FTAA-2512-1153 – Central and Southern Block Mining, Taharoa – s53 comments from D-G Conservation

Please include all the contact details listed below with your comments and indicate whether you can receive further communications from us by email at substantive@fastrack.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	Department of Conservation		
First name	Amy		
Last name	Robinson		
Postal address	PO Box 10420, Wellington 6140		
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Email	fast-track@doc.govt.nz and [redacted]		

2. We will email you draft conditions of consent for your comment			
X	I can receive emails and my email address is correct	☐	I cannot receive emails and my postal address is correct

3. Please provide your comments on this application
Please find comments attached

Jenni Fitzgerald
Fast-Track Applications Manager

Acting pursuant to delegated authority on behalf of the Director-General of Conservation.

Date: 21 May 2026

Note: A copy of the Instrument of Delegation may be inspected at the Director-General's office at Conservation House Whare Kaupapa Atawhai, 18/32 Manners Street, Wellington 6011

Comments on a fast-track consenting application

Fast-track Approvals Act 2024 section 53

To: The Expert Panel

From: Department of Conservation

Regarding fast-track project: Central and Southern Block Mining

Fast track Reference: FTAA-2512-1153

1. Introduction

1.1. Taharoa Ironsands Ltd (TIL) lodged a substantive application with the Environmental Protection Authority (EPA) to continue existing mineral sand extraction, including land preparation works, constructing a water supply reservoir, extracting ironsand material using dry and wet-mining techniques, processing extracted material, and transporting raw and processed material (the Project). Approvals are sought in relation the Resource Management Act 1991 (RMA), Wildlife Act 1953, and Heritage New Zealand Pouhere Taonga 2014.

1.2. In accordance with sections 53(2)(k) and 53(2)(m)(i) of the Fast-track Approvals Act 2024 (the Act), the Director-General of Conservation (DG) has been invited to comment on the substantive application. Statutory delegations are in place for the Department of Conservation (DOC / the Department) to provide commentary on behalf of the DG.

Project overview

1.3. TIL are proposing to continue their existing ironsand mining operation, concentration and processing facilities at the Central and Southern Blocks of the Taharoa Mine (Project Site). The Project Site has a history of disturbance and mining has continued across the site since the late 1970s.

1.4. TIL's operation was previously authorised under resource consents issued by Waikato Regional Council (WRC) in 2006 which expired on 31 December 2020. TIL lodged an application to renew the consents in July 2020 and is currently operating under s124 of the RMA.

1.5. An Independent Hearing Panel appointed by WRC in 2024 granted the necessary consents for mining that does not interact with groundwater (mining that interacts with groundwater is known as 'wet-mining'). This decision has been appealed in the Environment Court. Under the FTAA, TIL is seeking to continue mining, including wet-mining, and requesting amendments to conditions.

1.6. This FTAA substantive application is different from the 2020 RMA application as it includes:

- Wet-mining (not specifically sought in the 2020 application);
- An application to mine within 100 m of wetland, but no closer than 30 m to the wetland under the National Environmental Standards for Freshwater 2020 (NES-F). An integrated hydrology assessment (Appendix I of the application) which covers the effects of the above activity and other matters such as stream residual flow, Lake Taharoa water levels and flooding. These matters were not subject to a hydrology assessment under the 2020 application.
- Mining seven of the lower value wetland areas, and to potentially alter the hydrology of, and discharge water into, other wetlands;
- Harvesting approximately 60.6 ha of radiata pine trees from the eastern side of the Southern Block.
- A bond condition that has been proposed by TIL

1.7. Proposed works that relate to the wildlife approval in relation to lizards sought include vegetation and topsoil removal, overburden removal and ironsand extraction, and stabilisation and rehabilitation.

Previous engagement

1.8. The DG submitted on the 2020 applications, raising concern about impacts on terrestrial biodiversity, in particular relating to dune restoration, loss of wetlands, hydrological changes, loss of avifauna and lizard habitat, and impacts on fish passage. DOC provided evidence on avifauna, freshwater ecology, and planning matters but did not appear at the hearing.

1.9. In terms of the current application, DOC met with TIL on 26 August 2025 to receive an overview of the proposal, however was never provided with any draft documentation relating to the application, so was unable to provide feedback on it.

1.10. The current application raises similar issues for DOC to the previous application, which are addressed below.

2. Purpose of the section 53 comments

2.1. The DG has a range of functions which are relevant to the application. The Conservation Act 1987 sets out functions which include (amongst other things) management of land and natural and historic resources for conservation purposes, preservation so far as is practicable of all indigenous freshwater fisheries, protection of recreational freshwater fisheries and freshwater fish habitats, and advocacy for the conservation of natural resources and historic heritage.[1]

2.2. The DG has been invited to comment on the application on the following basis:

[1] Conservation Act 1987, s 6.

- Pursuant to section 53(2)(k) as a "relevant administering agency". The DG is administering agency for the wildlife approval.
- Pursuant to section 53(2)(m)(i). The application involves a suite of resource consents. Clause 13 of Schedule 5 lists the DG as one of the persons or groups who must be invited to comment where an application is made for a resource consent/s.

2.3. The DG has already provided a report under s 51 of the Act in relation to the wildlife approval. The primary purpose of these DOC comments is to outline the DG's position on the application for resource consents, with the intention of assisting the Panel in its consideration of the application as it relates to those approvals.

2.4. DOC has sought input from a range of technical experts. The experts provided technical reports on their area of expertise, which are appended to this report and inform the comments made below.

3. Conservation values

3.1. The area to which the Project relates has a wide range of conservation values. A brief summary of key conservation values of concern to DOC is provided in the following sections. The focus is on those significant conservation values where effects and effects management are in contention.

Freshwater values

3.2. The Taharoa lakes and their associated wetlands retain high biodiversity and freshwater values, providing crucial habitat for native freshwater species which are dependent on the ability to migrate between freshwater habitats and the sea during their lifecycles.

3.3. The Taharoa lakes are a group of shallow coastal lakes associated with the Taharoa Ironsands Mine catchment. Three of the lakes are interconnected, lakes Taharoa, Numiti and Rotoroa. Two smaller lakes, Piopio and Rototapu, are also connected to one another, primarily via groundwater.

3.4. The Taharoa lakes complex contains the most significant coastal freshwater wetlands between Kaipara and the South Taranaki Bight, on the west coast of the North Island. They have high biodiversity values and retain high (though declining) water quality compared with other dune lakes in the region.[2]

3.5. Two streams flow through the mine's operating area, providing crucial aquatic habitat and migration pathways for native freshwater species. These are the Wainui and Mitiwai streams. The Wainui Stream features a consented dam (built in 1971), and a fish pass structure which was installed to provide safe passage for freshwater species migrating

[2] Dean-Speirs, T, *et al.,* 2014. Waikato region shallow lakes management plan. TR 2014/59, Waikato Regional Council.

between the coastal, stream, lake and wetland habitats of the Taharoa, Numiti and Rotoroa lakes catchment.

3.6. The lakes are also associated with other ecosystem values. There are three naturally uncommon ecosystem types,[3] which occur either within or immediately adjacent to the Taharoa mine site. These are active sand dune (endangered), stable sand dune (endangered), and freshwater lake margin wetlands (vulnerable). Lake Taharoa, the largest lake of the Taharoa lakes complex, has more than 145 ha of adjoining wetland habitat.

3.7. The Taharoa lakes and associated coastal freshwater wetlands provide habitat for at-risk native freshwater species . The lakes retain high (though declining) water quality, compared with other dune lakes in the region, and the Wainui and Mitiwai streams are important habitat and dispersal corridors between the sea, the freshwater lakes, and the associated wetlands of the Lake Taharoa catchment, for at-risk migratory native fish species dispersal and recruitment during the natural process of their lifecycles.

Wetland values

3.8. A total of 17.54 hectares of natural inland wetlands (as defined under the National Policy Statement for Freshwater Management 2020) are located found within the Project Site, with a considerably larger wetland area located just beyond its boundary. These neighbouring wetlands are largely raupō-dominated lacustrine and palustrine systems along the edges of Lakes Taharoa, Numiti, Rotoroa, and Rototapu, and also include coastal seepage zones at the mouths of the Mitiwai and Wainui streams and in the Project Site's southern area.

3.9. While some wetlands are modified natural wetlands, many have developed as a result of historical mining activity (including lake-margin wetlands and others). However, these wetlands have now developed natural values - both in the water regime, vegetation and fauna within the wetlands themselves, and in their use by mobile fauna species including Australasian bittern and other wetland birds.

Terrestrial Values

Avifauna

3.10. A total of 46 bird species were recorded at the site, including two Threatened - Nationally Critical species (Australasian bittern, grey duck), one Threatened - Nationally Vulnerable species (Caspian tern), and one Threatened – Nationally Increasing species (New Zealand dotterel). There were also a further eight at-risk species.

3.11. Australasian bittern (bittern; matuku-hūrepo) are a wetland specialist, and are declining at a fast rate in New Zealand, due to a range of factors including habitat loss, predation by introduced mammals and harriers, water quality, starvation, and vehicle strike[4].

[3] Holdaway, Robert J., Wiser, Susan K., Williams, Peter A. 2012. Status Assessment of New Zealand's Naturally Uncommon Ecosystems. Conservation Biology. 26(4): 619-629

[4] O'Donnell CFJ & Robertson HA (2016). Changes in the status and distribution of Australasian bittern (*Botaurus poiciloptilus*) in New Zealand, 1800s – 2011. *Notornis* 63: 152-166.

3.12. Sand dunes (including sand found within the active mine site) have been shown to support occasional breeding attempts of New Zealand dotterel and banded dotterel. These species require open sites to breed as they have excellent camouflage from avifauna predators in this habitat, and also because it allows them to see predators approaching from a considerable distance.

Bats

3.13. Long-tailed bats (Threatened - Nationally Critical) have been recorded at the site, mainly in the pine forest and wetland margin areas. No roosts have been found however, and there is little to no suitable bat roost habitat available on the mining site.

Herpetofauna

3.14. Lizards have not been recorded at the site, but may be at low density in surveyed areas, and also may be present in the unsurveyed southern part of the block. For further detail, please refer to the Department's s 51 report dated 6 May 2026.

4. Assessment

4.1. DOC has undertaken a range of technical reviews of the application, which are summarised below. Broadly speaking, the hydrology reviews are intended to help understand the nature and scale of the impacts of mining, the ecological reports then consider the resulting effects on wetland, freshwater and terrestrial values, and the review of effects management addresses the applicant's proposed response to those effects.

4.2. A common theme of the comments is that the application documents have used generally appropriate methodologies, but for various reasons they have underestimated effects and risks, and the effects management measures proposed are not yet adequate.

Hydrology

4.3. To help understand the potential impacts on biodiversity values, DOC has had reviews undertaken of groundwater hydrology (Ms. Calder-Steele and Mr. Jones - Aqualinc Research Ltd - Appendix B) and wetland hydrology (Mr. Blyth - Collaborations Ltd - Appendix A).

4.4. Both reviews have found that the applicant's hydrological modelling uses appropriate methodologies but is likely to underestimate actual effects. Issues with the modelling include:

a) Inadequate data - Groundwater monitoring covered only 44 days in April–May 2025, unlikely to capture annual highs or lows. Stream flow rating curves used only 3–4 measurements each, with the lowest measured flows well above proposed minimum flows;

b) Lake Taharoa is modelled as a constant head boundary, artificially fixing its level and effectively masking drawdown impacts on lake-margin wetlands. The model also

repeats historic climate data rather than using projections, and was calibrated against very limited groundwater data;

c) Wetland mapping was also incomplete, excluding managed ponds without checking for wetland vegetation;

d) Groundwater contamination is ignored;

e) Lake drawdown is likely understated, as it relies on assumed reductions in abstraction, despite an increase in ship loading events;

f) Insufficient consideration of interactions between groundwater and surface water.

4.5. These issues with the modelling mean there is more risk of adverse effects arising as a result of hydrological changes than the application has allowed for. The reports also consider that the proposed response mechanisms (monitoring, trigger levels, ceasing dewatering and/or recharging via pumping) may be inadequate.

4.6. Given the greater risk of adverse effects, DOC considers that a more precautionary approach is required in management plans and conditions relating to hydrology. The conditions and management plans do not fully reflect recommendations made in the applicant's technical reports. The draft management plans provided are incomplete, and do not provide for adequate responses if adverse effects are detected.

4.7. DOC considers that improvements in the resource consent conditions should at least include:

a) revising the management plans;

b) clarifying monitoring requirements;

c) applying more precautionary response triggers (including the 8.53 mRL cease take level);

d) ensuring that conditions limit activities to the limits and assumptions relied on in the applicant's modelling and assessment of effects;

e) adopting a two-tier trigger system for retained wetlands, with an alert set at the 10th percentile of the low water levels and an alarm set at the 5th percentile;

f) providing clearer response mechanisms in the event that drawdown triggers are exceeded, including ceasing or relocating mining near affected wetlands.

4.8. Understanding the hydrological impacts on water levels and wetlands is a fundamental requirement to be able to understand the adverse effects of the proposed development. DOC therefore considers that the above matters need to be addressed as part of the approval process and prior to any decision on the application.

Wetland Ecology

4.9. Wetland ecology has been assessed by Dr Catherine Beard (Appendix C). She focuses on flora values and considers terrestrial ecosystems where relevant. She considers that the applicant's assessment of wetland and terrestrial values is largely adequate in identifying

and characterising ecological values, although it relies in places on assumptions and future management measures rather than showing how outcomes will be achieved in practice.

4.10. The proposal would result in the permanent loss of natural inland wetlands, including some that are rare and cannot realistically be replaced. It would also expose remaining wetlands and lake margins to ongoing risk from changes to groundwater and water levels, with uncertainty about how large or long-lasting those effects may be.

4.11. Dr Beard considers that the application does not adequately address how adverse effects will be managed and concludes that the application does not provide sufficient assurance that wetlands, and their associated buffer functions, will be protected from irreversible loss or functional degradation.

4.12. She considers that the Draft Natural Inland Wetland and Buffer Management Plan (NIWBMP) focuses mainly on what will be done (e.g. planting, and buffer widths) rather than clearly setting out enforceable, outcome-focused performance requirements that demonstrate buffer effectiveness or wetland protection over time. In particular, neither the Draft NIWBMP nor proposed consent conditions specify measurable targets for buffer vegetation structure, canopy development, species composition, or acceptable levels of exotic dominance, nor do they define timeframes within which such outcomes must be achieved. She also considers that the planting framework in the Draft NIWBMP is overly simplistic and not well matched to the complexity of wetland environments.

4.13. A key concern is the uncertainty associated with hydrological change. In particular, she outlines that adverse effects on wetland ecology can occur before water level changes are detected or responded to, and that damage can build up over time and become irreversible. She also notes that even if rewatering was used as a contingency measure, it would not replicate the natural groundwater-fed processes so should not be relied on to remedy effects on wetland ecosystems.

4.14. Given the risks and uncertainties, she considers that consent conditions should secure measurable ecological outcomes for wetlands and buffers, define the limits of adaptive management where recovery is uncertain or unlikely, and require early-acting wetland-specific indicators that can detect wetland functional decline before irreversible loss occurs. This includes taking a precautionary approach where uncertainty persists and the consequences of failure are irreversible.

Freshwater Ecology

4.15. Freshwater ecology has been assessed by Mr Nigel Binks. He considers that the application material does not adequately assess impacts on groundwater dependant ecosystems that support threatened freshwater invertebrates.

4.16. He is concerned about the loss of approximately 4.25 ha of natural inland wetlands that are naturally uncommon, functionally irreplaceable, and potential habitat for threatened freshwater invertebrates.

4.17. He also considers the proposal for water abstraction and flow augmentation to Mitiwai Stream and other inland waterbodies and wetlands, to be an ecological risk with the potential to impact habitat quality by introducing contaminants from unknown water quality and sources, directly or via seepage.

4.18. He also advises that the Wainui Stream fish pass is failing to provide for fish passage due to low flows, structural corrosion, blockages, and inadequate maintenance.

4.19. Based on Mr Binks' assessment, DOC considers that the effects on freshwater values could be significant. As well as the inevitable loss of extent and values over 4.25 ha of wetlands and loss of fish passage, there may be further loss of wetland values due to hydrological changes, and there is additional uncertainty due to lack of relevant information.

4.20. Given that, DOC considers that significant changes in approach and conditions are required to adequately address freshwater effects. Potential improvements would include:

a) addressing issues with the fish pass so that it remains functional at all times;

b) ensuring screens are installed that have a maximum screen size of 1.5mm;

c) ensure water used for augmentation is treated to remove contaminants;

d) undertake a species-level assessment of each independent inland wetland; and

e) additional monitoring of water levels.

4.21. DOC considers that these matters also need to be addressed as part of the approval process and prior to any decision on the application.

Terrestrial Fauna

4.22. Terrestrial ecology has been assessed by Dr Rhys Burns (Appendix D). He focuses on the risks to birds, lizards and bats, with particular emphasis on the critically threatened Australasian bittern and the hydrological conditions that support wetland avifauna.

4.23. Lizards have not been recorded at the site but could still be present, particularly as there is suitable habitat in the unsurveyed southern part of the site. If lizards are present, they should be captured and released to a suitable location with appropriate management. This has been addressed in DOC's s 51 report.

4.24. Long-tailed bats use the site primarily for foraging flights and the use of an approved bat roost tree removal process when harvesting pine trees along with using 'warm-coloured' lights during night operations are important mitigation measures that should be deployed.

4.25. Of more concern is the loss of wetland habitat and resulting effects on avifauna, particularly bittern. Bittern rely on a landscape-scale network of wetlands for foraging and breeding. They require specific types of wetland habitat – clear shallow water immediately bordering

dense vegetation is optimal for feeding, while for breeding, long reeds such as raupō are required to construct the nest material and screen it from aerial predators.

4.26. This means that maintaining the right wetland habitat is critical for sustaining bittern and allowing reproductive success. Dr Burns considers that the increased water extraction proposed for Lake Taharoa could lower water levels more rapidly than has occurred with previous consent conditions, potentially affecting the ability of bittern to successfully forage and breed in the wetland habitat that fringes Lake Taharoa, low-gradient streams flowing into Lake Taharoa, and wetlands hydrologically connected to Lake Taharoa.

4.27. In terms of the applicant's approach to effects management, Dr Burns considers that further details on monitoring are required, as well as more certainty around 'stop take' levels. He raises concern that the proposed rewatering of wetlands could contain high sediment loads or other contaminants.

4.28. Based on Dr Burns' review, DOC considers that potential effects on lizards and bats are appropriately managed, but that further work is required on effects on wetlands and avifauna.

Effects management

4.29. Dr Fleur Maseyk of The Catalyst Group has reviewed the applicant's effects management approach (Appendix E).

4.30. Like the other technical reviews, Dr Maseyk considers that the applicant's identification of values is adequate, but the adverse effects have been underestimated and the proposed effects management measures are inadequate.

4.31. Other key issues that Dr Maseyk has identified include:

a) Residual adverse effects have been underestimated, and therefore the adequacy of proposed offset has not been correctly evaluated;

b) The Biodiversity Compensation Model (BCM) used to evaluate losses and gains falls short of good ecological and offsetting model standards and is an inappropriate tool to evaluate ecological equivalence of high-value features. In particular, the BCM relies on an aggregated qualitative biodiversity value score and therefore cannot reasonably demonstrate a no net loss or net gain outcome. Further, the outputs have been incorrectly and misleadingly interpreted;

c) There is an unacceptably high level of uncertainty associated with the proposed offset, and this uncertainty is too great to be resolved through adaptive management. Dr Maseyk considers that there is significant risk in delaying confirmation of effects management until after consent has been granted, as the adverse effects will then be locked in with no certainty that the effects can be adequately responded to;

d) The proposed conditions of consent relating to the effects management response, including mitigation measures and the wetland offset proposal are inadequate, and the

supporting management plan light on specific details required to ensure the effects management measures are implemented as intended.

4.32. Given the concerns raised by Dr Maseyk, DOC considers that there is currently no certainty that effects management will be adequate, or that the applicant's proposed 'up to 10% net gain of biodiversity value' can be achieved. This means there remains a risk of significant adverse effects, including on wetland values and threatened avifauna.

4.33. Addressing these concerns will require confirmation of the offsetting proposal, and redrafting of consent conditions to provide more clarity and certainty. DOC considers that before consent can be granted there needs to be a defined offset proposal which can be assessed for effectiveness and outcomes, to provide a basis for assessing the nature and scale of remaining residual effects as part of the consent decision. Conditions can also provide for contingency measures if changes turn out to be required, provided that any changes are within the consented effectiveness and outcomes. If there is then a need for amendments or updates after the consent is granted, that can be addressed through the normal consent amendment process.

5. Statutory framework for decision

5.1. The applicant's assessment of environmental effects (AEE) has provided an assessment against the relevant statutory framework, as it applies under the Act and relevant provisions of the RMA. DOC generally agrees with the applicant's assessment of what provisions are relevant, and so does not repeat that here.

5.2. However, DOC disagrees with the AEE on some matters of how the statutory framework is to be applied.

5.3. In particular, the AEE states that Policy 3 of the New Zealand Coastal Policy Statement 2010 ('precautionary approach') is addressed through monitoring and adaptive management. As outlined above, DOC's experts consider that there is more uncertainty, and a greater level of risk, than the applicant has recognised. This means that a greater degree of precaution is appropriate, and that adaptive management measures must give certainty that they will be effective and will be applied before adverse effects become irreversible.

5.4. The other key issue in terms of the statutory framework is the assessment of the existing environment, against which effects are to be considered. TIL filed a Memorandum with their substantive application*: Assessment of the Existing Environment for Taharoa Ironsands Limited Central and Southern Blocks Fast-track Project* (Appendix CC to the application). Given the importance of understanding the existing environment at the Project site DOC in turn requested its own legal memorandum reviewing that advice (Appendix F).

5.5. The applicant has taken the view that many of the small lakes are there as a result of the sand mining and the associated damming of the Wainui Stream, and therefore those lakes

(and associated wetland values) are not part of the existing environment for the purposes of this application.

5.6. DOC disagrees with this approach. While the mining and damming will have changed the environment, there will also have been pre-existing lakes and wetlands. It is difficult to be certain which wetlands now are 'natural wetlands' and which are wholly or partially a result of the development. It is also clear that, if mining ceased, the environment would not return to a pre-existing state – many of the changes to topography and hydrology are permanent, and the Wainui Stream dam would require consent to remove or alter it.

5.7. It is therefore DOC's view that the existing environment for the purposes of this application includes the existing lakes and water levels, and the associated wetland values.

5.8. The relevant statutory documents under the Conservation Act 1987 were addressed in the s 51 Report, but can be summarised as:

a) Conservation General Policy 2005 (CGP): This provides guidance for the administration and management of lands and waters and natural and historic resources managed under conservation legislation including the Wildlife Act. The Wildlife approval application is not inconsistent with the CGP, but in terms of the resource consent applications it is relevant to note that under policy 7 of the CGP, DOC should undertake statutory advocacy to protect natural resources, particularly when indigenous terrestrial species are threatened with loss or decline.

b) Waikato Conservation Management Strategy 2014 (CMS): The CMS provides more local-specific detail for management of conservation values within the Waikato region. Section 5 outlines the role of DOC in preventing the decline and ensuring the persistence of threatened and at-risk species both on and off public conservation land. Objectives include conserving threatened species to ensure persistence, with an emphasis on those species listed in Appendix 6 of the CMS, which include Australasian bittern, long-tailed bat, New Zealand dotterel, and banded dotterel.

