delineated mine boundaries must be a minimum of 100m from the northern property boundary, the coastal lagoon, and any wetland.	35-39
18.1	100m setback	The 100m setback must apply throughout the year (12 months).	35-39

⁴⁴ Avian Management Plan v5, p16

⁴⁵ Supplementary Statement, Gary Bramley, 8 March 2024 [9]

⁴⁶ Reference to paragraph numbers in this Statement.

18.5	Wildlife cameras	It is unclear who will review the camera footage; interpretation of the images must be undertaken by a suitably qualified and independent person.	
18.7	AMP review	Any reviewed AMP and LMP must be approved/certified by the consent authority (Grey District Council) (see Condition 6).	
18.8	AMP review	Certification of the AMP and LMP must include approval by the consent authority (Grey District Council). (see Condition 6).	
18.9 (iii)	Kororā/penguins	Mining activities must avoid nesting kororā.	
18.9 (iv)	Penguin Management Plan	Any Penguin Management Plan must be approved and certified by the consent authority (Grey District Council).	
18.11	AMP objectives	The second objective (referred to elsewhere as a 'goal') must amended so it is consistent with the NZCPS.	51-52
18.13	AMP	Certification of the AMP must include approval by the consent authority (Grey District Council). (see Condition 6).	

Conclusion

58. The application for this mining activity has changed considerably since I provided my advice in December 2023. Critical changes for terrestrial ecology are: no night-time mining activity (except the Wet Concentrator Plant within a window-less building, and water-pumping equipment); restrictions on artificial lighting and vehicle movements; and, transport of material south – instead of north – along State Highway 6. These changes reduce the likelihood of adverse effects on indigenous fauna.
59. Analysis of the likelihood and magnitude of potential adverse effects is constrained by our limited understanding of the ecology of the mine environs and the wider coastal plain ecosystem. The applicant has provided considerable information. Nevertheless, the following uncertainties remain:
- a) The ecological value of vegetation and habitat on the property north of the proposed mine site (vegetation/habitat that is almost certainly ecologically significant) and the sensitivity of fauna using that habitat.
 - b) The extent to which mining activities will disturb or displace wildlife at the adjacent Canoe Creek lagoon-wetland complex (a regionally important habitat).
 - c) The magnitude of the adverse effects of displacing birds from foraging and/or nesting sites at the mine location.
 - d) The likelihood of the mining activity causing grounding of taiko (the loss of any taiko may have a population-level effect).
 - e) The compatibility of the Lighting Management Plan with health and safety lighting requirements.
 - f) The effect on the local kororā and taiko populations of any increased mortality caused by mine traffic on State Highway 6.
 - g) The risk of the mine pit causing erosion and/or dewatering of the adjacent coastal lagoon-wetland complex in the event of a catastrophic storm event, earthquake, or coastal inundation.
 - h) The reliability and robustness of self-reporting by mining staff of adverse effects on birds, and of compliance by mining staff with bird-protection operating procedures.

60. Two of the potential effects listed above are, in my view, critical: (b) disturbance and/or displacement of wildlife at the adjacent Canoe Creek lagoon-wetland complex; and (d) taiko groundings at the mine site. If either one of these occur, the adverse effects on terrestrial ecology will likely be significant (more than minor).
61. The Canoe Creek lagoon-wetland complex clearly provides very important habitat – in a regional context – for indigenous fauna, including at least 15 ‘at risk’ or ‘threatened’ species. The application includes a suite of actions to mitigate the adverse effects of the proposed mining activity. If one or more of these mitigating actions fail, there is a high probability that the adverse effects on adjacent habitats will be more than minor.
62. The loss of an individual taiko would be an adverse effect. The magnitude of this adverse effect would depend on the health of the taiko population. The evidence is clear that this species faces numerous threats, some of which are likely to increase, such as storm events and warming sea temperatures. If the loss of a taiko coincides with adverse effects from other population-level threats, the adverse effect on the taiko population will be significant (more than minor).
63. I have recent experience of two open-cast mining operations. My reviews of these mining operations found that intended mitigation – as required by consent conditions – did not occur as expected. Regardless of the diligence and intentions of the mine operator, there were failings which had consequent adverse effects on indigenous biodiversity.
64. There remains a considerable risk that regardless of the operator’s intentions – and the requirements of the consent conditions – one or more components of the proposed mitigation will fail. The location of the proposed mine in the coastal environment, adjacent to important bird habitats, and within the range of taiko, mean the consequences of failure will likely be high.

Mike Harding

18th March 2024