5.9. Those documents are directly applicable to the decision on the wildlife approval and are also able to be considered for the resource consents through the application of s104(1)(c) of the RMA.

6. Treaty obligations

6.1. DOC has provided an assessment of relevant Treaty of Waitangi settlement obligations in the s51 report. That assessment remains relevant to the wider application, including resource consents.

6.2. DOC's work in preparing the s 51 report was carried out in a manner that, as far as possible, gave effect to the principles of the Treaty of Waitangi (arising from the obligation on DOC from section 4 of the Conservation Act). That included engaging with Treaty partners as part of preparing the comments, noting that this was within the context of the fast-track process

with prescribed timeframes, and where the applicant has an obligation to consult and Treaty partners have a right to be invited to comment.

6.3. Where possible within the constraints of the s 53 comments process, DOC has carried through this approach into these current comments, and these comments have been informed by that s 51 consultation. In particular, we note that concerns raised by Treaty partners in terms of the wildlife approval are also relevant to consideration of the resource consents, particularly in terms of the Lizard Management Plan.

7. Comments on conditions

7.1. As noted above, there are a range of issues with the current version of proposed conditions. To a large extent, these cannot be finalised while further work is required on the underlying information (hydrology assessments, offsetting proposal, management plans, etc.). However, some initial key recommendations are set out below to assist the panel:

a) specifying the monitoring regimes within the conditions, including methodologies, frequency, reporting requirements, and provision for independent review by a suitably qualified and experienced person (SQEP) on behalf of the Consent Authority;

b) incorporating wetland-specific indicators capable of detecting functional decline before irreversible loss occurs, including accounting for lag effects between hydrological change and ecological response

c) adopting a two-tier trigger system for retained wetlands, with an alert set at the 10th percentile of the low water levels and an alarm set at the 5th percentile;

d) providing clearer response mechanisms in the event that drawdown triggers are exceeded, including ceasing or relocating mining near affected wetlands;

e) clearly defining the effects management and offset proposals and outcomes;

f) Amend conditions to require a comprehensive technical review of the Wainui Stream fish pass by a SQEP against the New Zealand Fish Passage Guidelines[5] and for its complete upgrade or replacement where it is not capable of meeting defined performance outcomes.

g) defining the limits of adaptive management where recovery is uncertain or unlikely and explicitly linking breach of these limits to pre-determined actions and/or review of the relevant consent(s) and conditions in accordance with sections 128 – 129 of the RMA;

h) amending the objectives for management plans so that they are certain and demonstrable (not just 'avoid, remedy or minimise');

i) updating key metrics, including water levels, residual flows etc;

j) various drafting changes to improve clarity and certainty.

[5] New Zealand Fish Passage Guidelines, Version 2.0 New Zealand Fish Passage Guidelines | Earth Sciences New Zealand | NIWA

7.2. Appendix E sets out the above issues, with examples, including relevant condition references and advice on changes that could be made to fix these issues. These are not exhaustive but illustrate key areas where the conditions require further work to achieve clarity, certainty, and enforceability.

7.3. Overall, DOC considers that significant further work is required to get the conditions to an appropriate standard to support grant of consent. In that regard, DOC is available for workshopping or conferencing on conditions, as appropriate.

8. Conclusions

8.1. Based on the technical reviews discussed above DOC considers that, although the application documents have used generally appropriate methodologies, they have underestimated effects and risks, and the effects management measures are not yet adequate.

8.2. It is clear that there will be significant adverse effects which cannot be avoided, in particular the direct loss of wetlands and the associated habitat values. It is also likely that there will be effects beyond those outlined in the application, due to uncertainties and gaps in the AEE information, and the significant risk of further impacts arising as a result of hydrological changes.

8.3. DOC therefore considers that further work is required before adverse effects on ecological values can be adequately understood and managed. Key elements of this should include:

a) further understanding hydrology effects and risks;

b) addressing fish passage requirements;

c) reviewing the approach to rewatering, reflecting that it does not replicate natural wetland processes and could introduce contamination;

d) further detailing monitoring requirements;

e) reviewing response triggers to be more precautionary and to capture ecological impacts as well as water levels;

f) further developing the offsetting proposal and effects management approach;

g) revising proposed conditions.

8.4. DOC is open to continuing to work through the issues raised – either directly with the applicant, or through combined processes such as expert conferencing or caucusing.

8.5. We hope the Panel finds these comments helpful.

Appendices

Appendix A: Hydrology assessment, James Blyth, Collaborations

Appendix B: Hydrogeology assessment, Nicole Calder-Steele and Matthew Jones, Aqualinc

Appendix C: Wetland assessment, Dr Catherine Beard, DOC

Appendix D: Terrestrial ecology assessment, Dr Rhys Burns, DOC

Appendix E: Effects management, offsetting and compensation assessment, Dr Fleur Maseyk, The Catalyst Group

Appendix F: Existing environment legal opinion, Sarah Ongley, Barrister

Appendix G: Initial Comments on Conditions

Appendix A: Hydrology assessment

Collaborations

Subject:	Taharoa Ironsands Limited (TIL) – Central and Southern Blocks – Fast Track Application Hydrology Review
Attention:	Department of Conservation
From:	James Blyth – Director and Water Scientist
Date	12 May 2026
Copies to:	Amy Robinson – DOC Project Management Fast Track

Summary

This review focussed on the two hydrological modelling reports, ecological impact assessments (EIA's) and the draft management plans for Lake Taharoa and Natural Inland Wetlands. The premise of the review was hydrology focussed, and considered the proposed effects on drawdown of Lake Taharoa, and groundwater drawdown from mining related activities on stream baseflow and retained wetlands. As the EIA's prepared for the application rely on the hydrological models to determine the level of effects on the environment, the suitability of these models for assessing hydrological change is important.

Generally, I consider that the *baseline* hydrological and hydrogeological models (noting I did not review the latter models calibration, only it's application) are appropriate for scenario testing of the applications potential effects on the environment. However, there was a lack of monitoring data in both models that increases the uncertainty of their outputs. I consider the hydrogeological model scenario results of mining activities appropriately attempts to assess potential drawdown effects on retained wetlands (a total of 44 potentially effected retained wetlands identified) using the 0.2 m drawdown contour. This comment is made independent of a detailed hydrogeological model review by Aqualinc Consulting Limited which may change my findings. Due to the large number of wetlands, water level and hydrology monitoring data did not exist for most sites, and inferences in the hydrogeology report were made based on short monitoring records and modelling.

I have some concerns that the scenario testing of the water abstractions from Lake Taharoa may underestimate the potential drawdown that could occur. The activity is proposing to increase shiploading events from ~18 per year to 35 per year, and seeking to maintain a daily maximum take of 75,000 m^3/d. Water use records indicate that over the last 10 years, TIL have typically utilised between 55 – 75,000 m^3/d from Lake Taharoa during these shiploading events. Scenario modelling assumed a maximum of between 38,928 and 48,628 m^3/d for Scenario 4 and 3, respectively. These scenarios showed greater drawdown below the 9.6 mRL level in Lake Taharoa, and even triggering of the cease take level of 8.53 mRL in consent conditions on a number of occasions. Lake Taharoa has not dropped below 9.6 mRL in the last 11 years of monitoring, despite a significant dry period in the Waikato in 2019/2020.

Subsequently, erring on the side of caution is recommended should this consent be granted, that effects may be greater than anticipated and monitoring with appropriate triggers and responses should be made clearer in the various draft management plans. I have provided greater detail on proposed consent conditions and the draft management plans in this document.

Contents

1 Introduction

This memorandum provides review comments on the Taharoa Ironsands Limited (TIL) Mine Central and Southern Blocks Fasttrack application. Specifically, this is an eco-hydrological review of the modelling and technical work prepared by the applicants' experts that assesses the effects of mining on the environment (particularly wetlands and lake hydrology). This review has been prepared to assist the Department of Conservation (DOC) with compiling comments on the application.

1.1 Scope of Works

The scope of this review covers:

a. the Williamson Water & Land Advisory (WWLA) Lake Taharoa hydrology modelling and groundwater hydrology assessments[1].
b. the drawdown effects assessments on wetland hydrology
c. the draft Lake Level and Water Management Plan and proposed monitoring and trigger levels.
d. the draft Natural Inland Wetland and Buffer Management Plan
e. the proposed consent conditions and suitability to protect the environment from the activity's effects.

This memo will provide commentary on the appropriateness of the hydrological technical assessments, potential effects of the activity on wetland hydrology and potential loss/modification of wetland or lake habitat and report on any areas of disagreement between the application and this experts opinion.

1.2 Scope exclusions

I have not commented on the areas of wetland that will be lost entirely (mined) if the application proceeds, and the suitability of the offsetting proposed. As per footnote (1) below, I have not undertaken a complete review of the hydrogeology modelling, instead focussing only on the wetland and stream hydrology components of this report. No assessment of the hydrological suitability of low flow provisions for fish passage on the Mitiwai Stream and through the dam structure (for example, flow augmenting during dry conditions) on Lake Taharoa has been undertaken. It is assumed this is being considered by other experts. My review of the two management plans is hydrologically focussed, and it is recommended that ecologists also review these plans for the suitability of wetland and ecological condition monitoring, offsetting and mitigations proposed.

2 Qualifications

I am a Director and Water Scientist at Collaborations Limited ('Collaborations'), an applied water and environmental science consulting firm. I hold a Master of Science (MSc) Degree with first class honours from the University of Waikato, with a thesis completed on wetland eco-hydrology. I am also

[1] A complete review of the hydrogeological model, its assumptions, limitations and performance (i.e. calibration) will be undertaken by hydrogeology experts from Aqualinc Consulting Limited. My review of the hydrogeological modelling is intended to focus on the drawdown effects as a result of the activity and assumptions made about effects on Lake Taharoa and the numerous wetlands.

a Certified Environmental Practitioner (CEnvP) under the Environmental Institute of Australia and New Zealand (EIANZ).

I have ~16 years of work experience. This includes roles within regional councils, four years as a mine environmental and water consultant working internationally, and ~11 years in the water consulting industry in New Zealand. This experience covers a range of water sciences, including water quality, water resources, hydrology, hydraulics and wetlands. I have developed many water balance, hydraulics and catchment hydrological and water quality models. I have provided evidence for hearings, environment court and high court processes and am currently involved in a number of Fast Track consent application reviews. Wetland hydrology is an area I specialise in.

2.1 Code of Conduct

Whilst it is acknowledged this is not an Environment Court Proceeding, I confirm that I have read the Code of Conduct for expert witnesses contained in the Environment Court Practice Note 2023. I have complied with the Code of Conduct in the preparation of this advice. Unless I state otherwise, this advice is within my area of expertise, and I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

3 Documents reviewed

Table 1 lists the documents reviewed in the development of this memorandum. Review of ecological documents was only to assess the hydrological components used by ecologists to determine their effects assessments.

Table 1. Review documents

Document Name	Short report description	Endnote Reference
Taharoa Ironsands Mine - Central and Southern Blocks Mining Project [Substantive Application]	Complete application, including effects interpretation of technical hydrological matters	i
Appendix I – Hydrology Assessment – Lake Taharoa	Hydrology report including water takes, lake water balance, flow and water take scenarios including trigger levels.	ii
Appendix K – Terrestrial Ecology – Wetlands and Vegetation Assessment	Ecological impact assessment of wetlands and terrestrial vegetation from the project.	iii
Appendix L – Freshwater Ecology Assessment	Freshwater ecology effects assessment from the activity, including damming and water abstraction	iv
Appendix N – Hydrogeology Assessment (Groundwater Effects)	Groundwater modelling report that describes modelled effects of mining activity on streams, lakes and wetlands.	v

Appendix BB – Proposed Resource Consent Conditions	Taharoa Ironsands Limited proposed resource consent conditions. Conditions relative to this review were considered.	vi
Appendix DD – Draft Natural Inland Wetland and Buffer Management Plan	Describes steps to minimise activity effects on wetlands and streams, including buffers, trigger levels and monitoring	vii
Appendix EE – Draft Lake Level and Water Management Plan	Update of an existing lake level and water management plan detailing inspection process, monitoring, reporting and response.	viii
Appendix M – Terrestrial Ecology Fauna Assessment	Describes monitoring of terrestrial fauna such as bats, birds and lizards, and the potential effect of the activity on these species.	ix

4 Review comments

The review comments primarily focus on the hydrological reports, and where necessary, integrate in findings from the terrestrial and freshwater ecology reports.

4.1 Lake Taharoa hydrology assessment and lake trigger levels

The WWLA hydrology report[ii] assesses water takes from Lake Taharoa, develops a water balance model for the lake and using water usage records from TIL, calibrates this to ~11 years of historical lake monitoring data. The calibrated model is then used to assess a number of scenarios, primarily with the focus of increased demand for the site due to greater amounts of shiploading events (increasing from ~18/year to 35/year). Of significance is that the ecological impact assessments (EIA's) for freshwater ecology, fauna and wetland/terrestrial ecology relative to the Lake Taharoa and Wainui Stream water bodies relies on the WWLA hydrology modelling to determine their effects assessments.

Table 1 and Table 2 of this hydrology report[ii] indicate the instantaneous rate of 868 L/s is set to cap daily abstraction at 75,000 m^3 for both operational use and shiploading. This rate is sought in the current application. This daily maximum volume is also the amount available for shiploading operations (currently occurring ~18 times per year), indicating operational volumes (daily maximum of 27,200 m^3) would be reduced if this was occurring concurrently[2].

Historical water use data from 2014 – 2025 (Figure 2)[ii] generally indicates TIL have been compliant with the 75,000m^3 daily maximum take, with one occasion where conditions may have been exceeded (~97,000 m^3/d in 2024).

There is, however, insufficient information to assess the compliance with conditions for the two separate activities; daily operations and shiploading, as Figure 2 presents the total abstraction only. The increased frequency of data records in Figure 2 of the WWLA report (reproduced below in Figure

[2] Note, TIL are seeking to change the daily operational take to a rolling 28 day average in proposed conditions.

1) provides an indication of daily operational water demands, and that there *may* be a number of periods where daily operational takes from Lake Taharoa have exceeded 27,200 m^3. This may indicate why TIL are seeking to modify the consent condition to a rolling 28 day average for operational water use.

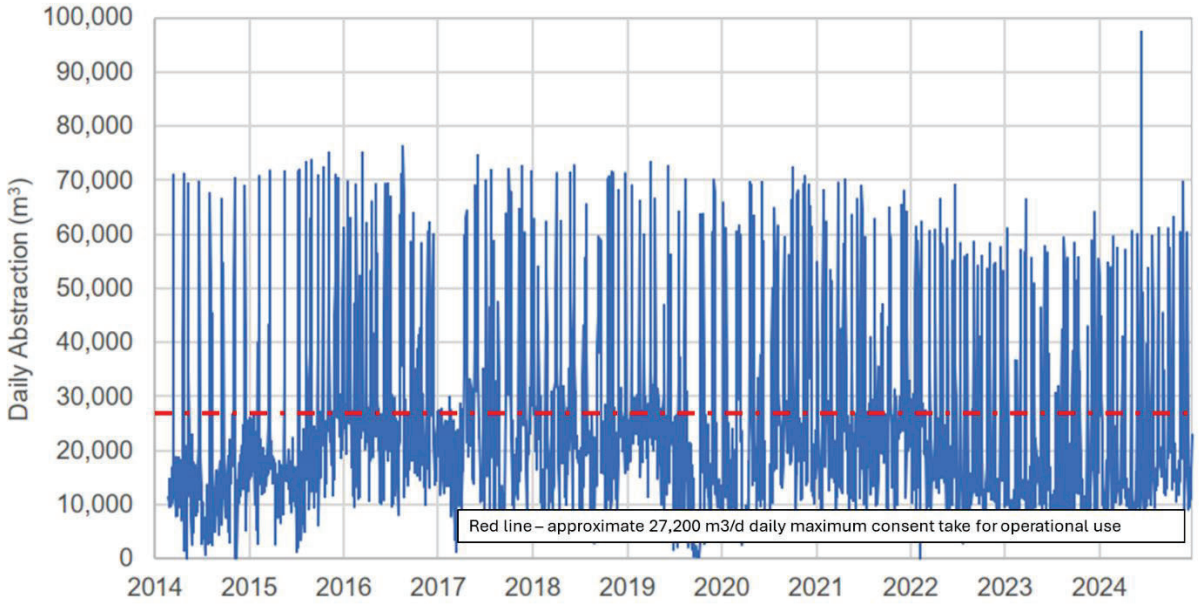

Figure 1. Total abstraction from Lake Taharoa (adapted from Figure 2 in WWLA 2024[ii]).

The report[ii] also identifies an annual average volume of 3,830,000 m^3 used for shiploading, which is greater than the 3,000,000 m^3 allowed in consent conditions. However, the report indicates that consent conditions have been complied with through a water recycling process of ~1,200,000 m^3/year. No information was presented to confirm this.

No data is available prior to 2013 on Lake Taharoa water levels. It is apparent that since 2013, the lake is historically stable between 9.6 and 10.4 m, significantly higher than the cease take level of 8.53 m in conditions and the 'notification' level of 9.0 m (which has not been triggered). The lowest level recorded at the downstream abstraction point (Wainui dam) was 9.45 m in 2014. The lake level at this time was approximately 9.63 m, with the difference due to the frictional headloss along the 2 km reach between the monitoring locations. The current application proposes to maintain the 8.53 m cease take, and increase the lake notification level to 9.6 m[(3)] with an additional management response to reduce water use and assess wetland health on the lake margins (aligning with conditions in the 2024 hearing decision[x]). My thoughts on these trigger levels are covered later (see Section 4.5).

The Lake Taharoa model utilised by the authors is appropriate for a water balance and the calibration *appears* satisfactory based on water level comparison charts. No model calibration performance criteria were presented which is common practice (i.e. percent bias, or Nash Sutcliffe Efficiency[xi]). There are some limitations that need to be considered as they affect the model predictions, primarily relating to data quality, including;

[3] All elevation references are to Taharoa Mines local datum, which is 2.38 m vertically higher than the New Zealand Vertical Datum.

- limited streamflow data, meaning the catchment runoff model is uncalibrated.
- rainfall data from the long-term Port Taharoa climate station (1990–2024) was missing ~7% of records (annual average), that was synthetically infilled from 2019-2024 data.
- monthly median evaporation data from 1990 through to 2002 is constant (as no historical data was available)
- no climate change modelling was included in scenarios due to the small projected changes in rainfall (<5%). Changes in evaporation due to warmer global temperatures were not mentioned.
- uncertainty in the seepage out of the lake, and in the outflow weir structures rating curve.

The theoretical rating curve developed for the outflow weir was modified as the primarily mechanism for calibration of the lake water balance. While this helps to improve the models simulated water levels (against the observed), this approach still needs to recognise that the model has residual uncertainties. Generally, I consider it an appropriate model for scenario testing with the limited data, as long as the limitations above are recognised when considering effects.

Scenarios were run to assess higher or lower takes from the lake and compared against the historical, calibrated baseline scenario. 'Somewhere' between Scenario 3 and Scenario 4[4] was identified in the report as the most likely to align with future abstraction rates, accounting for up to 35 ship loadings per year. A significant assumption in Scenario 4 was that ship loading would average 21,428 m^3/d (over a 4 day period) and operational demand would be 17,500 m^3/d (a total of 38,928 m^3/d), with the remaining water for shiploading coming via recycling processed water. This assumption raises two concerns:

1. The historic daily maximum demand from the lake has annually varied between ~55,000 and 72,000 m^3 during shiploading events (see Figure 1, above). This would indicate the modelled scenarios are assuming TIL would significantly reduce their lake abstraction (by 30-46%, respectively for Scenario 4) compared to their historical water use record, relying on recycled processed water.
    a. If this does not occur, and water demand from the lake aligns with current abstractions with ~double the amount of future shiploadings, it is likely the lake drawdown amount and frequency is understated in the modelling report, which could result in regular trigger exceedances and/or environmental effects not appropriately assessed in the EIA's.
2. The adoption of average rates in Scenario 3 and 4 for shiploading do not simulate maximum demands which are sought by the consent conditions (75,000 m^3/d). Subsequently, the effects of such an abstraction rate are currently not presented in modelling results.

The calibrated baseline model (Scenario 1) showed under current operations from 1990 to 2024, water levels only fell slightly below 9.5 m once in the simulation (2020/2021 summer), equivalent to <1% of the time. Model predictions for Scenario 3 and 4 (noting comments above) indicate due to greater demands, lake water levels would fall below 9.5 m approximately 11% and 4% of the time,

[4] Scenario 3 – Maximum Future Water Take **– total of 48,628 m^3/d** during shiploading events = 27,200 m^3/d (operational) and 21,428 m^3/d (shiploading x 35 events)
Scenario 4 – Increased Shiploading Take and Average Processing – **total of 38,928 m^3/d** during shiploading events = 17,500 m^3/d (operational) and 21,428 m^3/d (shiploading x 35 events).

respectively, with Scenario 3 triggering the cease take restrictions (8.53 m) on ~three occasions. These percentages of water levels below 9.5 m of ~11% (Scenario 3) and ~4% (Scenario 4) are equivalent to 1,406 and 511 days (from a 35 year simulation), an average of 40 and 15 days/year, respectively, most likely over summer.

Following this review, modelling indicates that the greater amount of shiploading events are likely to result in increased frequency and extent of water level declines in the lake. This frequency and extent may also be worse than simulated if the assumption about recycling process water to reduce lake abstraction rates is incorrect. The effects of this additional lake drawdown due to the activity proposed on the habitat that exists around (and in) the lake are unlikely to be 'less than minor' as indicated by the WWLA authors[ii]. The true extent of effects would be governed by the resiliency of the environment and habitat being affected, and the duration and frequency of these drawdowns and appropriate responses by TIL to reduce their water demand.

An indication of the potential risk to the lake edge ecosystem (classified as 'Very High Ecological Value') is highlighted in Section 4.2.3 of the SLR Ecological Impact Assessment (EIA)[iii], reproduced below;

Lake margins were considered Vulnerable by Holdaway et. al. (2021). At Taharoa, the lake margin ecosystems comprise raupō-(harakeke) reedland with a few areas of lower turf vegetation or Isolepis prolifera, and submerged macrophytes in deeper water. The majority of the lake margins are outside of Taharoa C Block and will not be directly impacted by mining works but may be indirectly affected by lake level changes.

In Section 6.2.4.1 of the SLR EIA[iii], the authors base their assessment of lake edge wetland risk from the activity proposed using the WWLA modelling[ii] (noting my modelling limitations comments above), and imply that the likelihood of drawdown effects occurring is low, but if this occurred, then the potential effects on the wetlands and their species they support would be high. Subsequently, if drawdown is more likely to occur than has been modelled, it could be assumed the potential effects are greater than assessed. Section 6.2.4.1 of the SLR EIA[iii] is a general assessment of potential effects of lake drawdown, and does not specifically assess any delineated wetlands in certain parts of the lake, despite WWLA hydrogeology modelling[v] identifying 88 wetlands, with the two largest being 50.2 ha and 20.8 ha, respectively.

Terrestrial fauna monitoring by SLR[ix] identified a number of wetland bird species such as spotless crake, grey duck and Australasian Bittern, the latter of which is nationally critical. Figure 2 of this report[ix] identifies the monitoring locations, and it is evident that much of Lake Taharoa was not surveyed, despite the entire lake being subject to water level declines due to the activities effects. As an example, species such as bittern prefer defined ranges for feeding and nesting in wetland environments, typically between 6–21 cm and <30 cm, respectively, based on DOC observations over a 5-year period in Whangamarino Wetland. Subsequently, the loss of water out of these Lake Taharoa wetland systems could result in habitat decline or species displacement in the long term, particularly as this is most likely to occur during summer and autumn (post breeding season)[xii].

4.2 Groundwater modelling and wetland drawdown effects

A review of the suitability of the WWLA groundwater model[v] development to assess mining related effects will be undertaken by Aqualinc Consulting Limited. I have also read the WWLA report with a focus on wetland hydrology and stream flow considerations, relative to my scope of work. EIA's utilise the drawdown assessments from this modelling[v] to assess potential mining impacts on wetlands and streams.

The drawdown predictions of the model for the two mining blocks has been reproduced in Figure 3 below. My summary of this drawdown is as follows:

- Central Block – Drawdown is primarily within the mining area, although ~1m of drawdown is predicted to extend outside the boundary towards the east and south west. Groundwater level drawdown of 17 m is predicted in the mined area, with excavation depths averaging ~56 m.
    - The wetlands most at risk (excluding those in the mined area) are along Wainui Stream and the edge of Lake Taharoa, primarily along Rotopuhoe Road. There will be some drawdown effects on Mitiwai and Wainui Streams (covered later in this memo).
- Southern Block – Drawdown is compounded by previous dewatering effects of the Central Block. The drawdown appears focussed in Pit 1 and 2 areas of the Southern Block (see Figure 2 and Figure 3 below), despite the mining plan showing the complete southern block to be mined over time, with the most time spent in Pit 3. While excavation depths are not presented in the report for the Southern Block, the primary reason for the lack of drawdown in this area appears to be related to mining being at or above the water table for the southern section (Pit 3) of the Southern Block (see Figure 3 in Appendix A of WWLA Hydrogeology report[v])
    - Drawdown extends outside of the mined area towards Lake Taharoa and to the north. Similar risks (depending on wetland hydrological connectivity to groundwater) are present to the Wainui Stream and wetlands around Lake Taharoa.
    - Drawdown of 1.65 m is predicted at a water supply bore (No. 142329) which is approximately 1 km northeast of Wainui Stream.
    - Wetland drawdown varies from 1 to 5 m depending on the proximity to the deepest area of the Southern Block mining (near Wainui Stream), with up to 11 m of drawdown predicted below the Wainui Stream and its wetlands.

The modelled groundwater drawdowns indicate there may be a high degree of risk to wetlands and potentially stream environments outside of the mined area. This depends entirely on the wetlands hydrological setting, where a perched wetland in a dune system fed by rainfall recharge may have little effects from mining, while a groundwater connected wetland (i.e. a seepage wetland, a swamp or a fen) could be irreversible changed to a dryland community.

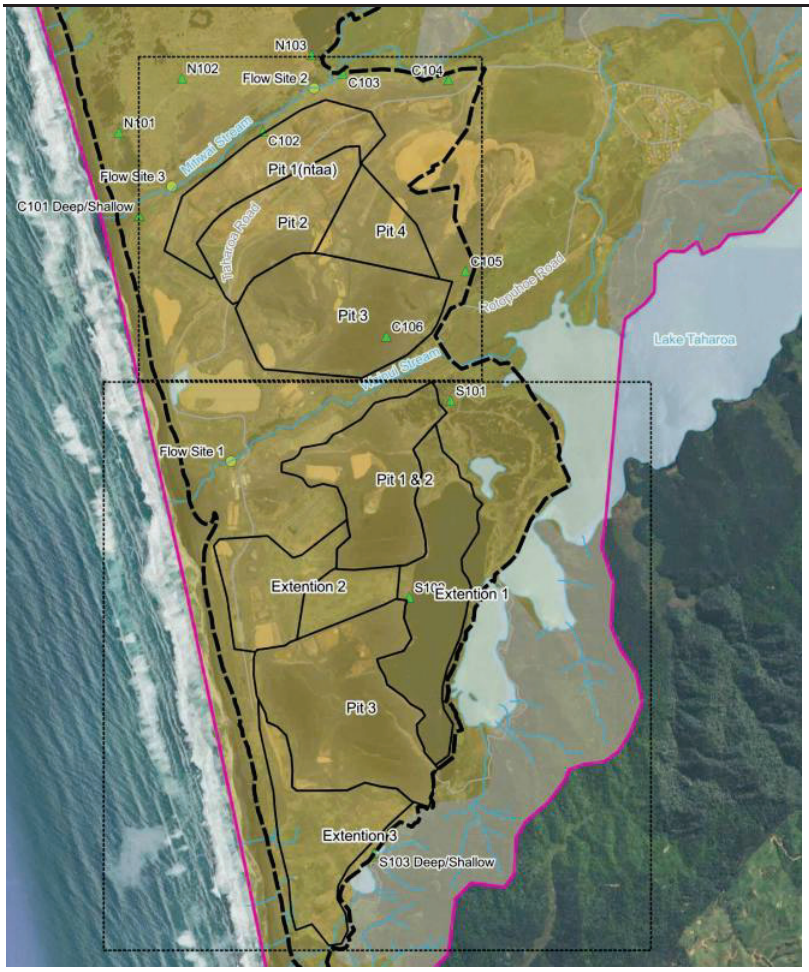

Figure 2. Central and Southern pit mining areas (reproduced from Figure 11 in WWLA hydrogeology report[v])

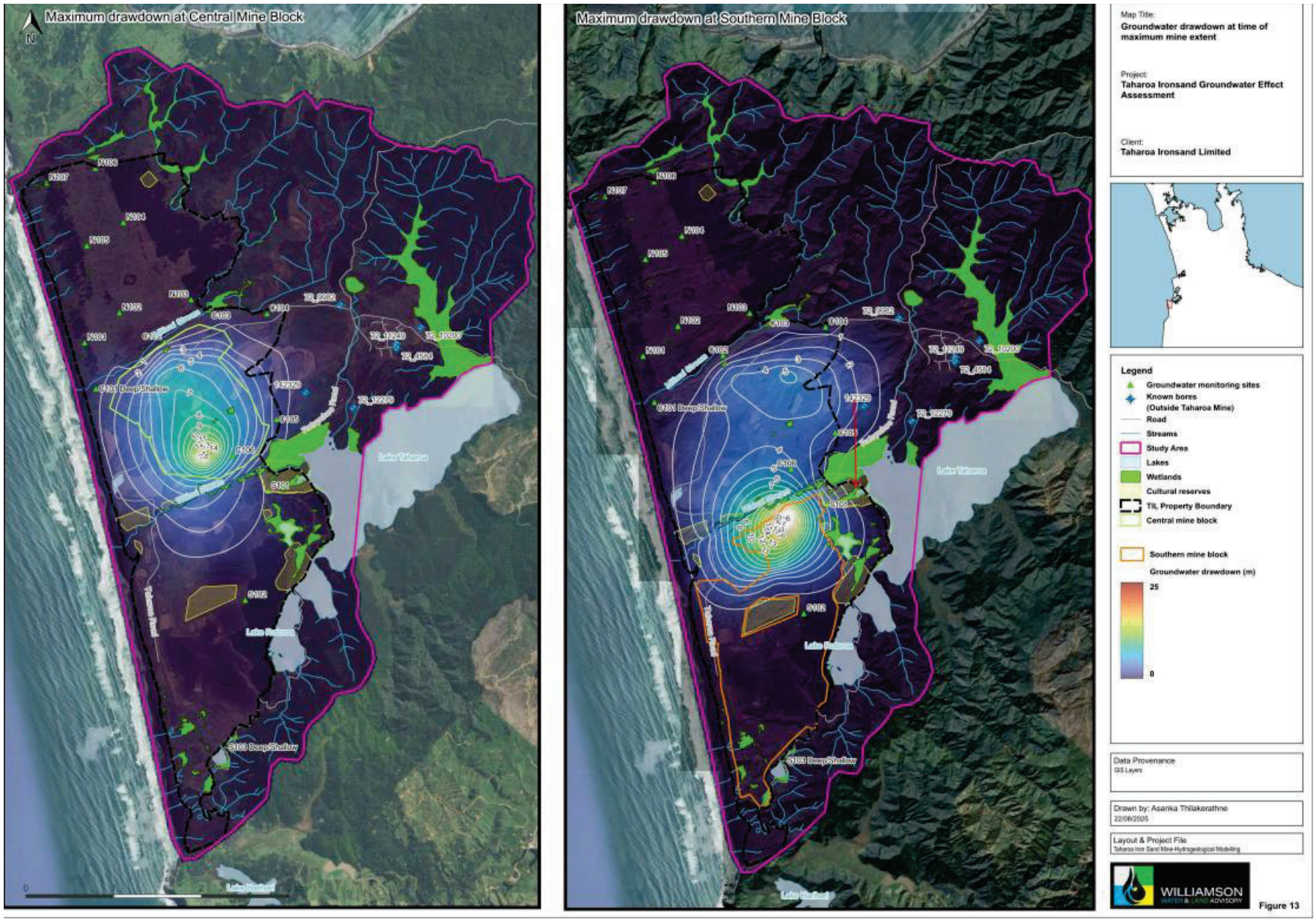

Figure 3. Maximum groundwater drawdown contours as predicted from mining activities (Source, WWLA hydrogeology report Figure 13[v])

WWLA Section 6.3.1[v] identifies that "under the dry conditions, the model predicted that 32 of the wetlands across the Taharoa C Block (the entire mine, including northern, central and southern blocks) are highly likely to be groundwater connected, whilst a further 12 are within 3 m of the land surface, and hence potentially groundwater connected". With a total of 88 wetlands assessed, this represents ~50% (44) that may be connected to groundwater, of which ~25 are to be retained and were assessed further by WWLA in Table 13 of their report[v].

I support the inclusion of the potentially affected wetlands (with water tables within 3 m of the land surface) and the identification of these sites from a starting drawdown of 0.2 m as an appropriate conservative measure by the WWLA modellers, given the uncertainty due to the short piezometer monitoring records used for calibration (<44 days for most sites) and that there appears to be only one piezometer (C103, along Wainui Stream, see Figure 3) installed within a wetland environment to enhance the calibration.

The grouping of these 25 retained wetlands makes logical sense, and can be summarised as:

- Group 1 – Mitiwai Stream wetland 42 (only), monitored by C103 piezometer. Valley floor wetland so likely a surface and groundwater fed system. This wetland is ~3 ha.
- Group 2 – Wetlands along Wainui Stream connecting to Lake Taharoa (11 in total). Primarily surface water fed and controlled by stream and lake levels, but interact with shallow groundwater (within 1 m of the surface).
    - The two largest wetlands of this group are 20.9 ha (No. 57) and 4.2 ha (no. 71)
- Group 3 – Wetlands to the west of Lake Taharoa (8 in total), but not directly hydrologically connected to the lake edge. Modelled water tables typically between 1-3 m of the ground surface.
    - The two largest wetlands of this group are 7.8 ha (No. 72) and 2.9 ha (no. 75)
- Group 4 – Southern mine wetlands (5 in total) that are partially or intermittently connected to groundwater, some of which may be perched.
    - The largest wetland of this group is 1.5 ha (No. 88), with wetlands 83 and 86 (near lake Rototapu) also significant in size (0.8 and 1.2 ha).

Generally speaking, wetlands alongside the lake and streams (Group 1 and 2) are likely to have a greater hydrological connection to surface water levels of these water bodies, and while drawdown may influence their baseflow under dry conditions, maintenance of stream low flows and low lake levels are likely[5] more important to sustain wetland ecological condition. The WWLA report[v] makes an appropriate attempt at classifying the hydrological condition and modelling effects for the numerous wetlands based on the data available at the time. There are some sites where it may be appropriate to move a wetland into a different group, should the consent be granted and monitoring be categorised at these group levels. An example of this is Wetland 73 and 75, which are split into groups 2 and 3. A closer inspection shows these two wetlands are part of the same mosaic (and hydrology), characterised as one wetland (21) in the original delineation by 4Sight Consulting (Table 1 in WWLA

[5] Noting a water balance for each wetland does not exist, and assumptions are being made off the information available in these reports.

report[v]). A thorough review of this is recommended, and has not been undertaken in this memo due to time constraints.

It is likely that some of these retained wetlands are perched (above the regional groundwater table) except during high water levels (i.e. after winter), and predominantly are fed by rainfall and local runoff, with some groundwater recharge during wet periods, as indicated by WWLA[v]. An example of this is Wetland no. 72, which is 7.7 ha in size and sits within a projected drawdown of 1–4 m (see Figure 4). Historical imagery shows much of this area was covered in pine trees in 2013. Pine trees can significantly lower water tables through greater evapotranspiration and canopy interception, and wetland 72's (~400 m inland from Lake Taharoa) presence throughout this period of pine canopy coverage indicates its likely hydrologically isolated except under high water levels, and therefore is more resilient to mining related drawdown activities. Note, this site has wetland features (Raupo reedland) but ***was not*** characterised as a natural inland wetland by SLR consulting, despite its ecological value (it is referred to as Site 27)[iii].

When considering the most southern group (4), three of the largest wetlands lie along the mines boundary. I generally agree with WWLA assessment that these three are likely perched, sitting on greywacke subsoils. Drainage typically appears to be to the north, from Wetland 88 to Lake Rototapu, and then through wetlands 83 and 86. A piezometer near these wetland is S103, which is a nested well, with shallow (<3 m) and deep (<35 m) monitoring, to the north of wetland 86. The shallow monitoring well was dry, indicating that the nearby wetland is likely perched.

A monitoring site is proposed in Wetland 72, and while this is useful, it may be better to consider monitoring in Wetland 73 – 75 (also referred to as Wetland 21 by SLR[iii]), subject to ecological experts considering whether SLR's assessment stands that Wetland 72 (also referred to as Site 27) isn't a natural inland wetland.

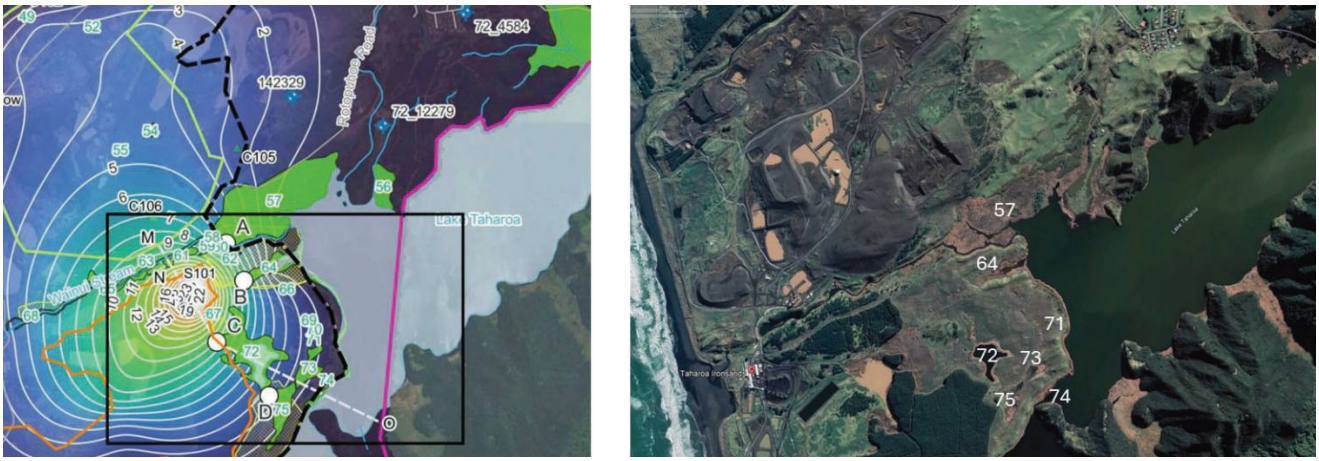

Figure 4. Reproduction of projected drawdown in the Southern Block and larger wetland systems identified from satellite imagery from July 2019.

SLR's wetland and terrestrial EIA[iii] (Section 6.2.4 of the report) discusses the potential effects of drawdown of the groundwater table from mining operations on wetlands 12, 13, 14 and 21 (collectively 5.52 ha), with a 1-3 m decline in water levels predicted (based on WWLA hydrogeological modelling[v]). In addition, wetlands 8, 9, 10/11, 15 and 16 (collectively 0.62 ha) are also potentially connected to groundwater and may also be at risk. I note that the wetland naming convention is

different between reports and my reproductions in the figures and text above, which makes this challenging to interpret (primarily, these are the Group 3 wetlands).

It is also apparent that SLR's wetland assessment differs to that from WWLA, that latter of which utilised a range of different wetland delineation sources. A significant example is wetland 57 in WWLA report[v], identified in Figure 4 above, and wetland 45 at the head of Lake Taharoa. Wetland 57 is 20.9 ha, while wetland 45 is 50.2 ha, and classification of wetland 57 by SLR appears to be as 'lake edge', rather than a lacustrine wetland. The largest wetland (no. 45) was not assessed by SLR. I recommend wetland ecology experts consider the wetland classifications applied. Regardless, these lake edge 'wetlands' would still have significant ecological value and would be subject to effects of lake level drawdown due to abstraction (see hydrology comments above).

The effects were considered by SLR to vary depending on the level of drawdown, but likely ranging from a decline in habitat, to a complete drying of the wetland and invasion of dryland species (typically weeds as early colonisers). As these wetlands are dominated by obligate wetland species, the risk of the wetland environment changing due to hydrological effects was consider high, if appropriate management is not in place.

4.2.1 Streamflow drawdown

Assessment of the Mitiwai Stream flow was undertaken in Appendix D of the WWLA report, and included a number of flow gaugings and utilisation of water level data (~11 months of monitoring) corrected to a flow timeseries. This was compared against a catchment streamflow model, with a 'reasonable fit' achieved. I repeat my previous comment, that no calibration parameters[xi] were presented to consider if this model was satisfactory for use in setting flow triggers.

The model was then utilised to determine streamflow characteristics, such as minimum flow, mean flow and daily maximum flow. It is unclear if this assessment utilised a long term climatic series to develop the streamflow statistics, as this has not been presented in the report. The modelled streamflow statistics were used in the assessment of effects (section 6.2.1 of the WWLA report[v]) to assign a three tier trigger level system for low flow conditions, which may be triggered by mining activities (i.e. dewatering).

The WWLA report[v] references the Waikato Regional Plan change when considering the low flow trigger system. Tier 3 is where contingency measures are necessary for a stream (i.e. Wainui or Mitiwai) that may include flow augmentation (pumping) to increase baseflows. I note this Tier 3 level is set at 90% of the Q5 (1 in 5 year 7-day low flow conditions); see section 6.2.1 of the WWLA report[v].

In the Waikato Regional Plan[xiii], Section 3, policy 2(a) a default minimum flow of 90% of the Q5 is assigned to streams with a mean flow greater than 5 m^3/s, while streams with lower flows (<5 m^3/s), 95% of the Q5 is assigned. Appendix D in WWLA hydrogeology report[v] shows the Mitiwai Streamflow is <1.5 m^3/s for ~11 month monitoring period, with a mean flow of ~0.151 m^3/s. This indicates the Tier 3 triggers should be atleast set at 95% of the Q5 (29.5 L/s in WWLA hydrogeology report Table 10[v]).

The actual drawdown risk presented is ~4.4 L/s reduction in baseflow, which is predicted to represent ~10% of the 7-day mean annual low flow (MALF) in summer. I generally agree with the WWLA authors that this level of streamflow reduction for a period of time until mining rehabilitation occurs is

likely to be minor, and that the trigger level system would be appropriate to mitigate larger effects during dry periods.

When considering the Wainui Stream, which has streamflow modified by the upstream dam, little flow monitoring data is presented to understand its Q5 flow conditions to compare to the Waikato Regional Plan[v], except some flow gaugings in Section 3.3 of the WWLA hydrology report[ii] that indicate flows of 0.3–1.36 m^3/s. This comment is only made given flow augmentation conditions exist in the consent (that occurs along the fish pass and through the dam, totalling 34 L/s), which has not been compared to a Q5 minimum flow as per plan policy. Maximum drawdown of baseflow to the Wainui Stream is anticipated to be 43.3 L/s, significantly larger than Mitiwai Stream, however the WWLA modellers indicate that this is unlikely to occur due to the recycling of water from tailings disposal and flow augmentation. While it is not clear in the reports how, or to what extent, the recycling of water would occur, I generally agree with their statement; assuming the baseflow augmentation (when needed) of 34 L/s is adequate to maintain stream health, an appropriate wetted perimeter and fish passage (to be advised by other DOC experts).

Hydrology modelling[ii] of Lake Taharoa abstractions has shown that the greater amount of shiploading events will likely lead to greater lake drawdown, so there will be increased frequency of the dam dropping below the weir invert levels (9.36 m). Subsequently, the flow augmentation of the fish pass will be increasingly needed, should this consent be granted.

4.3 Draft Natural Inland Wetland and Buffer Management Plan

This SLR Natural Inland Wetland and Buffer Management Plan[vii] (NIW-BMP) outlines the monitoring and mitigations proposed for inland wetlands and lake margin wetlands to establish baseline data and also identify any changes in their hydrological and ecological condition due to the proposed activity. The management plan relies on the WWLA modelling. Generally, I consider the application of the hydrogeological modelling[v] to be appropriate for assessing drawdown risk, while I have some concerns about the Lake Taharoa water balance modelling[ii] which may under-estimate the drawdown risk.

It is worth noting that this management plan title indicates it is for the inland wetlands, however, has a section dedicated entirely to monitoring *some* of the lake edge wetlands (it excludes the largest wetland at the head of Lake Taharoa). There are overlaps with the Lake Level and Water Management Plan (LL-WMP), and I recommend these two documents could be revised, or merged to be clearer (should the consent be granted). See further comments in Section 4.4.

A number of wetland monitoring plots are proposed around the edge of Lake Taharoa (12 in total), to be monitored at the commencement of consents, and every 5-years after. A proposed lake level trigger of <9.6 m for greater than 30 days would also warrant an additional round of monitoring (see Table 1 of the NIW-BMP[vii]).

This lake level trigger of 9.6 mRL for >30 days is not consistent with proposed consent conditions (see Section 4.5 below), which indicate that as soon as the lake level hits 9.6 mRL, an ecologist will be engaged to monitor the lake edge wetlands for a continuous period of 30 days. Clarity should be sought on this condition.

The outcomes of the ecological monitoring is a brief report, where reductions in wetland extent of >10% would be required before any 'action' would be taken. I believe the NIW-BMP (or the LL-WMP) should detail the actions and responses for adverse environmental effects from lake drawdown. Currently, this draft plan simply refers to consent conditions (AUTH142035.05.01) and to 'update the LL-WMP to identify measures that can be implemented to address adverse effects'. As mentioned in Section 4.4, the LL-WMP is also insufficient in this matter.

When considering the retained inland wetlands that may be at risk from groundwater drawdown, the NIW-BMP details 12-months of monitoring to establish a baseline, commencing at the start of the consent. I support this approach. However, the NIW-BMP is lacking significant detail on the type of water level monitoring (i.e. weekly or monthly dips of a piezometer, or installation of a continuous water level sensor) and the locations proposed (no map is presented). Instead, this management plan only references some comments from the hydrogeology report[v] which seems to indicate that three piezometers will be used to monitor wetland hydrology across the groups (C103 – Group 1, New site in Wetland 72 – Group 3, and a new site at Wetland 80 – Group 4). Group 2 is suggested to be monitored through the use of existing lake level stations.

The LL-WMP in Section 4.4 (below) also lacks this detail, however, appears to indicate that every wetland that will be retained will also be monitored for 12 months;

"*For wetlands which are to be retained (insert map showing these wetlands following FTAA decision), a 30m setback will be established and water level monitoring in the wetlands, for a 12-month baseline period, will be undertaken" (page 17 of the LL-WMP*[viii])

Currently, it is unclear to me what sites will be monitored and how they will be monitored, except that a 12 month baseline monitoring period will be undertaken which will then be used to update a water balance model to run long term climatic simulations to help set trigger levels. I support this approach, however, I don't agree with recommendations by SLR in Section 3.3. of the NIW-BMP[vii] that states trigger levels should be based on the lowest natural level during any given season and that if levels fall below this for 14 days, mitigating actions should be implemented. The reason I disagree with this approach is:

- WWLA[ii] previously ran a 35 year simulation for Lake Taharoa. If a similar climatic period was used for setting wetlands lowest natural levels, in a general sense it could be assumed the trigger is being set an extreme event (for example, a 20 or 50 year drought).
- Assuming water levels reach and fall below their lowest natural level for >14 days, this would indicate a significant deviation from natural hydrology and it may come too late for a range of plant species that would have been under stress as water levels declined prior to the trigger.
- The proposed mitigation approach to pump water into the wetlands (see below) may only increase the stress to these systems, depending on the species adapted at each location.

I would recommend a two tier trigger system be considered for retained monitored wetlands from the long term calibrated simulation (after baseline monitoring data is collected):

- Tier 1 – Alert, set at the 10th percentile of the low water levels.
- Tier 2 – Alarm, set at the 5th percentile of the low water levels.

When considering the mitigation approach, the NIW-BMP[vii] has proposed to cease dewatering in pits *and/or* pump water into these wetlands when drawdown is identified in monitoring wells (locations yet to be identified or established). There are limitations to these mitigations as drafted, including;

- Without clear direction that mining activity would cease near a wetland as the first priority, which would seem unlikely given the operational costs this could have on TIL, the default approach would be to pump water into these wetlands.
- Water quality of the pumped water is unknown, and the volume required to sufficiently recharge larger wetlands (Wetland 72 is 7.7 ha in size[6]) is unknown.
- Pumping of water to a point source location in a wetland is not guaranteed to re-wet the entire wetland, as will depend on its natural gradient and how water drains out of the system.
- Recharging of silty water through a sand bed via soakage sounds good in practice, but there is little information to indicate where these locations are and how long their hydraulic performance would suffice if silty soils are pumped into the infiltration galleries (i.e. they could block up over time). Similar concerns exist about recharging all of the wetland.
- There may also be a change in hydrological regime from groundwater dominant to surface water supplemented wetlands which could alter the plant communities or cause shock and greater ecological effect (as an example, wetland 15 is a seepage wetland).
- The unknown duration of time these wetlands will require supplemental water. This could occur for many years, and likely will result in a degradation in wetland habitat condition

Should this consent be granted, it is clear that mining would lower the water table, although the effects on all retained wetlands is currently unclear, inpart due to the lack of monitoring in each site. Modelling has indicated 1-5 m of drawdown for a prolonged period is likely to occur and the SLR EIA [iii] indicates the effects of drying these wetlands would be high. Subsequently, I question whether monitoring of the retained wetlands and an adaptive management response will be sufficient for some of the wetlands, to adequately protect these ecosystems.

4.4 Draft Lake Level and Water Management Plan

The Lake Level and Water Management Plan (LL-WMP)[viii] is in a draft state, and subsequently, some areas are insufficient to understand the response of TIL during certain conditions, such as drawdown of Lake Taharoa that triggers an ecological effect.

An example of this is Section 7 of the LL-WMP (Lake Taharoa water level and lake margin wetlands), where the plan details the additional measures that must be implemented should lake water levels drop below 9.6 mRL for a continuous 30 day period (note this does not align with proposed consent conditions). Primarily this lists reducing water takes out of the lake and engaging an ecologist to monitor and report on the lake edge wetland condition. However, there is a lack of detail about what actions TIL would take should an ecological effect be identified, instead only this paragraph is mentioned:

[6] Intermittently, this site is called Wetland 72 or Site 27 by SLR ecologists. Subsequently, it is unclear whether this will be monitored as a retained wetland and how it fits in with the ecological assessments.

[the measures to reduce water requirements are being considered and will be incorporated into the final LLWP] – page 16 of the LL-WMP[viii]

Coupled with the NIW-BMP, their appears to be insufficient information in the two management plans about what actions would be taken to reduce or mitigate adverse effects on the environment should this occur when the lake is drawn down below 9.6 mRL. Noting that in the last 11 years, the lake has consistently been above 9.6 mRL (see Figure 6 in WWLA hydrology report[ii]) despite a significant dry period through 2019/2020.

When considering the monitoring and mitigations (i.e. augmenting water into wetlands) due to drawdown of groundwater in inland wetlands from mining, the LL-WMP refers back to the NIL-WMP. These two documents overlap on occasion, for example, with lake edge wetlands. In addition, the LL-WMP mentions the Mitiwai Stream, however does not set out the three tier trigger level system presented by WWLA[v]. Only the flow rate (28 L/s) where augmentation is required has been presented in the LL-WMP (Tier level 3). I believe this is inadequate for what would become the primary operational management plan should the consent be granted.

I would recommend that the LL-WMP and the NIL-WMP be updated to provide a clearer separation of purpose, or be merged into a single document that focuses on the lake and wetland monitoring and mitigations including the appropriate trigger levels and the necessary actions and responses should a trigger, or an ecological effect be identified. Currently, there are no groundwater level triggers established in wetlands that may be affected by mining related groundwater drawdown, so it is expected this should be developed after 12 months of baseline monitoring and thoroughly reviewed through consent conditions (if the consent was granted), prior to being integrated into the LL-WMP or the updated management plan.

4.5 Proposed consent conditions and trigger levels for Lake Taharoa

Due to time constraints, only a short review was considered for proposed hydrology and wetland related conditions. The following points are relevant:

- Daily operational water demand (27,200 m^3) is being maintained (as per existing resource consent 100905), but instead shifting to a 28-day rolling average.
- The proposed surface water take permit has Lake Taharoa cease takes at 8.53 mRL.
    - Based on the Lake Taharoa modelling results to date, the panel should consider the appropriateness of the cease take level of 8.53 m. WWLA[ii] indicate this may have been set based on the minimum lake levels prior to the dam installation. Subsequently, maintaining this 8.53 m level as part of a grandparenting approach may provide an insufficient environmental backstop to reduce abstraction effects for the existing[7] lake and wetland environment (~50 years of adaptation, since the dam was installed in the ~1970's [i]). Lake monitoring indicates levels <9.6 m have not occurred since 2013, despite the Waikato Region experiencing low rainfall and drought stress in 2019–2020, with the lowest annual totals recorded at Ruakura Station in its ~21 years of record[xiv].

[7] I make this comment assuming the dam and environmental features around Lake Taharoa now forms part of the existing environment, recognising this is a planning and legal matter that I have not considered and may be addressed elsewhere.

- The proposed surface water take permit has a water reduction and ecological investigation being triggered at a lake level of <9.6 mRL.
    - I generally support the adoption of this revised 9.6 mRL trigger (the previous level was ~9.0 mRL), recognising it sits at the lowest monitored water levels in the lake over the last decade. There are however, some uncertainties;
        - The NIW-BMP[vii] and the LL-WMP[viii] seem to misinterpret this proposed consent condition, indicating that lake levels would need to be below 9.6 mRL for a continuous 30 day period before an ecologist is engaged.
        - The response to an identified adverse ecological effect (condition 10.c) appears to be unclear, with no detail on how TIL would mitigate or rehabilitate the environment. Instead, this simply states that the LL-WMP would be reviewed and updated to identify potential measures and provide a copy to the council for certification within 30 days.
- The proposed consent conditions for destroying or disturbing a wetland details the baseline water level monitoring and the trigger levels for wetlands. As per previous comments, I highlight that:
    - The conditions (5) and the draft management plans provide no indication where monitoring will occur, how many wetlands will be monitored (presumably, all retained wetlands) and how they will be monitored.
    - Condition 5 and 6 also suggest that the long-term simulation will be used to set the lowest natural water levels in each wetland, which will then be monitored in accordance with the NIW-BMP to identify triggers.
        - I recommend a 10th percentile Tier 1 (Alert) and a 5th percentile Tier 2 (Alarm) trigger be adopted from long term calibrated water balance modelling of the wetlands, instead of the lowest natural water level, for reasons previously discussed.
        - I also recognise that knowing a wetland has reached a trigger level requires the establishment of a permanent monitoring well with continuous and likely telemetered water level monitoring data being sent to the on-site environmental officer. This information has not been presented in any of the management plans, so it is currently unclear how the wetland drawdown will risk will be monitored in practice.

5 Limitation statement

This document has been prepared by Collaborations Limited in good faith, based on the information, data, assumptions, and methodologies available at the time of preparation. It has been prepared for the purpose of providing technical review comments to inform the Department of Conservation in relation to the proposed application.

The findings and opinions expressed are professional judgments only and should be read in the context of the stated scope, limitations, and reliance on third-party information. Collaborations Limited does not warrant the completeness of the information relied upon and accepts no responsibility for use of this document beyond its intended purpose.

6 References

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Appendix B: Hydrogeology assessment

Memorandum

To:	Amy Robinson	**Of:**	Department of Conservation
From:	Nicole Calder-Steele & Matthew Jones	**Date:**	1/05/2026 Reissued 18/05/2026
Reviewed by:	Ross Hector	**Job no:**	PRJ-2600190
Subject:	**Groundwater advice on Taharoa Ironsands FTAA Application**		

1 Summary

Aqualinc reviewed evidence for the Central and Southern Block Mining application[1] under the Fast Track Approvals Act 2024 (FTAA) to provide comment on groundwater-related matters. Our major findings are summarised in Table 1-1. We consider that the model could be considered acceptable provided that all identified concerns are explicitly treated as uncertainties and significantly more conservative conditions are imposed. This would require a robust monitoring and management framework, which could include telemetered piezometers in each wetland, stringent trigger levels, and rapid, predefined responses to any exceedances (e.g., immediate cessation of dewatering or augmentation of water levels). With these measures in place and strictly adhered to, the model's use would be more defensible.

[1] https://www.fasttrack.govt.nz/projects/central-and-southern-block-mining

Table 1-1: Key findings and rationale.

Key finding	Rationale
Environmental data has significant limitations	*Groundwater level data:* • Manual measurements from April and May 2025 across the site are unlikely capture high or low groundwater levels. • There is no assessment of the data to show it is suitable for use in groundwater modelling. *Surface water flows:* • Rating curves are based on few observations in potentially unstable channels. This does not meet NEMS standards. • Because the rating curves are poorly constrained, we do not have confidence in flow estimates, especially low flow estimates.
The groundwater model is limited by the environmental data and by modelling assumptions	*Environmental data limitations:* • As GWLs were unlikely high or low, we don't know how well the model can predict these levels nor how well it can predict the effects of dewatering on these levels. • As we do not trust the rating, we do not trust the absolute values that were derived from the model. ○ The flux relationship between surface water and groundwater could be reasonable. • Repeating historic climate data for forecasting is inappropriate. • Available climate data was ignored. *Modelling assumption limitations:* • Constant head boundary for Lake Taharoa was inappropriate as it is known to fluctuate and would mean that impacts of dewatering were muted/under-predicted, especially on lake-margin wetlands.

Flawed conceptual hydrology of wetlands	• Where wetlands were identified as being predominantly surface water fed, they were not identified as being at significant risk from dewatering.
	  ○ Groundwater and surface water can be highly connected and so reducing groundwater levels may impact wetlands even if they are primarily surface water fed.
	  ○ Being predominantly surface fed is not the same as being disconnected from groundwater.
	  ○ Ignores natural flux in relationship between groundwater and surface water.
	• No acknowledgement of the potential for groundwater contamination, nor the potential for wetlands to be contaminated by groundwater inflows.

Key finding	Rationale
Effects were assessed on natural inland wetlands, not all wetlands	• Not all potential wetlands were identified. The applicant did not assess vegetation on constructed ponds to see if they were wetlands. • The effects assessment focussed on wetlands that met the "natural inland wetland" criteria, ignoring effects on other wetlands.
The offset wetland will not be a "natural inland wetland", so could be destroyed	• The offset wetland would be vulnerable as it would not be a "natural inland wetland". Assuming a consistent approach as used in this application, the offset wetland would not be assessed for effects in future and could be damaged and destroyed without consequence.
Post-mining conditions will impact site hydraulics	• Post-mining infill will have different hydraulic properties so will impact water flows. No information has been given on how the new fill will ensure the return of the hydrological system to status quo.
Resource consent conditions should constrain the activity to what has been assessed and give greater consideration to groundwater	• Assessments of effects are based on assumptions, limitations, and recommendations. These should all be included as consent conditions. Failure to constrain mining activities using these same criteria would likely result in greater effects than anticipated. • Conditions do not consider the impact of the proposed activity on groundwater across all relevant consents and so neglect to account for how impacts to groundwater may impact receiving environments including wetlands and streams. • Resource consent conditions should require that all freshwater monitoring sites are installed, operated, and maintained consistent with National Environmental Monitoring Standards (NEMS).
Effective monitoring, environmental triggers, and responses to breaching of triggers are needed to prevent effects greater than predicted	• Evidence (as above) demonstrates the effects of the activity are likely understated. • Effective triggers cannot be set if environmental data are inadequate/insufficient. Because data inadequacy, the precautionary principle should be applied in selecting the monitoring sites, monitoring frequency, and trigger levels. • Consent conditions should limit the activity based on the maximum predicted effects. This includes effects on groundwater level (inside and outside of wetlands), salinity, and surface water stage and flow. ○ Saline intrusion is much harder to reverse than a decline in water level so conditions for this are important. • Triggers should be effective to prevent effects exceeding those that have been predicted. • Responses to triggers should prevent environmental harm. These responses should be proportionate to the risk of environmental damage or harm. • Monitoring and calibration (e.g. rating curves) should be consistent with NEMS. • As modelling suggests that there can be high variation in how connected wetlands are to groundwater, groundwater levels in individual wetlands should be monitored until it can be established that use of a representative wetland is appropriate for a subset of wetlands. • Groundwater quality downgradient of potential areas of contamination should be monitored for contaminants, with appropriate triggers for action if contamination is detected.

1 Introduction

Department of Conservation (DoC) have asked Aqualinc Research Limited (Aqualinc) to provide comment on groundwater matters (especially relating to wetlands) for the Central and Southern Block Mining application[1] under the Fast Track Approvals Act 2024 (FTAA) to undertake mineral sand extraction and processing across 911 hectares at Taharoa Road, Taharoa. DoC agreed we could also consider hydrology and ecology where it was relevant to inform understanding and modelling of groundwater and wetlands.

We have approached the task on the basis that the activities will be consented, but effective resource consent conditions are needed to effectively manage the effects of the activities on groundwater and wetlands; where proposed consent conditions are silent on a matter, then an activity is authorised without limit (so long as it is not inconsistent with planning rules). Our focus was therefore to understand the application and activity, understand the relevant proposed resource consent conditions, understand the relevant current[2] resource consent conditions, identify gaps relating to groundwater and wetlands in these consenting frameworks (based on the information presented in the FTAA application), and recommend consent conditions that could better manage impacts from the activities.

Our review is based on understanding of groundwater at the Taharoa Mines site is based on conceptualisation as presented in Appendix N – Hydrogeology Assessment (Groundwater Effects); understanding of wetlands at the Taharoa Mines site is based on conceptualisation as presented Appendix K – Terrestrial Ecology – Wetlands and Vegetation Assessment; Appendix I – Hydrology Assessment, Appendix L – Freshwater Ecology Assessment, and expert judgement/experience supplement understanding. Any matters related to the coastal marine area are out of scope. Time constraints have limited the thoroughness of review and comment.

2 Code of Conduct

Whilst it is acknowledged this is not an Environment Court Proceeding, we confirm that we have read the Code of Conduct for expert witnesses contained in the Environment Court Practice Note 2023. We have complied with the Code of Conduct in the preparation of this advice. Unless I state otherwise, this advice is within my area of expertise, and we have not omitted to consider material facts known to me that might alter or detract from the opinions we express.

3 Understanding of activity based on FTAA application

Taharoa Ironsands Limited (TIL) are seeking resource consent to dry mine (excavate) and wet mine (dredge) the Central and Southern blocks of Taharoa C Block. This involves:

1. Damming Wainui Stream, increasing the levels of the Taharoa Lakes.
    - Ensuring a minimum flow of 10 L/s across the dam weir.
    - Diverting water through a fish pass and ensuring a minimum flow of 28 L/s through the fish pass.
    - Taking impounded water (up to 75k m^3/day and 3 Mm^3/yr) to enable mining operations.
2. Disturbing land to mine ironsand and to construct ponds to manage process water and stormwater.
    - Discharge tailings to ground.
    - Discharge slurry/process water to constructed ponds and to ground.
    - Destroy and disturb identified wetlands as part of mining activities.
3. Groundwater dewatering to enable mining below the water table.

[2] The resource consents granted in 2024 that are being appealed: DECISION APP142035 Taharoa Ironsands Final conditions 20 November 2024

- Dewatering is to occur in one pit at a time; no concurrent dewatering has been modelled.
- Dewatering modelling suggests this will reduce baseflow to Mitiwai and Wainui streams and inflows to wetlands.

4. Incidental stormwater discharge to Wainui Stream from mining.

Table 3-1 shows the proposed relevant resource consents. Consents 01-03 and 05-08 were granted under the Resource Management Act (RMA) by a hearing panel in 2024. Consents 14-17 are new consents under the FTAA application.

Table 3-1: Proposed relevant resource consents.

Consent ID	Activity to be authorised
AUTH142035.01.01	Undertake iron sand mining operations and associated land disturbance activities including (but not limited to) construction of dredge ponds, stormwater ponds, water supply/storage ponds, access roads, stockpiles, wetlands and other features for environmental offsetting, restoration and/or rehabilitation purposes, and ancillary buildings.
AUTH142035.02.01	To dam and divert the Wainui Stream for the purpose of creating a water supply reservoir for iron sand mining operations on the Taharoa C Block and any land legally authorised to be used for iron sand mining operations.
AUTH142035.03.01	Occupy the bed of the Wainui Stream via a rock and sheet pile weir, fish pass intake and outlet structures and the associated diversion of water through a fish pass channel located adjacent to the Wainui Stream.
AUTH142035.05.01	Take water from a water supply reservoir created by the damming of the Wainui Stream, for the purpose of ship loading and iron sand mining operations (including the operation of the on-site plant nursery and for establishment and maintenance of ecological buffer and offset planting wetlands and other features for environmental offsetting, restoration and/or rehabilitation purposes, including augmentation of flows and water levels in perennial waterbodies and all wetlands).
AUTH142035.06.01	Incidental discharge of settled stormwater and washdown water into the Wainui Stream from the area containing the administration building, stores compound and workshops.
AUTH142035.07.01	Discharge process water and other water potentially containing contaminants into the ground as a result of iron sand mining operations on the Taharoa C Block.
AUTH142035.08.01	Discharge mine overburden and tailings from the Taharoa C Block and any land legally authorised to be used for iron sand mining operations onto land for the purpose of rehabilitating mined areas.
AUTH142035.14.01	To divert groundwater in association with ironsand mining operations and to take water from within a dredge pond as a result of extraction of sand for use in mining operations.
AUTH142035.15.01	Discharge mining process water into water within a dredge pond and water management ponds, and discharge water containing contaminants (naturally occurring sediment) from a mining dredge into water within a dredge pond.
AUTH142035.16.01	Destroy and/or disturb natural inland wetlands and dewater natural inland wetlands by undertaking mining within 100 m of a natural inland wetland.
AUTH142035.17.01	Undertake earthworks, discharge of sediment, and forestry harvesting in a red zone of Land Use Capability Class 8e land as per regulation 71 of the NES-CF.

4 Understanding of groundwater, wetlands, interconnections, and potential effects from mining activities based on FTAA application

We reviewed the application and relevant appendices to understand groundwater, wetlands, interconnections, and potential effects from mining activities. Based on this review we found:

- There is a lack of long-term environmental monitoring data to inform conceptualisation, assess effects, and constrain modelling.
    - Williamson Water & Land Advisory (WWLA) (Appendix I and N) do not describe the existing environment as informed by measured data. Their reporting relies on presenting modelled data and using measured data to support model results, when it should be the inverse. As measured data is not explored we cannot robustly comment on the accuracy of the modelling nor its results.
- The hydrogeological assessment relied on numerical groundwater modelling, which we found to be flawed and likely resulting in effects being understated.
- Wetland mapping was not comprehensive (focussed on natural inland wetlands), and effects were not assessed on all extant wetlands.
- Climate change was not adeqautely considered.
- Significant limitations in the hydrological data. As these were used to inform groundwater modelling, this further reduces confidence in the model results.

4.1 Groundwater

Regional groundwater flow is westwards towards the Tasman Sea. In Appendix N, WWLA estimated groundwater levels from the piezometer network and gaining streams and springs where groundwater discharges at the land surface. They found groundwater originates from the higher altitudes in the north, east and south and generally flows westwards towards the ocean, with localised convergence into stream channels. Steeper groundwater gradients occur where there is steeper terrain and low-permeability materials, while the water table profile is significantly flatter in the plains where the mine is located.

WWLA relied on numerical groundwater modelling for effects assessment. Our review of this model found significant issues. Though we consider the assesment of hydraulic properties to be acceptable, the impact of groundwater on wetlands is potentially understated, saline intrusion is possible, and contamination via groundwater was ignored.

4.1.1 Assessment of hydraulic properties is acceptable

The slug test analysis to measure aquifer properties is stated as being completed using an accepted method but the link in the reference to the tool used for analysis leads to an inaccessible website. This is probably not a significant issue as the stated method is accepted for use but the implementation cannot be verified. The values mostly fall within a realistic range, with those that do not being noted in the report. These data were used to inform initial conductivity values in the model and constrain calibration within a realistic range. The data seem to be suitable for this purpose.

4.1.2 Observational groundwater level data is limited

Overall spatial coverage of the monitoring piezometers is reasonable, although coverage is better in the northern block than in the central or southern blocks. The temporal coverage of the piezometers is limited with each location having at most 44 days of observations. The observations took place in April and May so are unlikely to include annual high or low groundwater levels. No assessment is provided as to how representative of average

conditions these groundwater levels are. Even if no additional groundwater level data is available for comparison, comparison of rainfall data around the observation period with long-term averages would provide some indication of how representative groundwater levels at this time may be of typical conditions. The main use of this data was calibration of the steady-state model, and no assessment was provided of how suitable it was for this purpose.

4.1.3 Groundwater modelling has significant issues

The groundwater model appears to be well constructed but three potentially significant issues have been identified.

1. The climate data (Rainfall and PET) inputs for the transient model only cover a period of 22 years from the start of 2003 to the end of 2024. These data are then repeated to project the climate timeseries into the future (i.e. 2024 – 2046). As the next two decades are unlikely to have the same climate conditions as the last, the lack of climate projection into the future will cause inaccuracy in model outputs.
    a. Climate projections by NIWA for MfE[3] suggest that the area will likely see reduced rainfall over the next two decades with most of this reduction occuring in spring and autumn, with summer possibly being slightly drier too. This suggests that more recharge may be modelled than will actually occur and so groundwater levels could be lower than projected. The projected changes in climate conditions in the area are close to neutral, so this effect on model outputs may be small in comparison to other sources of modelling uncertainty. This therefore may not be an issue but is an easily addressable source of uncertainty/inaccuracy in the model outputs.
    b. While 22 years of historic data is probably sufficient for these purposes, it is less than would be considered best practice as it does not represent a single climatic period (30 years). Although the report states that PET data is only available back to 2003, both PET and rainfall are available back to the 1970s by including data from the historic nearby climate stations which were replaced by those used in the study.
2. The model calibration was completed using a proven method (PEST) and provides a good fit of modelled heads to available observations. However, only having short term (44 days) groundwater level data available for model calibration is a significant limitation on the model and little was done to mitigate this limitation. A longer timeseries of groundwater levels would greatly improve the model reliability, but more could have been done to assess the reliability of the model within the limitations of available data as well. The data was used to calibrate the steady state model which then provided the basis for the transient model, but the ability of the transient model to replicate observations was not assessed. Comparison of the transient model outputs to observations in the period for which observations are available would provide some indication of whether the transient model can accurately replicate real-world data even over a short period. With such a short period of calibration data it is also difficult to know how good the model is at predicting high and low groundwater levels. This means that it is unknown how well the model represents groundwater levels when wetlands are most vulnerable to drying and so most at risk from the impacts of dewatering from mining activities.
3. Lake Taharoa is modelled as a constant head boundary with its level assumed to be constant as it is fed from outside the model domain. It appears that this may be a reasonable assumption for modelling historic data but with the possible increased abstraction rates under future mining methods, lake levels could potentially become less stable and drop making the assumption of a fixed water level inaccurate. Treating the lake as a constant head boundary makes it effectively an unlimited supply of water within the model. This would keep water levels stable near the lake margin making it unlikely for drawdown to be modelled in lake margin wetlands. Modelling may therefore fail to capture the potential for wetlands in the lake margins to be impacted by activities which lower lake levels.

Page A7 in Appendix A of Appendix N states that defining the interface between the model layers included "some hydrogeological judgement where necessary to ensure compatibility with the TIL mine plan". This statement is ambiguous and needs clarification.

Even though the modelling seems to mostly be of sufficient standard for the purpose it is over relied upon in the assessment where measured data would be provide stronger evidence. WWLA do not do an adequate job of describing the existing environment as informed by data (noting the limitations of the existing dataset). Reporting

[3] https://map.climatedata.environment.govt.nz/

relies on presenting modelled results and refers to measured data only to support the model. Data collected under proposed resource consent conditions should enable better characterisation for future reconsenting.

4.1.4 Impacts of groundwater on wetlands is potentially understated

The conclusion that wetlands which are primarily fed by surface water are not at significant risk from groundwater effects is questionable as, particularly on the margins of water bodies where most of the wetlands occur, groundwater and surface water can be highly connected and so reducing groundwater levels may impact wetlands even if they are primarily surface-water fed.

Rating curves for stream flow measurements are based on three or four gaugings. The lack of measurements for the rating curves suggests that stream flows may not be accurately represented based on stage height. Many of the wetlands on the stream margins have high groundwater connection but are fed primarily from surface water and so will rely on streamflow augmentation to prevent drying out when drawdown is induced in groundwater. If stream flows are poorly understood, appropriate trigger levels and mitigation measures are difficult to determine and implement.

The report recognises uncertainty and the need for monitoring but provides few concrete recommendations about monitoring system design. As the modelling suggests that there can be a high degree of variation in how connected wetlands are to groundwater even over short distances, and the degree of connection may vary seasonally, it is recommended that groundwater levels in as many wetlands as possible be individually monitored at high enough frequency to catch changes in groundwater levels when they occur and implement mitigation strategies.

4.1.5 Saline intrusion is possible

The modelling suggests that saline intrusion is possible but unlikely. Appendix N does not acknowledge it, but Appendix N figures show that Wainui Steam and adjacent wetlands are in the area that saline intrusion may occur. No recommendations are made for monitoring of conductivity to identify whether saline intrusion does occur. The conclusion that saline intrusion is unlikely seems reasonable, but potential consequences of saline intrusion to wetlands mean that monitoring and mitigation strategies should be in place to ensure that appropriate responses can be enacted should saline intrusion occur as a result of the mining activities. Monitoring of conductivity of groundwater in the areas of potential saline intrusion should be undertaken to ensure that should saline intrusion occur it can be identified and acted upon.

4.1.6 Contamination via groundwater was ignored

Other than saline intrusion, Appendix N does not address the potential for contamination of groundwater, nor does it address groundwater as a contamination pathway. There is greater potential for contamination than has been identified in the application and consent conditions should be used to minimise potential contamination pathways.

The applicant indicates that water quality impacts will be managed through use of planted buffers, however these buffers do not consider groundwater flow paths. Where wetlands are connected to groundwater, there is potential they will be impacted by contaminants lost to groundwater. The application does not address this.

There is potential for contamination of groundwater and contamination of sensitive receiving environments via groundwater from intentional, incidental, and accidental discharges to land and groundwater.

- Section 8.1.6 does not identify discharges to land from refuelling and other normal mine operations so does not consider the effects of this. Consent conditions should require:
    - Fuel and other potential contaminants should be stored in a hardstand area, with associated stormwater to be treated before being discharged to the environment.
    - Refuelling to only occur in such hardstand areas.

- Section 8.1.6 of the application considers the discharge of process water and wastewater to land is unlikely to result in contamination of groundwater but has no evidence to support this.
- Section 8.1.6 of the application considers the discharge of dredge process water within the mine footprint has similar characteristics to other process water so is unlikely to result in contamination of groundwater. There is no evidence to support this.
- Consent conditions should restrict what maintenance/repair/operational works can be performed on dredges when within a pit to limit the potential for contamination of groundwater.
- The application does not at all consider that contamination could occur via groundwater. This is especially relevant in the case of wetland 15 (Appendix K), which is potentially groundwater fed and is to be retained downgradient of mine operations. There should be monitoring upgradient of this wetland to ensure that contaminants associated with mining activities are not evident in groundwater, and an action plan required should monitoring indicate conditions that could impact wetlands.

4.1.7 The post-mining scenario is questionable

Appendix N states that pits will be filled and recontoured as they are finished and new pits started. However, ambiguous statements are also made about leaving the final pit in each area open. Leaving the pits open is unlikely to cause permanent drawdown in groundwater levels as eventually an equilibrium level will be reached. However, leaving the final pit in each area open will result in permanent daylighting of groundwater and alterations to groundwater flow in the area. No potential effects of leaving the final pits open are mentioned in the associated documentation and it does not appear that potential impacts have been investigated.

Although it is stated that pits will be infilled after extraction, it is unclear how (or if) complete infill will be achieved. Most places in Appendix N seem to imply that the only source of infill material will be from the mine tailings which means that the total volume of infill will be lower than the volume of sand extracted. This suggests that the ground surface may be lower after extraction and infill than before meaning that depth to groundwater will decrease and that groundwater flow paths may be altered. Appendix A of Appendix N states that the engineered land fill (ELF) will be composed “primarily” of tailings, implying the addition of supplimentary material, but makes no mention of what the rest of the fill will be comprised of nor is this mentioned anywhere else in the report. When assessing the effect on groundwater conditions post mining the report assumes that since the ELF is comprised of mine tailings the conductivity of the material will return to oringinal state after infill. Without knowing what the rest of the infill is comprised of it cannot be determined whether this is a reasonable assumption. Two assumptions have been made about the state of the system post mining which have insufficient information provided to verify:

1. that the land surface will be at the same level post-mining as pre-mining, and
2. that hydraulic conductivity in the area will be the same before and after mining.

It seems reasonable that either one of these assumptions could be accurate, but without confirmation that there will be additional infill material and that it will have similar hydraulic properties to the existing material it does not seem reasonable to state that both assumptions are simultaneously accurate. Without being able to accept these two assumptions together the accuracy of the post-mining modelling is questionable.

If the post-mining scenario is to result in different landscape gradients, this could impact flow paths, resulting in altered water balances for waterways and wetlands. The applicant has not presented any information to indicate how water features will be impacted by an altered landscape, so we can only conclude that they intend to restore the landscape to its former alignment.

4.1.8 Additional matters

WWLA’s dewatering assessment assumes one pit is dewatered at a time, at a maximum dewatering rate, inducing a maximum drawdown. Consents should specify one pit can be dewatered at a time and at a rate no greater than modelled, causing no more than the maximum modelled drawdown, with water to be discharged hydraulically downgradient of the active pit. Monitoring should ensure these conditions are met. Failure to constrain the activity could result in greater than modelled impacts on groundwater and groundwater dependent systems.

Section 8.1.9 of the application does not consider that harvesting pine trees will impact groundwater. However, the removal of pine trees means that the water table will likely rise (as the trees will no longer be using the water), which could increase the wetted extent of wetlands or cause them to be more connected to groundwater. It could also increase dewatering requirements for the southern block mine.

4.2 Wetlands

The applicant was inconsistent in identifying potential wetlands in active mining areas. More wetlands likely exist than have been identified, so the scale of wetland loss is also likely greater than estimated.

> "*Many of the wetlands within the Site have been induced as a result of mining activity over the years, although some are modified natural wetlands. This is the case with all the wetlands on the margins of the lakes, as well as a few others. It is acknowledged that when considering the 'existing environment' a few of the induced wetlands may not exist or would be significantly changed in the conceptual environment where TIL's existing consents have expired, mining under those consents has ceased and the Site has been rehabilitated.*
>
> *The mining operation uses and re-uses a large quantity of water and there are a number of storage ponds within the Site, as well as stormwater detention ponds. For the most part these were excluded from the wetland assessment because they are artificial waterbodies. However, a few sites (Sites 1, 3, 4, 26, 27, 28, 29) were assessed because of the presence of hydrophytic plant species, but because many of them are maintained and managed as part of the mining operation for water storage, retention or treatment, they cannot be considered natural wetlands under the NPS-FM definition*." (Appendix K, page 27)

The applicant only assessed impacts of dewatering and lake level change on wetlands that met the definition of inland natural wetland. Assessment largely ignored artificial or induced wetlands and other potential effects, especially those arising from groundwater. Induced and constructed wetlands were not fully mapped. Those that were mapped were excluded from the effects assessment. Constructed or induced wetlands could be damaged or destroyed by the activity. Constructed offset wetlands could be similarly treated and so no value would be offset.

4.2.1 Wetland mapping was not comprehensive

Wetlands need to be comprehensively mapped. Wetlands were mapped using methods consistent with Ministry for the Environment Wetland Delineation Protocols. "*some of the more established ponds*" were assessed as wetlands, but "*many other ponds across the site were not considered as they were being actively managed for water storage or other purposes, or were transient ponds fed by rain or groundwater that will disappear as mining operations evolve around them.*"

- It is not known whether the actively managed or transient ponds could be considered wetlands, therefore more wetlands could exist on the site than have been identified.
- The location of ponds fed by groundwater are not known. Knowing this would help constrain site conceptualisation, better inform groundwater flow gradients and contaminant transport pathways.
- Appendix K, Table 9 indicates at least one natural inland wetland is being used for water storage[4] and other constructed/induced wetlands that were mapped are also being used for water storage and stormwater discharge[5]. This suggests it was inappropriate to not consider all areas being actively managed for water storage or retention for potential wetlands.

[4] Appendix K/Appendix N: wetland 21/wetland 73 & 75.

[5] Appendix K/Appendix N: Site 1/wetland 52, Sites 2 & 3/wetland 55, Site 3/wetland 55, Site 4/wetland 54, Site 27/wetland 72.

The wetlands and potential wetlands that appear across Appendix K Table 9[6], 11, 12, and Figure 4 are inconsistent. For example, Appendix K, Table 9 has site 3 twice, and is missing Lake Piopio wetlands, site 28, and 29; Appendix K, Figure 4 does not show site 2; Appendix K, Table 11 excludes all “sites” except site 27, and; Appendix K, Table 12 excludes all “sites”. The rationale for the inconsistency is unclear and results in an incomplete understanding of wetlands.

Though an appropriate mapping methodology was used, the choice to exclude some areas from mapping means there may be wetlands onsite that have not been delineated, have not had an effects assessment, and so could be impacted by activities.

4.2.2 Wetland characterisation and groupings between Appendix K and Appendix N was inconsistent

There is inconsistency in the descriptions of the wetlands to be destroyed. The application, Section 4.11 claims that the wetlands to be removed exist as a result of mining activity, while Appendix K finds three (wetlands 5, 6, 23) were likely induced by mining, one (wetland 7) pre-dates mining activity, and three (wetlands 17, 20, 25) are natural or modified natural wetlands.

Wetlands need to be consistently characterised. There was general agreement in wetland description between the application, Appendix K and N, but not for all wetlands. Table 4-1 compares the groupings used in Appendix K and N. Where there are differences in groupings and anticipated effects between the reports, we have greater uncertainty. Because there are inconsistent impacts within the same groups, we recommend telemetered groundwater level monitoring for each unique combination to ensure the impacts do not exceed those modelled. Where monitoring indicates thresholds could be exceeded, it is recommended the rate of dewatering decreases (or ceases) to prevent unacceptable impacts. Piezometers should be installed in a manner that minimises potential damage to the wetland and securely constructed so that measured groundwater levels are accurate and data stationarity[7] can be assured.

Table 4-1: Differences in wetland groupings between Appendix K and Appendix N. Anticipated effects from Appendix K. (Appendix K: Table 11: Ecological values assessment for wetlands; shades of blue denote where groups have been split) (Appendix N: Table 13: Retained wetlands within 0.2 m groundwater drawdown contour; shades of orange denote where groups have been split).

Wetland ID		**Anticipated effects** (Appendix N)	**Grouping**	
Appendix K (wetlands)	**Appendix N** (hydrogeology)		**Appendix K** (wetlands)	**Appendix N** (hydrogeology)
Wetland 5	82	To be destroyed	Southern	Not assessed
Wetland 6	81			
Wetland 7	85			
Wetland 17	87			
Wetland 20	84			
Wetland 23	77			
Wetland 25	79			
Not assessed	42	Likely to be impacted by dewatering	Not assessed	Group 1
Wetland 12	62		East Wainui	Group 2
Wetland 13	60			
Wetland 14	59			
Wetland 22	64		Lakes	
	57			

[6] We assume “Sites” are wetlands that do not meet the criteria to meet the definition of “natural inland wetlands” and “wetlands" are wetlands that do.

[7] Data is accurate to a relative fixed, unmoving point. Casing damage or poor well security can mean this point moves, and data becomes unreliable.

Wetland ID		Anticipated effects (Appendix N)	Grouping	
Appendix K (wetlands)	**Appendix N** (hydrogeology)		**Appendix K** (wetlands)	**Appendix N** (hydrogeology)
Lake shore wetlands	71			
Wainui Stream wetlands	58			
	61			
	63			
	65			
	68			
Wetland 10	69		Eastern	Group 3
Wetland 21	75		Wetland 21	
	73	Limited impacts from dewatering (high groundwater levels only)		
Site 27	72			
Wetland 9	67		Eastern	
Wetland 11	70			
Wetland 16	66			
Wetland 18	80		Southern	Group 4
Wetland 8	74	Uncertain impact from dewatering	Lakes	Group 3
Wetland 19	86	Limited impacts from dewatering (partially perched groundwater)		Group 4
Lake Piopeio wetlands	83			
Wetland 18	88	No impact from dewatering (perched groundwater)		
Site 24	78			
Site 1	52	Not assessed	Not assessed	Not assessed
Site 2 & 3	55			
Site 3	55			
Site 4	54			
Site 26	47			
Site 28	48			
Site 29	49			

4.2.3 Assessment of effects on wetlands was not comprehensive

All potential effects arising from mining activities need to be assessed against every wetland. The application assessed the effects of dewatering and changes in lake level on natural inland wetlands.

The application did not assess all potential effects. Effects such as sedimentation, contamination, changes in groundwater flow, and inundation could be more than minor.

- Appendix K, Section 6.2.5 assumes vegetation buffers offer adequate water quality protections. This fails to consider contaminant loads from groundwater.

- Appendix K, Table 9 indicates at least one natural inland wetland is being used for water storage[8], with sites being used for water storage and stormwater discharge[9]. The application does not consider the effects on wetlands from using them as water stores/buffers to support mining operations, nor does it consider whether such use could result in additional effect once use ceases.

Consent conditions should identify which wetlands can be used for water storage and management purposes, prohibit the use of other wetlands for this purpose, and introduce limits on this use to prevent changes to wetlands that cannot be sustained in a post-mining environment.

The application also did not assess impacts on wetlands that did not meet the definition of natural inland wetland. Failure to consider effects on all wetlands means constructed offset wetlands could be similarly vulnerable to damage and destruction in the future meaning the loss of natural inland wetlands is not offset.

The application suggests that wetland 18 (in Appendix K, wetland 80 in Appendix N) will not be destroyed. However, it is shown to be within the southern block mine outline in Appendix N, Figure 12. Destruction of wetland 18 would require additional offsetting. The applicant should confirm whether this wetland is to be destroyed and if so, offset appropriately.

4.2.3.1 How will wetland water levels be augmented if water is not available from Wainui Stream?

Table 3-1 shows AUTH142035.05.01 permits take from the Wainui Stream dam reservoir for uses including to augment water levels in wetlands. The application is not clear where water would come from if water from Wainui Stream was unavailable (e.g. due to minimum flow compliance). If the applicant is intending to use "settled" process water or stormwater, or diverted groundwater, to augment wetland levels, they must be able to demonstrate that this will not cause adverse effects through contaminant loading. This should be provided for and managed via consent conditions.

4.2.4 Based on the applicant's approach, offset wetlands could be lost

The applicant proposes offsetting the loss of the destroyed wetlands by expanding the site 27 wetland (Appendix K, wetland 72 in Appendix N). The value of this is questionable given this wetland is actively used as water storage for mining operations, its proximity to the southern mine pit, and the ability to fully offset the loss of wetlands, especially if constructed wetlands are excluded from effects assessment. It draws the question of whether any existing offset wetlands are to be destroyed or damaged.

4.2.5 The effects of climate change were not adequately considered

Climate change was addressed in one paragraph in Appendix I (hydrology), was not addressed in Appendix N (hydrogeology), and was addressed in one paragraph in the application. This is an inadequate consideration given the scale of the activity and the duration of consent sought.

The applicant has not adequately considered the effects of climate change. The applicant relies on the Ministry for the Environment (MfE) climate dashboard[10] total rainfall and number of rainy days variables for 2041-2060 to describe the effects of climate change. There are many other variables on the dashboard that are appropriate to consider, including number of very rainy days (>25 mm) and heavy rainfall (99th percentile) as these will impact stormwater and sediment mobility. Changes to wind should also be considered in the context of managing effects from dust and sediment mobility. We consider the applicant should be considering changes over both the 2021-

[8] Appendix K/Appendix N: wetland 21/wetland 73 & 75

[9] Appendix K/Appendix N: Site 1/wetland 52, Sites 2 & 3/wetland 55, Site 3/wetland 55, Site 4/wetland 54, Site 27/wetland 72

[10] https://map.climatedata.environment.govt.nz/

2041 and the 2041-2060 periods as this is the period across which they would be operating under a 35-year consent duration (2026-2061).

Appendix I, Section 5.1 states that "*only a 2% decrease in annual rainfall* [is] *projected for the period 2041-2060. Summer rainfall is projected to decrease by ~5%, while winter rainfall is projected to increase by ~2%*" but does not identify the climate scenario used. Table 4-2 shows all changes in total rainfall on MfE's climate dashboard for the 2041-2060 period. Table 4-2 shows all annual total rainfall changes are equivalent to a 2% decrease, whereas summer total rainfall could change by -8.2% to +0.2% depending on the scenario (with a 5% increase under 2.6 °C of warming), and winter total rainfall could change by +1.5% to +4.9% depending on the scenario (with a 2% increase under 7.0 °C of warming). The applicant has used numbers from different scenarios to describe potential change which is unusual.

Table 4-2 Total rainfall across the 2041-2060 future period[10]. Bold text is where values align with Appendix I descriptions.

Base period	Season	Climate change scenario		
		SSP1 – 2.6	SSP2 – 4.5	SSP3 – 7.0
1986-2005	Annual	**-1.7%**	**-1.9%**	**-2.1%**
	Summer	**-4.7%**	-8.4%	-2.6%
	Winter	+4.9%	+3.0%	+3.7%
1995-2014	Annual	**-1.8%**	**-2.0%**	**-2.3%**
	Summer	-1.9%	-5.8%	+0.2%
	Winter	+3.4%	+1.5%	**+2.2%**

4.3 Hydrological considerations and their impact on confidence in groundwater modelling

The applicant did not comprehensively explore how proposed activity will impact hydraulic gradients and so has not adequately assessed the effects of activity. The applicant failed to consider how the creation of ponds can change local flow gradients, how groundwater can act as a contamination pathway, they treat the impact of dewatering on streamflow inconsistently between waterways, and they propose minimum flows for the waterways that have been determined using different approaches. They have inadequate data on which to convert river stage data to flow data meaning we cannot have faith in the flow data used in the modelling process. The applicant failed to explain why they did not consider impacts of activity on lakes Piopio and Rototapu, despite their inclusion within the modelled extent.

4.3.1 The effects of ponds and pits on flow paths and contaminant transport have not been adequately considered

The applicant has not comprehensively mapped existing ponds. Nor have they indicated where future ponds may be located. Effects of ponds could include:

- Excavation to construct a pond could result in daylighting of groundwater and could result in ponding of additional groundwater through altered flow gradients, undermining the ability for the pond to function as intended perpetually or seasonally. Discharge to such a pond would mean contaminants have potential to directly enter the aquifer.
- Excavation to construct a pond reduces the depth to groundwater. This makes it easier for contaminants to enter groundwater.
- Water infiltration through the base of a pond can result in groundwater mounding.
    - This can alter local groundwater flow directions.
    - This can cause groundwater flooding (where the water table is above ground) locally, or downgradient.

- Operating a dredge in a pit gives potential for direct contamination of the aquifer from refuelling and other potential incidental contaminant discharges.

Where contaminants can enter groundwater via ponds or pits is a concern where this occurs upgradient of a sensitive receiving environment such as a drinking water supply, wetland, or waterway.

4.3.2 The effect of dewatering on streamflow is treated inconsistently

WWLA modelling indicates that both Mitiwai and Wainui streams would be impacted by dewatering for wet mining but treat the impacts differently.

- Appendix N, Section 6.2.1 finds the theoretical maximum base flow reduction was 4.4 L/s. WWLA recommend trigger levels and actions to ensure the minimum flows are not breached because of dewatering.
- Appendix N, Section 6.2.2 finds the theoretical maximum baseflow depletion at the mouth of the Wainui Stream to be 43.3 L/s but considers this can be discounted because it is a continuation of current practice, the largely non-consumptive use of water, and that Wainui streamflow is largely a function of lake levels.

Impacts should be treated proportional to their scale, and consistently between sites.

4.3.3 Minimum flows must be based on good data and consistent with regional rules

The applicant must clearly identify minimum flow sites. Minimum flows must be determined consistent with regional rules. The applicant must follow National Environmental Monitoring Standards (NEMS) in their data collection, flow rating, and all other relevant aspects in demonstrating adherence to minimum flow conditions.

4.3.3.1 The minimum flow for Wainui Stream is inappropriate

Proposed minimum flow of 34 L/s for Wainui Stream (below fish pass), 10 L/s through the weir, and 24 L/s through the fish pass are not based on hydrological or ecological recommendation, or planning requirements, but based on operational requirements. This is appropriate only where the operational flow requirements are greater than what minimum flow would be otherwise. Given flows would be higher if calculated under the Waikato Regional Plan (as in Appendix F) and would be based on measured data and have ecological consideration, we recommend minimum flows at all three locations be updated to reflect this approach. This would also be consistent with the method used to determine minimum flow for Mitiwai Stream (28 L/s, as in Appendix N).

4.3.3.2 Where is augmentation water coming from?

The applicant proposes augmenting stream flows to ensure minimum flows are not breached. The application assumes the water for augmentation is coming from Wainui Stream. The application is not clear where water would come from to augment Wainui Stream. It was also not clear where water would come from if water from Wainui Stream was not available to augment Mitiwai Stream. If the applicant is intending to use “settled” process water or stormwater to augment stream flows, they must be able to demonstrate that this will not cause adverse effects through contaminant loading. This should be provided for and managed via consent conditions.

4.3.4 Flow gaugings are insufficient to be confident in the rating curves and derived conclusions

The rating curves are inadequate. We therefore do not have confidence in conclusions derived (in full or in part) from stage data. Resource consent conditions should require the applicant to establish and maintain rating curves at all gauging sites consistent with National Environmental Monitoring Standards[11] (NEMS).

4.3.4.1 Wainui Stream

The location of the Wainui Stream downstream of dam gauging site is not shown. Appendix I, Section 3.5 says it is downstream of the dam, positioned to verify calculations of discharge through the dam structure and fish passage. We assume the gauging site is located downstream of the fish pass and so measures total flow below the weir and the fish pass[12].

Appendix I, Table 4 shows four flow gaugings for Wainui Stream downstream of the dam. These gaugings were used to convert river stage data to river flow data as a rating curve. Four gaugings are inadequate to construct a reliable rating curve. Reliability of Wainui Stream flow data is further reduced as the lowest gauged flow (75 L/s) is more than twice as large as the proposed minimum flow (34 L/s) meaning the rating curve is unlikely to accurately predict low flows. We have low confidence in the Wainui Stream flow dataset, and the conclusions derived from (in full or in part) from it.

4.3.4.2 Mitiwai Stream

Appendix I, Table 4 shows three flow gaugings at Mitiwai Stream near the mouth and three at Mitiwai Stream upstream of proposed mining areas. These gaugings were used to convert river stage data to river flow data as a rating curve at each site. Three gaugings are inadequate to construct a reliable rating curve. Potential streambed variance at Mitiwai Stream upstream of proposed mining areas further reduces confidence in the dataset.

4.3.4.2.1.1 Mitiwai Stream near the mouth

Appendix I, Table 4 shows three flow gaugings for Mitiwai Stream near the mouth. These gaugings were used to convert river stage data to river flow data as a rating curve. Three gaugings are inadequate to construct a reliable rating curve. Reliability of flow data is further reduced as the lowest gauged flow (50 L/s) is almost 50% greater than the proposed minimum flow (28 L/s) meaning the rating curve is unlikely to accurately predict low flows. We have low confidence in the Mitiwai Stream near the mouth flow dataset, and the conclusions derived from (in full or in part) from it.

4.3.4.2.2 Mitiwai Stream upstream of proposed mining areas

Appendix N, Section D.1 notes:

> *"the upstream site appears to show a slow decreasing trend in baseflow water levels into winter, whereas this is not as evident at the downstream site. This is more likely a result of erosion/scour lowering the streambed at this site (and hence lower water levels) than an actual reduction in water level and flows."*

No evidence is provided to support this assumption. Aerial imagery indicates mining inland of this site within the central block. It is possible that:

- mining activity has indirectly destabilised the streambed, or

[11] https://www.nems.org.nz/documents/rating-curves

[12] This means separate meters would be required to ensure compliance with minimum flows through the weir and the fish pass.

- sedimentation has impacted the waterway, or
- the streambed is naturally variable, or
- large or fast in-channel flows have altered streambed morphology.

Nevertheless, if the bed is changing, it is even more important to complete gauging consistent with NEMS to ensure accurate rating.

The Mitiwai upstream gauging location is below a confluence, with the proposed flow augmentation point/minimum flow site (per Appendix N, Section 6.2.1) being on one of the influent tributaries (based on alignment between Appendix N Figure 14 and Figure D1). This means data from Mitiwai upstream gauging location will likely indicate higher flows than what are occurring at the minimum flow site. Consent conditions are needed to ensure an accurate flow record at the correct location.

Appendix I, Table 4 shows three flow gaugings for Mitiwai Stream upstream of proposed mining areas. These gaugings were used to convert river stage data to river flow data as a rating curve. Three gaugings are inadequate to construct a reliable rating curve, especially where there could be a shifting streambed. We have low confidence in the Mitiwai Stream upstream of proposed mining areas flow dataset, and the conclusions derived from (in full or in part) from it.

4.3.5 Effects were not assessed on lakes Piopio and Rototapu

Appendix I (hydrology) did not include assessment of effects on lakes Piopio and Rototapu. The applicant has failed to explain why these lakes should be excluded from effects assessment given their proximity to the activity. We recommend conditions to manage potential impacts on the lakes and their associated wetlands.

5 Proposed resource consent conditions

In its 2024 decision, the RMA Hearing Panel granted 11 resource consents to TIL for mine operations, four were coastal permits and seven for activities inland of the mean high water springs (Appendix F). The FTAA application includes these 11 consents and four additional resource consent applications (Appendix BB).

Assessments of effects within the application appendices are based on assumptions, limitations, and recommendations. Not all of these are included as consent conditions. Failure to constrain mining activities using these same criteria would likely result in greater effects than anticipated. Assumptions, limitations, and recommendations should be included as resource consent conditions so that effects can be no greater than what has been described.

Conditions in Appendix BB do not consider the impact of the proposed activity on groundwater across all relevant consents and so neglect to account for how impacts to groundwater may impact receiving environments including wetlands and streams. I recommend Schedule 1 be updated to address the following matters:

- Findings within the assessments of effects (Appendices I (hydrology), K (terrestrial ecology), L (freshwater ecology), N (hydrogeology)) are based on assumptions, limitations, and recommendations. Not all of these are included as consent conditions. Failure to constrain mining activities using these same criteria would likely result in greater effects than anticipated. Assumptions, limitations, and recommendations should be included as resource consent conditions so that effects can be no greater than what has been described.
- Resource consent conditions should require that all minimum flow sites are telemetered and are installed, operated, and maintained consistent with National Environmental Monitoring Standards[13] (NEMS), including maintaining an accurate rating relationship[14].
- Consent conditions should ensure that mining operations do not undermine the stability of waterways.

[13] https://www.nems.org.nz/

[14] https://www.nems.org.nz/documents/rating-curves

I recommend the consent conditions be updated as recommended in subsections 5.1 and 5.2 to address specific matters relevant to the activities requiring resource consent.

Subsection 5.3 provides recommendations for updating the plans required to be prepared under resource consent conditions.

Beyond these recommendations, requirements to establish baseline conditions against which to assess change do not consider the antecedent conditions. If baseline is established in a "dry" year, then effects will be considered against a lower/more impacted threshold than if baseline is established in a "wet" year. We also recommend baseline be established while there is no dewatering activity, and no mining activity hydrologically upgradient of the area being monitored.

5.1 Conditions from consents granted under the RMA and sought under the FTAA

Consents AUTH142035.01.01-13.01 were granted under the RMA by a hearing panel in 2024 and are being re-sought under the FTAA. Seven consents (as in Table 5-1) are relevant to groundwater. AUTH142035.08.01[15] is the only one of these with no proposed changes in conditions under the FTAA application from those granted in 2024. Where conditions have been altered or removed, we support the more conservative approach. Table 5-1 shows recommendations relevant to each consent.

Table 5-1: Additional matters recommended to be addressed in resource consents already granted by RMA hearing commissioners.

Consent ID	Activity to be authorised	Additional matters that should be addressed
AUTH142035.01.01	Undertake iron sand mining operations and associated land disturbance activities including (but not limited to) construction of dredge ponds, stormwater ponds, water supply/storage ponds, access roads, stockpiles, wetlands and other features for environmental offsetting, restoration and/or rehabilitation purposes, and ancillary buildings.	• Define the area to be mined. • Set extraction limit, maximum excavation depth, and pit size. • Specify where ponds can be located (or exclusion areas) and their maximum size and number. • Explicit permissions regarding excavating/mining close to and below the water table. • How the applicant will ensure 80% of the settling pond volume is retained at any time.
AUTH142035.02.01	To dam and divert the Wainui Stream for the purpose of creating a water supply reservoir for iron sand mining operations on the Taharoa C Block and any land legally authorised to be used for iron sand mining operations.	• Monitoring should be consistent with NEMS. • Minimum flow should be set consistent with Regional Plan.
AUTH142035.03.01	Occupy the bed of the Wainui Stream via a rock and sheet pile weir, fish pass intake and outlet structures and the associated diversion of water through a fish pass channel located adjacent to the Wainui Stream.	• Monitoring should be consistent with NEMS.
AUTH142035.05.01	Take water from a water supply reservoir created by the damming of the Wainui Stream, for the purpose of ship loading and iron sand mining operations (including the operation of the on-site plant nursery and for establishment and maintenance of ecological	• Clarify the maximum daily volume. • Require cessation of take where it would contribute to breaching the fish pass minimum flow.

[15] Discharge mine overburden onto land for the purpose of rehabilitating mined areas.

Consent ID	Activity to be authorised	Additional matters that should be addressed
	buffer and offset planting wetlands and other features for environmental offsetting, restoration and/or rehabilitation purposes, including augmentation of flows and water levels in perennial waterbodies and all wetlands).	• Specify the location of take. • Include all trigger levels as conditions.
AUTH142035.06.01	Incidental discharge of settled stormwater and washdown water into the Wainui Stream from the area containing the administration building, stores compound and workshops.	
AUTH142035.07.01	Discharge process water and other water potentially containing contaminants into the ground as a result of iron sand mining operations on the Taharoa C Block.	• Requirement to use and store contaminants in sealed areas. • Prevent discharge above sensitive receiving environments. • Require land to be recontoured in a manner that reflects the original environment to mitigate risk of long-term changes to hydraulic gradients.
AUTH142035.08.01	Discharge mine overburden and tailings from the Taharoa C Block and any land legally authorised to be used for iron sand mining operations onto land for the purpose of rehabilitating mined areas.	
Schedule 1		• How saline intrusion will be monitored/prevented, especially regarding wetland health.

Table 5-1 shows additional matters we recommend be covered in the specified consents.

- For AUTH142035.06.01 we question why they need consent for incidental discharge to Wainui Stream and not Mitiwai Stream, and how they are preventing incidental discharge to wetlands.
- For AUTH142035.07.01 and AUTH142035.08.01 we question how they are going to prevent cross-boundary groundwater discharges, and whether the impact of groundwater discharges have been considered on wetlands and ponds.

5.2 Conditions from new consents sought under the FTAA

AUTH142035.14.01[16], AUTH142035.15.01[17], AUTH142035.16.01[18], AUTH142035.17.01[19] are new consent applications; no equivalent was granted under the 2024 decision. Table 5-2 shows additional matters we recommend be covered in the specified consents.

[16] To divert groundwater in association with ironsand mining operations and to take water from within a dredge pond as a result of extraction of sand for use in mining operations.

[17] Discharge mining process water into water within a dredge pond and water management ponds and discharge water containing contaminants (naturally occurring sediment) from a mining dredge into water within a dredge pond.

[18] Destroy and/or disturb natural inland wetlands and dewater natural inland wetlands by undertaking mining within 100 m of a natural inland wetland.

[19] Undertake earthworks, discharge of sediment, and forestry harvesting in a red zone of Land Use Capability Class 8e land as per regulation 71 of the NES-CF.

Table 5-2: Additional matters recommended to be addressed in resource consents sought under the FTAA.

Consent ID	Activity to be authorised	Additional matters that should be addressed
AUTH142035.14.01	To divert groundwater in association with ironsand mining operations and to take water from within a dredge pond as a result of extraction of sand for use in mining operations.	• Specify monitoring locations. • Recommend condition 2 is changed to monitor Mitiwai Stream during all central mine dewatering to ensure minimum flow is not breached. • Condition 3 should specify when, where, and under what conditions sampling is to occur and how often during augmentation monitoring for compliance is required. • Specify where dewatering is to occur and the maximum dewatering rate and volume. • Specify the maximum drawdown that is allowed and where this is to be measured. • Specify only one pit can be dewatered at a time. Consider if limiting dewatering to one unit at a time is more appropriate. • Require monitoring for dewatering impacts on wetlands.
AUTH142035.15.01	Discharge mining process water into water within a dredge pond and water management ponds, and discharge water containing contaminants (naturally occurring sediment) from a mining dredge into water within a dredge pond.	• Require incidental and accidental contamination to be prevented (e.g. no refuelling within the pit) or mitigated. • Prohibit activity upgradient of and where it may enter sensitive receiving environments. • Specify maximum rates and volumes for the discharge, including how much groundwater level or wetland water level can be changed by a discharge, and require monitoring to ensure this is not breached.
AUTH142035.16.01	Destroy and/or disturb natural inland wetlands and dewater natural inland wetlands by undertaking mining within 100 m of a natural inland wetland.	• AUTH142035.16.01, Figure 1 indicates seven wetlands to be destroyed and 19 to be impacted. The AEE identifies 25 to be impacted. Wetlands to be destroyed and impacted should be clearly identified/named. • Establish protections so that any created wetland cannot be damaged or destroyed. • Require that all wetlands not identified as being destroyed or impacted, to have no effects from mining. Require all wetlands be comprehensively mapped and regularly surveyed to ensure this occurs. Require restoration or offsetting where it is found wetlands not identified in AUTH142035.16.01 Figure 1 have been damaged or destroyed. • Monitoring and surveying are to be of every wetland. • Require augmentation where water level falls below lowest natural seasonal water levels.
AUTH142035.17.01	Undertake earthworks, discharge of sediment, and forestry harvesting in a red zone of Land Use Capability Class 8e land as per regulation 71 of the NES-CF.	• Define area to be harvested. • Require mapping of wetlands within the forestry area prior to harvesting and appropriate setbacks to be implemented. • Restriction of use of contaminants (e.g. refuelling) in areas of high groundwater level or upgradient of sensitive receiving environments.

5.3 Plans required to be prepared under resource consent conditions

This section explores the plans required to be prepared under resource consent conditions.

5.3.1 Natural inland and buffer management plan

Requirement to establish baseline conditions against which to assess change do not consider antecedent conditions. If baseline is established in a “dry” year, then effects will be considered against a lower/more impacted threshold than if baseline is established in a “wet” year.

Section 2.0 addresses minimising significant adverse effects on lake margin wetlands. Section 2.4 proposes a minimum of 12 monitoring sites across ‘Lake Shore’ and ‘Wetland 22’ areas to determine whether the extent and health of the raupō and flax wetlands on the margins of Lake Taharoa adversely change over time. Baseline monitoring is to be the first February and March following consent commencement, with repeat monitoring in February and March every five years thereafter. Additional monitoring of these sites is to be required when the lake level in Lake Taharoa is less than 9.6 m RL for 30 consecutive days. It should be specified if this is minimum or average daily lake level.

Section 3.0 addresses minimising drawdown effects on retained wetlands only as relating to the Southern block. This should be broadened to include the Central block. We agree with the potential drawdown effects described in Section 3.1. However, we again note that the applicant has not yet identified all wetlands and this should be done so that effects can be managed. We disagree with the monitoring approach in Section 3.2. Water level in each wetland should be independently monitored until an appropriate grouping based on measured data can be determined, at which time use of a representative wetland would be appropriate. We agree with the method to determine the baseline level, provided baseline is adjusted for antecedent conditions. We disagree that water level should be below the trigger level for 14 days before contingency measures are taken. A trigger level should be the point at which action is triggered. We agree with the contingency measures, with the caveat that these also apply to the central block too.

Section 4.0 addresses the offset wetland. The applicant proposes earthworks to construct offset wetlands but have not sought consent to enable this activity. The applicant has not indicated whether they intend to continue taking water from site 27 if it is to become the offset wetland nor have they addressed how the offset wetland will be maintained into the future given it does not meet the definition of natural inland wetland. We recommend water level monitoring using nested piezometers to understand water level in the wetland vs groundwater level. This section also contains significantly more detail on site hydrology than the AEE, drawing attention to the inadequacy of the AEE.

Section 5.0 addresses wetland and stream buffers. Buffers do not consider groundwater nor groundwater as a contamination pathway. This should be rectified.

5.3.2 Lake level and water management plan

This plan contains significantly more detail on water at the mine than the AEE, drawing attention to their inadequacy.

Requirement to establish baseline conditions against which to assess change do not consider antecedent conditions. If baseline is established in a “dry” year, then effects will be considered against a lower/more impacted threshold than if baseline is established in a “wet” year.

Appendix EE, Section 7 notes that when the level of Lake Taharoa is below 9.3 m RL the flow in the Wainui Stream must be augmented to ensure there is a residual flow in the fish pass of at least 24 L/s. It does not indicate where this water is to come from if take from Lake Taharoa is unavailable.

Appendix EE, Section 8 identifies that the Mitiwai Stream minimum flow condition is to apply to the upstream recording site. However, Appendix N (hydrogeology) indicated it applies at the flow augmentation point, which is upstream of this location. This needs to be clarified. Section 8 should specify the water quality monitoring frequency for Mitiwai Stream.

Appendix EE, Section 9 addresses natural inland wetlands. This again neglects to consider the other wetlands onsite. This section identifies that each wetland will have 12 months baseline monitoring, rather than representative wetlands as in the natural inland and buffer management plan. We recommend the method to determine the baseline water level and contingency measures are updated to reflect Section 3.0 of the natural inland and buffer management plan. Section 9 also identifies that AUTH142035.05.01 gives permission to take and use water for augmentation in natural inland wetlands, however this is not evident in the consent as written in Appendix BB.

Appendix EE, Section 10, Table 3 again gives more insight into the proposed activity than the application and AEE's, drawing attention to their inadequacy. This table also references the septic system and contaminated water from laboratory use. There is no consent application for the septic system and there is no application to discharge contaminated water.

5.3.3 Environmental management plan

This plan contains additional detail on water at the mine than the AEE, drawing attention to their inadequacy.

- Section 5 fails to identify risk to water as an environmental risk.
- Section 7 does not identify how hazardous substances are managed to avoid contamination of surface water and groundwater, nor monitoring or remediation.
- Section 8 fails to consider how excessive rainfall could compromise ground stability during operations.
- Section 14 fails to consider impacts on wetlands, waterways, or groundwater.

5.3.4 Harvest and earthworks management plan

This plan relies on buffers to protect wetlands. There are no inland natural wetlands mapped within the harvest area. Wetland mapping will need to be done prior to harvesting. We again recommend mapping all wetlands across Taharoa C block and applying the 30 m setback to these, not just those that meet the definition of inland natural wetland.

6 Disclaimer and Copyright

Appendix C: Wetland assessment

Before the Fast-track Panel

Under: Fast-track Approvals Act 2024

In the matter of: FTAA-2512-1153 Central and Southern Block Mining Project

Statement of advice: Dr. Catherine Beard

Terrestrial and Wetland Ecology (flora)

DOC Senior Science Advisor, Ecology

20 April 2026

Department of Conservation
Te Papa Atawhai

Te Kāwanatanga o Aotearoa
New Zealand Government

Executive Summary

1. This advice provides an ecological review of the Taharoa Ironsands Limited Central and Southern Block Mining Project, with primary focus on natural inland wetlands and wetland-dependent habitats, while also considering terrestrial ecosystems where relevant.
2. Overall, the Applicant's assessment of wetland and terrestrial vegetation values is largely adequate in identifying and characterising ecological values. However, the proposal would result in the permanent loss of natural inland wetlands, including naturally uncommon groundwater-dependent seepage wetlands that are effectively irreplaceable, and exposes retained wetlands and lake-margin ecosystems to ongoing risk from groundwater and lake-level drawdown. The proposed reliance on monitoring, adaptive management, and offsetting does not provide sufficient certainty that adverse effects on sensitive wetland ecosystems will be avoided over the proposed consent term.
3. While the Draft Natural Inland Wetland and Buffer Management Plan (NIWBMP) adds operational detail in relation to monitoring, buffers, and contingency responses, it is principally input-based in its approach. The plan does not define enforceable, outcome-focused performance requirements that would demonstrate buffer effectiveness or wetland protection over time. In particular, neither the Draft NIWBMP nor proposed consent conditions specify measurable targets for buffer vegetation structure, canopy development, species composition, or acceptable levels of exotic dominance, nor do they define timeframes within which such outcomes must be achieved. As a result, buffer performance is assumed rather than demonstrated.
4. The planting framework set out in the Draft NIWBMP further simplifies wetland complexity through a coarse, four-zone model and generalised percentage-based mixes of species. This approach does not adequately reflect fine-scale hydrological variation, microtopography, or differences between surface-water-dominated, groundwater-expressed, and seepage-fed systems. In particular, seepage wetlands are not treated as a distinct ecological type within the zoning framework, despite their reliance on lateral subsurface flows

and limited capacity for rehabilitation once hydrological processes are disrupted.

5. Independent reviews confirm that uncertainty remains regarding the magnitude, duration, and spatial extent of hydrological change. From a wetland ecology perspective, this uncertainty is significant because ecological degradation may occur before changes are detectable through water-level monitoring alone. Wetland responses are often non-linear and cumulative, with repeated or prolonged drawdown capable of driving irreversible changes in vegetation composition, soil condition, and ecosystem function. The use of rewatering as a contingency measure does not replicate natural groundwater-fed processes and should not be relied upon as a substitute for avoiding hydrological disruption in sensitive wetland systems.
6. Consent conditions therefore need to address residual ecological risk that remains unresolved at the point of decision-making**.** In particular, conditions should secure measurable ecological outcomes for wetlands and buffers, define the limits of adaptive management where recovery is uncertain or unlikely, and require early-acting wetland-specific indicators capable of detecting functional decline before irreversible loss occurs. Where uncertainty persists and the consequences of failure are irreversible, a precautionary approach is warranted.
7. In summary, while the proposed management framework may reduce risk, it does not currently provide sufficient assurance that wetlands, and their associated buffer functions, will be protected from irreversible loss or functional degradation over the consent term. Where such assurance cannot be demonstrated, consent controls should prioritise ecological protection over operational flexibility and constrain reliance on post-impact responses.

Introduction

8. My full name is Catherine Michelle Beard

Instruction

9. I have been requested to provide expert biodiversity advice on behalf of the Department of Conservation (DOC) on the Taharoa Ironsand Ltd (TIL) Central and

Southern Block Mining Project Fast-track application, particularly where relevant to terrestrial habitats and wetlands.

Qualification and Experience

10. My role at DOC is Senior Science Advisor – Ecology in the Flora and Ecosystems Team within the Terrestrial Biodiversity Unit of the Biodiversity, Heritage and Visitors Group, based in Kirikiriroa/Hamilton. I hold a BSc and PhD in Biological Sciences from the University of Waikato and have approximately 40 years' work experience in the natural sciences, which provides the scientific foundation for my expertise in New Zealand flora and functional ecosystem ecology.

11. I have held my current role with DOC since 2014. My work focuses primarily on New Zealand flora, plant ecology, and functional ecology of terrestrial (including some wetland) ecosystems. I provide specialist scientific advice to support conservation management, ecological assessment, and evidence-based decision making. My responsibilities include interpreting, assessing, and synthesising complex ecological information; advising on the management of plant species, communities, and ecosystems; and contributing to the scientific basis of conservation practice and policy. I also have responsibilities for ensuring scientific integrity, methodological robustness, and quality assurance of ecological evidence, and for supporting multidisciplinary teams on matters requiring technical judgement.

12. Prior to joining DOC, I worked for seven years as a Wetland Ecologist at Waikato Regional Council, where I undertook wetland ecological assessments, monitoring, restoration planning, and technical reporting to support regional environmental management. Earlier in my career, I also held the position of Technical Officer in Biological Sciences at the University of Waikato, where I provided specialist support for plant ecology and flora research and teaching, also serving as Herbarium Curator with responsibility for specimen collections, taxonomic accuracy and research support, and as a contract lecturer teaching undergraduate and graduate courses in biological sciences.

13. I have extensive experience preparing and reviewing scientific evidence that informs policy, regulatory, and operational decision-making. My professional

background includes authorship and review of scientific and technical reports and papers, participation in advisory and expert working groups, contribution to the development of scientific standards and guidance, and presentation at professional conferences and workshops. I also have a strong understanding of wetland and terrestrial vegetation composition and ecology in New Zealand, including areas on the west coast of the Waikato Region where the Taharoa Ironsand mine is located.

Code of conduct

14. Whilst I acknowlege that this is not an Environment Court proceeding, I confirm that I have read the Code of Conduct for expert witnesses contained in the Environment Court Practice Note 2023 and have complied with it in preparing this advice. Unless stated otherwise, this advice is within my area of expertise, and I have not omitted to consider any material facts known to me that could alter or detract from my opinions.

Scope of advice

15. My expert focus in the following assessment is wetlands and terrestrial habitats. Where necessary, I have drawn on specialist hydrological, hydrogeological and freshwater advice/information to inform and clarify my understanding of hydrology as relevant to wetland condition under different mine operational scenarios. This includes independent reviews of hydrology and groundwater provided to the Department by Collaborations and Aqualinc.
16. I provide an opinion on whether the application includes adequate safeguards to protect terrestrial and wetland ecosystems over the proposed consent term, and in so doing address the following matters:
    i. The adequacy of the Applicant's assessment of wetlands and terrestrial habitats, including the identification and characterisation of ecological values, the assessment of effects on those values, and the extent to which those effects have been appropriately identified, characterised, and addressed.
    ii. The adequacy of the Applicant's proposed mitigation, rehabilitation, and management measures for wetlands and terrestrial habitats.

iii. Where appropriate, alternative or additional mitigation and management approaches, including clarification of my recommended measures where these differ from those proposed by the Applicant, and commentary on the proposed consent conditions.

Disciplinary scope and interface with freshwater ecology advice

17. My advice is focused on the ecology of wetlands and terrestrial habitats, with particular emphasis on vegetation composition, ecosystem processes, buffer functionality, and the factors that influence the resilience or irreversibility of wetland systems over time. Where my assessment intersects with hydrological processes or freshwater systems, this is considered only insofar as those processes influence wetland structure, plant communities, and buffer effectiveness. Detailed assessment of instream ecological thresholds, freshwater species responses, flow regimes, fish passage, and freshwater statutory considerations is addressed separately in freshwater ecology advice. My conclusions therefore complement, rather than duplicate, freshwater ecology advice, and focus on whether wetland ecosystems and their associated buffers can be protected from irreversible loss or functional degradation over the proposed consent term.

Scope exclusions

18. I have not formally reviewed the Application's assessments of hydrology, hydrogeology, freshwater or marine environments, terrestrial fauna, or the proposed effects-management package, as these are being addressed by other DOC experts. However, I have considered relevant information from those assessments where it informs the values of terrestrial habitats and wetlands, the potential effects on those values, and the proposed management of those effects.

Material Considered

19. The following list comprises all documents I have read or reviewed in developing this advice statement.

i. Taharoa Ironsands (TIL) Mine - Central and Southern Blocks Mining Project [Substantive Application]

ii. Appendix G – Key issues table

iii. Appendix I – Hydrology Assessment – Lake Taharoa

iv. Appendix J: Site Project Map

v. Appendix K – Terrestrial Ecology – Wetlands and Vegetation Assessment

vi. Appendix L – Freshwater Ecology Assessment

vii. Appendix M – Terrestrial Ecology Fauna Assessment

viii. Appendix N – Hydrogeology Assessment (Groundwater Effects)

ix. Appendix P – Preliminary Site Investigation

x. Appendix T – Draft Environmental Management Plan

xi. Appendix BB – Proposed Resource Consent Conditions

xii. Appendix CC: Memorandum Assessment of the Existing Environment for TIL

xiii. Appendix DD – Draft Natural Inland Wetland and Buffer Management Plan

xiv. Appendix EE – Draft Lake Level and Water Management Plan

xv. Appendix FF: Discharge and Dispersion Modelling Assessment

xvi. Blyth, James.: Taharoa Ironsands Limited (TIL) – Central and Southern Blocks – Fast Track Application Hydrology Review. Collaborations Memorandum to Department of Conservation. 07 April 2026.

xvii. Calder-Steele, Nicole and Jones, Matthew.: Draft review and response: Groundwater advice on Taharoa Ironsands FTAA Application. Aqualinc Research Ltd, Memorandum to Department of Conservation. 10 April 2026

Site Visit

20. On 2 April 2026, I undertook a site visit to the Taharoa mining area with Nigel Binks (DOC Technical Advisor – Freshwater) and Rhys Burns (DOC Senior Technical Advisor). We were escorted by the mine managing Director Wayne Coffey, senior mine staff, and one of the Applicant's consultants. Site access was limited due to the time we had available for the visit. We briefly inspected areas within the southern part of the proposed mining footprint where terrestrial vegetation and wetlands are to be removed, followed by a visit to a potential offset/mitigation area west of Lakes Taharoa and Numiti (outside the proposed

mine footprints, but currently used for water storage), and finally the Wainui Stream fish pass area and Mitiwai Stream margins near the coast.

Adequacy of the Applicant's Assessment of Wetlands and Terrestrial Habitats

21. This review examines the application's assessment of ecological values and effects, considering terrestrial ecosystems generally but placing greatest emphasis on natural inland wetlands and wetland-dependent habitats. My analysis has been undertaken with regard to both the Ecological Impact Assessment for wetlands and terrestrial vegetation (Appendix K) and the Draft NIWBMP (Appendix DD), which together describe the identification of ecological values, the assessment of effects, and the proposed framework for monitoring and managing those effects.
22. Overall, the Applicant's assessment of wetlands and terrestrial vegetation (Appendix K) is largely adequate in identifying and characterising ecological values, and the assessment of effects is generally transparent and aligned with accepted guidance. However, the assessment relies in key areas on assumptions, grouping of values, and future management plans, and would require clearer linkage to enforceable consent conditions to provide confidence that effects are appropriately addressed over the consent term.
23. The proposal will cause the permanent loss of natural inland wetlands, including effectively irreplaceable groundwater-influenced seepage wetlands, and will place retained wetlands and lake margin ecosystems at significant risk from groundwater and lake level drawdown. The proposed reliance on monitoring, contingency management, and offsetting is insufficient, as key measures are deferred, uncertain, or lack enforceable assurance.
24. As a result, substantial residual ecological risk remains for naturally uncommon seepage wetlands, other groundwater-dependent inland wetlands, and high-value lake margin ecosystems. There is a material risk that adverse effects on wetland biodiversity and lake margin habitats will not be fully avoided, remedied, offset, or compensated for over the life of the consent.

25. The Draft NIWBMP provides useful detail on how effects would be managed in practice, including monitoring, contingency actions, buffer management, and offsets. However, it does not remove the need to demonstrate at the consenting stage that any remaining effects are acceptable, that uncertainty has been properly considered, and that the effects management hierarchy has been applied. This review therefore distinguishes between matters that can reasonably be addressed through management plans and those that must be resolved to provide confidence in the decision under the NPS-FM and Fast-track framework.

Identification and characterisation of ecological values

26. The identification and characterisation of ecological values presented in Appendix K of TIL's application is generally robust and fit for purpose. The assessment applies established survey methodologies across the Central and Southern Blocks and makes effective use of recognised vegetation and wetland classification frameworks. Natural, modified, and induced ecosystems are clearly distinguished, and this differentiation is applied largely consistently, recognising that the long history of disturbance at the site limits certainty regarding ecosystem origin in some locations.
27. Naturally uncommon ecosystems, including active and stable sand dunes and lake-margin wetlands, are appropriately identified and their values are carried through into the effects assessment. Overall, the application of the EIANZ ecological value framework is sound, and the grouping of habitat types is logical and generally adequate for the assessment of landscape-scale values and ecological connectivity.
28. Notwithstanding the overall adequacy of values identification and characterisation, several limitations are material to the assessment of effects and to the application of the effects management hierarchy, and these are outlined below.

Naturally uncommon ecosystem types

29. Several seepage wetlands are identified within the site; however, their status as a naturally uncommon ecosystem type is not explicitly acknowledged or

addressed in the assessment. Seepage wetlands are recognised nationally as naturally uncommon due to their specific hydrological setting, typically small spatial extent, and disproportionate contribution to indigenous biodiversity (Williams et al. 2007, Wiser et al. 2013). Seepages and flushes are classified as endangered, reflecting a historical decline in ecological function and a very severe reduction across at least 70% of their former distribution (Holdaway et al. 2012).

30. While some seepage wetlands within the proposed Taharoa mine footprint may be wholly or partly induced by historic mining activities and could reasonably be assessed as having moderate site-specific value, others are natural, albeit in a degraded condition. For these wetlands, national rarity, inherent sensitivity, and irreplaceability should have been explicitly recognised and addressed, particularly given that their complete loss is proposed.
31. This omission understates the ecological significance of these wetlands and has direct implications for the application of the effects management hierarchy. In particular, it affects the level of avoidance required and the scale, certainty, and credibility of any proposed offsetting or compensation. Where effects involve the complete loss of naturally uncommon ecosystems, reliance on post-hoc offsets or compensation, especially where outcomes are uncertain, is inconsistent with both ecological best practice and the intent of the NPS-FM.
32. While the Draft NIWBMP acknowledges that seepage wetlands require specific hydrological conditions that are “impossible to recreate” and therefore cannot be directly replaced through offsetting, this recognition is confined to the offset design section and is not carried through into the ecological value assessment or the application of avoidance-based protection for those wetlands. As a result, the national rarity, sensitivity, and irreplaceability of naturally occurring seepage wetlands remain understated.

Grouping of wetlands for value assessment

33. The grouping of wetlands (for example, as “southern wetlands” or “eastern wetlands”) is understandable given the scale of the proposal. The Draft NIWBMP introduces more site-specific monitoring for selected wetlands, particularly lake-margin systems and Wetland 22, which partially addresses this limitation

for those locations. However, grouping remains the dominant framework for assessing drawdown effects and management responses across groundwater-influenced wetlands, which masks important variability in condition, hydrology, sensitivity, and vulnerability between individual wetlands. This limitation is particularly relevant where some wetlands are proposed to be completely lost, while others are retained but potentially subject to hydrological effects.

34. Such aggregation reduces transparency around site-specific effects and increases the risk that wetlands with higher sensitivity or lower resilience are treated as interchangeable with more modified or robust systems. This has implications for the accuracy of magnitude and significance determinations and for the design of management responses.

Reliance on the "existing environment" construct

35. The assessment defines the existing environment primarily by reference to post-closure rehabilitation conditions rather than current ecological conditions. While this approach may be legally defensible, it introduces ecological uncertainty when characterising current values, particularly where induced wetlands or rehabilitation plantings are assumed to persist or to mature along specific and favourable trajectories.
36. From an ecological perspective, this approach risks overstating baseline resilience and adaptive capacity, and underestimates the consequences of additional stressors on systems that may already be transitional or contingent on ongoing management inputs.
37. The Draft NIWBMP adopts the same "existing environment" construct as the application and is therefore subject to the same limitations when interpreting ecological change relative to current conditions, particularly for induced wetlands and rehabilitation plantings whose persistence is assumed rather than demonstrated.

Inconsistent evaluation of wetland values and effects

38. Wetlands were identified and mapped using methods broadly consistent with the Ministry for the Environment Wetland Delineation Protocols. However,

numerous ponds and waterbodies currently managed for water storage or operational purposes were excluded from consideration. It is unclear whether exclusions were based solely on the absence of hydrophytic vegetation, or whether value judgements influenced by historic or current mining use were applied.

39. This approach introduces inconsistency, particularly where some features identified as natural inland wetlands are also used for water storage. In addition, the potential for groundwater connectivity in some excluded ponds does not appear to have been fully assessed. These inconsistencies reduce confidence that the full extent of wetland-associated ecological values has been captured.

Values of wetlands beyond the mine boundary that are likely to be impacted

40. While the assessment acknowledges the potential for hydrological effects beyond the site boundary, it does not adequately identify or undertake an ecological value or effects assessment of wetland ecosystems outside the consent area that may be hydrologically connected to, or affected by, the proposal.
41. Given the scale and duration of groundwater abstraction proposed, and the acknowledged uncertainty in predicted hydrological effects, this represents a substantive gap in the assessment of ecological effects.

Terrestrial habitats

42. The Ecological Assessment also addresses a range of terrestrial habitats across the site, most of which are highly modified by historic mining, forestry, and grazing. Active and stable sand dune systems are identified as naturally uncommon ecosystems of high to very high ecological value due to their national rarity and severe historical loss, and while direct disturbance is largely avoided through buffers, these habitats remain sensitive to indirect effects such as weed invasion, altered disturbance regimes, and edge effects over the life of the consent.

43. Other terrestrial habitats, including grassland, shrubland, and rushland mosaics, are dominated by exotic species and are of moderate botanical value;

however, the ecological assessment notes that these areas contribute to landscape connectivity and provide functional habitat for indigenous fauna, including At-Risk bird species. In addition, plantation pine forest and associated scrub, while of low floristic value, are identified as providing foraging and commuting habitat for long-tailed bats, a nationally threatened species, elevating the ecological relevance of these habitats beyond vegetation condition alone. Overall, terrestrial effects are generally more reversible and more amenable to management through buffers, pest control, and rehabilitation than wetland effects; however, ongoing attention to cumulative indirect pressures on dunes, fauna habitat, and landscape connectivity remains important.

Assessment of effects on identified ecological values

44. The assessment of effects on wetlands and terrestrial habitats clearly identifies the principal effect pathways, including vegetation clearance, wetland loss, hydrological drawdown, water-quality effects, and pest plant spread. The evaluation of effect magnitude and overall significance is undertaken consistently with the EIANZ guidelines, with appropriate application of professional judgement where matrix-based approaches may understate ecological effects. Notably, the report explicitly recognises the permanent loss of 4.25 ha of moderate-value wetlands as a high to very high magnitude effect that cannot be avoided, remedied, or minimised. Potential hydrological effects on retained wetlands are informed by specialist hydrological advice, with the assessment appropriately acknowledging uncertainty and distinguishing between groundwater-fed, potentially groundwater-fed, and surface-fed wetlands.

Wetland ecology considerations arising from hydrological uncertainty

45. Independent hydrological and hydrogeological reviews confirm that substantial uncertainty remains regarding the magnitude, duration, and spatial extent of changes to groundwater and surface water. This uncertainty poses ongoing risk for wetland habitats whose structure, composition, and function are tightly

linked to hydrological conditions, and which may respond before predefined hydrological thresholds are reached.

46. The Draft NIWBMP strengthens the integration of ecological and hydrological monitoring, including measures of wetland extent, vegetation condition, and species composition. This addresses, in part, previous concerns about reliance on hydrological proxies alone.
47. Consistent with the NPS-FM, the analysis below does not revisit technical modelling assumptions. Instead, it focuses on the ecological consequences of uncertainty—specifically whether the proposal provides sufficient confidence that natural inland wetlands will be protected from further loss or functional degradation over the full duration of the consent.

Precaution where effects are uncertain

48. Although the application relies on modelling, monitoring, and adaptive management frameworks to address hydrological effects, independent reviews confirm that uncertainty remains regarding the magnitude, duration, and spatial extent of changes to groundwater and surface water. From a wetland ecology perspective, this uncertainty is material because the structure, composition, and function of wetland ecosystems are tightly coupled to relatively stable hydrological conditions, and responses may occur in ways that are not readily reversed.
49. The ecological implications of relying on physical hydrological thresholds rather than biologically derived indicators are addressed in detail in freshwater ecology advice. From a wetland and vegetation perspective, the core concern is that irreversible changes to plant assemblages, soil structure, and wetland hydroperiods may occur before any defined management trigger is reached. Loss of permanently saturated substrates, contraction of seepage expression, or transition from obligate wetland vegetation to facultative or terrestrial assemblages may represent an effective loss of wetland function, even if water levels remain within nominal or modelled ranges.
50. The Draft NIWBMP introduces defined trigger levels and contingency responses that strengthen integration between hydrological and ecological monitoring compared with earlier versions of the application. However, these triggers

remain primarily framed around hydrological parameters rather than early indicators of wetland ecological change. As a result, there remains a risk that ecological degradation could occur before management responses are activated, limiting the extent to which the framework gives effect to a precautionary approach where effects are uncertain and potentially irreversible.

51. Precaution is particularly important where wetlands are groundwater-dependent or seepage-dominated, as these systems rely on diffuse, low-energy hydrological inputs and exhibit limited tolerance to altered hydroperiods or repeated drawdown events. Where uncertainty persists regarding the likelihood or reversibility of ecological change, this strengthens rather than weakens the case for consent conditions that prioritise avoidance of adverse effects and early intervention over reliance on adaptive management responses after degradation is detected.

Sensitivity of wetland habitats to water-level change

52. Wetlands within and adjacent to the site include lake-margin raupō reedlands, stream-associated wetlands, groundwater-dependent seepage systems, and smaller perched or seasonally wet wetlands. Many of these habitats are characterised by obligate wetland plant species, shallow rooting zones, organic or semi-organic soils, and a strong dependence on relatively stable water tables. Their ecological integrity is therefore closely linked not only to absolute water levels, but also to the timing, persistence, and spatial distribution of saturation within the wetland profile.
53. From a wetland ecology perspective, even modest or short-term reductions in water availability can have disproportionate effects. Lowering of water tables or contraction of saturated zones can lead to loss of permanently wet microsites, reduced seepage expression, and changes in soil redox conditions. These changes can result in replacement of obligate wetland vegetation by facultative or terrestrial species, increased susceptibility to weed invasion, and loss of fine-scale habitat heterogeneity that supports wetland biodiversity and ecological function. Such transitions may occur gradually and without obvious acute thresholds, yet still represent a substantive degradation of wetland values.

54. Extended or repeated periods of drying pose particular risk to groundwater-dependent and seepage-dominated wetlands. Prolonged reduction in saturation can lead to oxidation and physical alteration of wetland soils, loss of organic substrates, mortality of dominant vegetation, and depletion of seed banks and vegetative propagules. Once these soil and vegetation changes occur, subsequent re-wetting does not necessarily restore former ecological conditions, and wetlands may transition to alternative ecosystem states with reduced biodiversity, altered structure, and diminished function.
55. The ecological consequences of hydrological change in freshwater systems, including the role of biological thresholds and species-level responses, are addressed in freshwater ecology advice. From a wetland and vegetation perspective, the critical concern is that ecological degradation may occur before changes are detectable through water-level monitoring alone. Because wetland responses are often non-linear and cumulative, reliance on minimum water-level thresholds or late-stage triggers provides limited protection against incremental loss of wetland extent and function over time.
56. These sensitivities are amplified over the duration of a long-term consent, particularly where wetlands may be exposed to repeated drawdown events during dry seasons or under cumulative abstraction scenarios. Even where individual events are short-lived, limited recovery between stress periods may progressively erode wetland resilience. For wetlands that are naturally uncommon, groundwater-dependent, or seepage-fed, this loss of resilience increases the likelihood of irreversible functional change, reinforcing the need for precautionary management and avoidance-based protection where uncertainty persists.

Cumulative and long-term ecological effects

57. Ecological risk is amplified when hydrological uncertainty is considered over the full duration of the consent, particularly through cumulative and repeated drawdown events. Repeated drawdown, even if individually short lived, may cumulatively erode wetland resilience by limiting recovery between stress periods. Over time, this can lead to gradual but persistent declines in habitat quality, extent, and ecological coherence across wetland networks.

58. While the Draft NIWBMP provides for ongoing monitoring and response over the life of the consent, it does not explicitly assess or manage cumulative ecological effects arising from repeated or prolonged drawdown across the consent duration. In the absence of a cumulative effects framework, there remains a material risk of incremental loss of wetland resilience and ecological connectivity between wetlands, streams, and lake margins—changes that may not be apparent in assessments focused on individual events or short-term compliance.

Limitations of rewatering as an ecological mitigation measure

59. Concerns regarding water quality, contaminants, and fauna responses to augmentation are addressed in freshwater ecology advice. From a wetland ecology perspective, the primary limitation of rewatering is its inability to replicate diffuse, low-energy groundwater inputs that sustain seepage expression, soil redox conditions, and wetland plant community structure.
60. Notwithstanding the adaptive management framework proposed in the Draft NIWBMP, the use of rewatering as a contingency measure raises substantive ecological concerns for wetland systems that are naturally groundwater-dependent or seepage-dominated. From a wetland ecology perspective, rewatering should not be assumed to be functionally equivalent to maintaining natural hydrological regimes, particularly where wetlands rely on diffuse, lateral subsurface flows rather than ponded water or episodic surface inflows.
61. Wetland ecosystems are structured around characteristic hydroperiods that govern soil chemistry, redox conditions, nutrient availability, and plant species composition. Artificial supplementation may increase surface wetness or water levels, but it does not replicate the spatial and temporal distribution of groundwater discharge that sustains seepage expression, permanently saturated substrates, and fine-scale microhabitat heterogeneity. As a result, rewatering may fail to prevent loss of obligate wetland vegetation, shifts toward facultative or terrestrial species, and degradation of soil conditions that underpin wetland function.

62. Where drying or drawdown has persisted for sufficient duration to cause soil oxidation, compaction, or loss of organic substrates, subsequent rewatering is unlikely to restore former ecological conditions. Mortality of dominant vegetation, depletion of seed banks and vegetative propagules, and disruption to below-ground structure may result in lasting changes to community composition and ecosystem trajectory. In such cases, rewatering represents a reactive measure applied after critical ecological thresholds have already been crossed, limiting its effectiveness as mitigation.
63. The ecological risks and uncertainties associated with rewatering and flow supplementation in freshwater systems, including species-level and water-quality considerations, are addressed in freshwater ecology advice. From a wetland and vegetation perspective, the key limitation is that engineered rewatering cannot recreate the processes that sustain groundwater-fed or seepage-dominated wetlands, nor can it reliably prevent transition to alternative, lower-value ecosystem states once natural hydrological regimes have been disrupted.
64. Accordingly, rewatering should not be relied upon as a primary means of mitigating hydrological effects on sensitive wetland ecosystems, nor used to justify drawdown or loss of wetlands where recovery is uncertain or unlikely. For wetlands that are naturally uncommon, groundwater-dependent, or seepage-fed, ecological protection is most effectively achieved through avoidance of hydrological disruption and maintenance of natural water regimes, rather than post-impact intervention.

Proposed rehabilitation planting and buffer design

65. The Draft NIWBMP details a proposal to establish or preserve vegetated buffers of 30 m width along the margins of the Wainui and Mitiwai streams and around all retained wetlands. Adherence to ecosourcing principles, the use of species mixes reflecting local vegetated communities, appropriate timing of planting, and the proposed fencing and maintenance specifications are supported and considered practical.
66. However, while a 30 m buffer may represent a reasonable minimum baseline for maintaining ecological integrity in some contexts, a generic “one size fits all”

approach is not optimal for this development. It does not adequately recognise the variability in freshwater habitat types, hydrological settings, and ecological processes present across the site, nor does it ensure buffers are designed to deliver the specific ecological functions required to address adverse effects on wetlands and other freshwater ecosystems.

67. Buffers should be designed to respond to site-specific conditions, perform clearly defined ecological functions, meet measurable performance standards, and remain effective under future climate pressures. The application of uniform buffer widths alone provides only limited assurance of ecological outcomes. Effective buffer design should be informed by local biophysical drivers, including topography and slope (which influence runoff, erosion, and sediment delivery), hydrological pathways such as overland and shallow subsurface flow, groundwater–surface water interactions, and local exposure and microclimatic conditions. Where wetlands are groundwater-dependent, buffers also need to recognise sensitivity to changes in infiltration, drawdown, and flow interception. Buffers that are designed with reference to these factors provide greater confidence in protecting wetland hydrology and water quality than buffers defined solely by a fixed width.
68. Buffers should also be designed according to the ecological functions they are intended to deliver, rather than setting a simple nominal width and assuming efficacy. Relevant functions include water quality protection through sediment and nutrient attenuation, hydrological protection through maintenance of infiltration capacity and moderation of peak flows, and habitat provision and connectivity that support indigenous vegetation communities and gradual terrestrial–wetland transitions. Explicitly linking buffer design to these functions assists in aligning planting composition, spatial layout, and management objectives, and provides a clearer basis for assessing effectiveness.
69. Future climate conditions are expected to place additional pressures on freshwater systems, including increased rainfall intensity and longer dry periods. Buffer design should therefore incorporate elements that enhance resilience, such as planting mixes tolerant of hydrological variability, and sufficient width and structural complexity to maintain function under more extreme conditions.

Designing buffers to anticipate these pressures reduces reliance on reactive management and increases confidence in long-term effectiveness.

70. Within this broader design framework, the planting zones proposed in the Draft NIWBMP are relatively coarse, and in my opinion do not adequately reflect the diversity of wetland types and hydrological processes present across the site. The use of four broad zones—lake margin, shallow water, wetland (saturated soils), and terrestrial buffer—does not distinguish between wetlands driven by different water sources or between permanently saturated and seasonally wet environments, nor does it capture fine-scale variation in topography that influences plant assemblages and wetland function.
71. In particular, seepage wetlands are not identified separately within the proposed zoning framework. These systems are characterised by dependence on lateral subsurface flow rather than ponded water or vertical groundwater expression, and their ecological character is closely tied to intact hydrological pathways. Where such pathways are disrupted, the ability to reinstate seepage wetlands is highly uncertain. As a result, post-disturbance planting should not be relied upon as an effective means of replacing seepage wetland function, and any mitigation assumptions based on rehabilitation warrant cautious consideration.
72. In addition, the Draft NIWBMP relies on generalised percentage-based species mixes for each planting zone, which further simplifies wetland complexity. Such approaches assume that proportional representation of species is ecologically appropriate across a zone, irrespective of fine-scale variation in saturation, groundwater input, or microtopography. In practice, wetland plant assemblages are structured by dominant hydrological and soil conditions rather than by even or predetermined species proportions. Applying standardised percentage mixes risks establishing floristically diverse plantings that are poorly aligned with site processes, leading to dominance by facultative species, reduced persistence of obligate wetland taxa, and increased maintenance inputs to sustain plantings that are not self-supporting.

Performance measures for buffers

73. The Draft NIWBMP sets out buffer widths, planting intentions, and high-level management actions, but it does not include clear or enforceable performance

measures that would provide certainty that buffers will achieve and maintain their intended ecological functions over time. While such design inputs are necessary components of buffer establishment, they are not performance standards, and do not allow a reliable assessment of whether buffers are functioning effectively once implemented.

74. From a wetland and terrestrial ecology perspective, effective buffers should be assessed against measurable ecological outcomes, rather than assumed to perform based on nominal width or planting prescription alone. Even when read alongside the proposed resource consent conditions (Appendix BB), the Draft NIWBMP does not define measurable or enforceable targets for vegetation structure, canopy development, species composition, or acceptable levels of exotic or pasture dominance within buffers, nor does it specify timeframes within which these outcomes are to be achieved. In the absence of such standards, it is difficult to determine whether buffers are developing in a manner that provides meaningful protection for wetlands against edge effects, altered hydrological pathways, weed ingress, or indirect ecological degradation.
75. Monitoring provisions within the Draft NIWBMP are primarily focused on implementation activities and general vegetation condition, rather than on buffer performance relative to clearly articulated ecological functions. There is no explicit linkage between monitoring results and defined thresholds that would indicate buffer under-performance, nor are there time-bound requirements for corrective action where outcomes are not being met. As a result, adaptive management for buffers remains largely discretionary and reactive, rather than structured around early detection and timely intervention.
76. While broader limitations of adaptive management frameworks are addressed in freshwater ecology advice, the absence of outcome-focused performance criteria within the Draft NIWBMP means that buffer effectiveness is largely assumed rather than demonstrated. This reduces confidence that buffers will continue to function as intended over the consent term, particularly under cumulative pressure from hydrological change, edge disturbance, and climatic stressors.
77. The Draft NIWBMP would be materially strengthened by the inclusion of clear, measurable buffer performance standards that are explicitly linked to

monitoring, reporting, and adaptive management. Such standards could include, for example, targets for canopy closure and structural development within defined timeframes, thresholds for exotic species dominance, and indicators of buffer integrity relevant to wetland protection. Without these provisions, buffers remain conceptually valuable but operationally uncertain, limiting their contribution to decision-level assurance of ecological protection.

78. Refinement of the Draft NIWBMP zoning framework would also improve certainty around ecological outcomes. This could include incorporation of hydrological overlays to distinguish surface-water-dominated, groundwater-expressed, and laterally fed systems; identification of areas of permanent versus seasonal saturation; and recognition of fine-scale topographic variation relevant to species selection. Where seepage systems occur, this reinforces the importance of avoidance and hydrological protection. Introducing this level of resolution would better align buffer design and planting with underlying ecological processes and support a more robust assessment of residual effects.

Implications for consent conditions and management

79. Given the sensitivity of wetlands affected by the proposal, and the presence of naturally uncommon and groundwater-dependent wetlands, consent conditions need to address residual ecological risk that remains following the measures described in the Draft NIWBMP and Appendix BB. In particular, conditions must provide confidence at the point of decision-making that wetland integrity and buffer functionality will be maintained over the full consent term, rather than relying on future plan development or post-impact responses to demonstrate effectiveness.
80. Existing provisions focus primarily on buffer extent, planting inputs, and management processes. To address the ecological risks identified in this review, consent conditions need to explicitly secure ecological outcomes, rather than rely on assumed performance. This requires conditions that link buffer establishment and management to demonstrable outcomes for wetland protection, supported by monitoring and enforceable response requirements.
81. Consent conditions should also clearly define the limits of adaptive management. For wetland systems that are naturally uncommon, seepage-fed,

or groundwater-dependent, ecological recovery following degradation is uncertain or unlikely, and reliance on adaptive management or post-effect mitigation provides limited ecological assurance. In these circumstances, conditions should prioritise avoidance of adverse effects and protection of underlying processes, rather than flexibility to respond after change has occurred.

82. While the freshwater ecology advice addresses hydrological thresholds and species-level responses, consent conditions should additionally require wetland-specific ecological indicators capable of detecting early functional decline, including changes in wetland extent, loss of obligate wetland vegetation, and degradation of permanently saturated soil zones. These indicators are necessary to ensure that ecological change is identified before irreversible loss occurs.
83. Accordingly, the presence of multiple management plans and review mechanisms does not, in itself, resolve the need for clear, precautionary consent controls. Where uncertainty remains and the potential for irreversible wetland loss exists, consent conditions must directly reflect that risk by constraining activities and responses in a way that ensures wetland and buffer functions are protected throughout the consent term.

Conclusions and recommendations

84. This review has considered the adequacy of the Applicant's assessment and proposed management of effects on wetlands and terrestrial ecosystems, with particular focus on natural inland wetlands and wetland-dependent habitats. While the application adequately identifies key ecological values and proposes a comprehensive suite of management and monitoring measures, it also relies heavily on assumptions, grouped assessments, and future plans to manage effects that are potentially irreversible.
85. The proposal would result in the permanent loss of natural inland wetlands, including seepage wetlands that are naturally uncommon, groundwater-dependent, and effectively irreplaceable. Retained wetlands and lake-margin systems would remain exposed to ongoing risk from hydrological change over the consent term, with uncertainty persisting around the magnitude, duration, and cumulative effects of drawdown. From a wetland ecology perspective, this uncertainty is significant because ecological

degradation may occur in ways that are difficult to detect early and unlikely to be reversed once thresholds are crossed.

86. The Draft Natural Inland Wetland and Buffer Management Plan provides useful operational detail on how effects would be managed in practice, including monitoring, contingency responses, buffer establishment, and rehabilitation planting. However, as set out in this report, the plan and associated consent framework do not consistently translate those measures into outcome-focused, enforceable requirements capable of demonstrating that wetlands and their supporting buffers will retain ecological function over time. In particular, reliance on input-based planting prescriptions, coarse zoning, and adaptive management reduces confidence that residual effects can be adequately controlled where recovery is uncertain or unlikely.
87. Accordingly, the central issue is not whether further management detail can be developed post-consent, but whether the proposal provides sufficient assurance at the point of decision-making that wetlands and associated terrestrial ecosystems will be protected from irreversible loss or functional degradation. Where such assurance cannot be demonstrated, a precautionary approach is required.
88. On the basis of the assessment above, I recommend that consent decisions and conditions:
    i. Prioritise avoidance-based protection for naturally uncommon, seepage-fed, and groundwater-dependent wetlands where ecological recovery following disturbance is uncertain or unlikely.
    ii. Require outcome-focused ecological performance standards for buffers and rehabilitation planting, including clear targets, timeframes, and triggers linked to enforceable management responses.
    iii. Specify wetland-specific indicators of ecological change (such as changes in wetland extent, vegetation composition, and soil saturation) alongside hydrological measures, to enable early detection of functional decline.
    iv. Define clear limits on reliance on adaptive management and rewatering, recognising that these measures cannot substitute for maintaining natural hydrological processes in sensitive wetland systems.
    v. Apply precautionary consent controls where uncertainty remains and the consequences of failure would be irreversible, rather than deferring resolution of key risks to future plan reviews or post-impact responses.

89. Taken together, these recommendations reflect the need for consent conditions that provide clear, enforceable assurance that wetland ecosystems and their associated buffers will be protected over the life of the consent, consistent with best-practice ecological effects management and the intent of the NPS-FM and Fast-track framework.

References

HOLDAWAY, R.J., WISER, S.K. and WILLIAMS, P.A. (2012), Status Assessment of New Zealand's Naturally Uncommon Ecosystems. Conservation Biology, 26: 619-629. https://doi.org/10.1111/j.1523-1739.2012.01868.x

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Wiser SK, Buxton RP, Clarkson BR, Hoare RJB, Holdaway RJ, Richardson SJ, Smale MC, West C, Williams PA 2013. New Zealand's naturally uncommon ecosystems. In Dymond JR ed. Ecosystem services in New Zealand – conditions and trends. Manaaki Whenua Press, Lincoln, New Zealand. Pp. 49–61.

Appendix D: Terrestrial ecology assessment

Before the Fast-track Panel

Under: Fast-track Approvals Act 2024

In the matter of: FTAA-2512-1153 – Central and Southern Block Mining Project

Statement of advice: Rhys Burns

Terrestrial Fauna

DOC staff

27 April 2026

Department of Conservation
Te Papa Atawhai

Te Kāwanatanga o Aotearoa
New Zealand Government

Introduction

1. My full name is Rhys James Burns.

Instruction

2. I have been requested to provide expert advice on behalf of the Department of Conservation (DOC) on the Taharoa Ironsands Limited (TIL) Central and Southern Block Mining Project Fast-track application.

Qualification and Experience

3. I am a Senior Technical Advisor (Fauna) for the Department of Conservation (DOC) based in the Rotorua Office. I have a BSc(Hons) (1993) and a PhD (1997) in Biochemistry from the University of Otago. I have been employed by DOC for 26 years – 5 years as a Biodiversity Ranger and the other 21 years as a Technical Advisor for terrestrial biodiversity. In this role I have performed a wide variety of roles such as providing advice to staff regarding terrestrial conservation matters, advising on prioritising national aerial 1080, assessing and advising on Wildlife Act authorities including lizard salvage applications and wildlife translocations. I am the leader of the Weka Recovery Group and the Kōkako Recovery Group, and am a member of the Frog Recovery Group. I have been an expert witness for DOC on terrestrial fauna matters in several RMA cases including Mt Messenger Road Bypass, Kaiwaikawe Windfarm, and Auckland Regional Landfill (Dome Valley). I am also a member of the Mt Messenger Ecological Review Panel, that advises New Zealand Transport Agency (NZTA) on ecological and pest control matters as they arise during the construction of this road bypass. I currently also have a central role co-ordinating DOC's terrestrial responses to listed and referred projects under the Fast-track Approvals Act (2024). Other Fast-track projects I have provided expert terrestrial fauna advice to include Waihi North, Southland Windfarm (also under the Covid Fast-Track (2021) legislation), Takitimu North Link Stage 2, and Huriwaka Windfarm.

4. My role in this project to date has included review of application documents concerning terrestrial fauna values of the sites, and I have had two visits to the Site – on 10th January 2024 as part of the RMA consent application and on 2nd April 2026 as part of this FTAA application.

5. I have a good understanding of the terrestrial fauna of the site. Work that is especially relevant to this application includes:

    i. TIL 2020-2025 RMA application for Central and Southern block

Code of conduct

6. Whilst it is acknowledged this is not an Environment Court Proceeding, I confirm that I have read the Code of Conduct for expert witnesses contained in the Environment Court Practice Note 2023. I have complied with the Code of Conduct in the preparation of this advice. Unless I state otherwise, this advice is within my area of expertise, and I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

Scope of terrestrial fauna advice and expert opinion

7. My expert advice relates to the following:

    i. Adequacy of the Applicant's assessment of terrestrial fauna, including identification of any values that have not been assessed or have been insufficiently characterised.

    ii. Adequacy of the Applicant's assessment of effects on terrestrial fauna with specific reference to any effects that are incomplete, understated, or not addressed.

    iii. Adequacy of the Applicant's proposed mitigation, rehabilitation and management measures.

    iv. Alternative mitigation or management approaches, where appropriate, including clarification of my recommended or preferred measures including where these differ from those proposed by the Applicant.

    v. Comments on conditions.

Material Considered

8. In preparing this advice I have reviewed the following documents as part of the substantive application:

    i. Taharoa Ironsands Mine – Central and Southern Blocks Mining Project, Substantive Application

    ii. Appendix I: Lake Taharoa Hydrology Assessment

    iii. Appendix J: Site Project map

    iv. Appendix K: Terrestrial Ecology – Wetlands and Vegetation Assessment

v. Appendix M: Terrestrial Ecology – Fauna Assessment

vi. Appendix N: Hydrology Assessment (Groundwater Effects)

vii. Appendix U: Draft Harvest and Earthworks Management Plan and Harvest plan

viii. Appendix BB: Proposed Resource Consent Conditions

ix. Appendix DD: Natural Inland Wetland and Buffer Management Plan

x. Appendix EE: Draft lake Level and Water Management Plan

xi. Appendix KK: Wildlife Act Approval Application

xii. Binks, Nigel: Statement of Advice – Freshwater. Department of Conservation

xiii. Beard, Catherine: Statement of Advice – Terrestrial and Wetland Ecology (Flora). Department of Conservation

xiv. Blyth, James: Taharoa Ironsands Limited (TIL) – Central and Southern Blocks – Fast Track Application Hydrology Review. Collaborations Memorandum to Department of Conservation

xv. Calder-Steele N & Hones, Matthew: Draft review and response: Groundwater advice on Taharoa Ironsands FTAA Application. Aqualinc Memorandum to DOC

xvi. Maseyk, Fleur: Statement of Advice – Effects management, offset and compensation. The Catalyst Group

Summary

8. TIL is proposing to mine ironsands at Taharoa for the next 35 years. These actions have the potential to adversely affect terrestrial fauna such as birds, lizards and bats through habitat destruction or alteration, with the potential to directly harm lizards.

9. Additional use of water from Lake Taharoa may cause lake levels to decline below that recorded in recent decades and in turn have detrimental impacts on lake fringe wetlands containing high value wetland avifauna species, particularly the critically threatened Australasian bittern.

10. Ground water extraction near dune lakes and wetlands has the potential to affect wetland avifauna and waterbirds through changes in the hydrological regime of their lake and wetland habitat.

11. There is uncertainty regarding the impact of pumping stored mine water into wetlands and whether the water quality from this source is sufficient to prevent adverse effects on birds, their food resources, and habitat.

12. Lizards have not been found at the site but may be at low density in surveyed areas. There is suitable lizard habitat in the unsurveyed southern part of the Block and if present, will be at risk of being killed through pre-mining habitat destruction, and road building (e.g. during pine forest harvest) in potential lizard habitat. Capture and release of all lizards found to a location with suitable habitat and adequate pest control is an appropriate management approach.

13. Long-tailed bats use the site primarily for foraging flights and the use of an approved bat roost tree removal process when harvesting pine trees along with 'warm-coloured' lights during night operations are important mitigation measures that should be deployed.

Key Issues

Avifauna values

14. A total of 46 bird species were recorded at the site, with 12 species being threatened[1]:

    i. Two species (Australasian bittern, grey duck) are Nationally Critical;

    ii. One species (Caspian tern) is Nationally Vulnerable;

    iii. One species (New Zealand dotterel) is Nationally Increasing;

    iv. Five species (red-billed gull, fernbird, New Zealand pipit, marsh crake, spotless crake) are At Risk – Declining;

    v. Three species (pied shag, NZ dabchick, variable oystercatcher) are At Risk – Recovering.

15. Grey duck are predominantly regarded as being close to extinction due to hybridisation with the introduced mallard duck (*Anas platyrhynchos*). I regard this issue as being beyond the scope of the direct effects of this proposed Project, so I consider any adverse effects from this Project on grey duck should be regarded with that primary agent of threat in mind.

16. Australasian bittern (bittern; matuku-hūrepo) are a wetland specialist, and are declining at a fast rate in New Zealand, due to a range of factors including habitat loss, predation by introduced mammals and harriers, water quality, starvation,

[1] Robertson HA, Baird KA, Elliott GP, Hitchmough RA, McArthur NJ, Makan T, Miskelly CM, O'Donnell CJ, Sagar PM, Scofield, RP, Taylor GA & Michel P (2021). Conservation status of birds in Aotearoa New Zealand, 2021. *New Zealand Threat Classification Series* 36. Department of Conservation, Wellington. 43p.

and vehicle strike[2]. The presence of bittern at and around the site indicates the presence of high-quality wetland habitat.

17. Matuku-hūrepo require specific types of wetland habitat in order to successfully forage and breed. In feeding habitats, clear water with a typical depth of 15-25cm immediately bordering dense vegetation is optimal[3]. For breeding, long reeds such as raupo are required to construct the nest material and screen it from aerial predators (mainly harriers/kahu).

18. Bittern also use other wetland habitat such as carex sedgeland, sedges and wirerush, seasonal adventives and grasses[4]. When foraging in more open habitat, bittern are potentially more vulnerable to predators such as ferrets, feral cats and dogs.

19. Bittern are termed 'hyper-mobile' because they can frequently fly to neighbouring sites to forage and can also undertake long-distance flights (sometimes hundreds of kilometres) at irregular intervals. This means they utilise a landscape-scale network of wetlands and wetland habitat, with some wetlands used as crucial 'staging posts' containing food resources they need to refuel themselves in their long-distance flights. Bittern may only use these sites for a few hours or days before flying to another wetland, but each one provides habitat needed to support bittern. As bittern mainly fly at night, they are seldom seen flying. However, even if not previously recorded using all these wetland sites, I consider it likely that bittern in the Lake Taharoa area are utilising most if not all 88 wetland sites present there, including boggy and degraded wetlands, even if intermittently. In addition, bittern from other areas undertaking long-distance flights may also utilise any of these areas intermittently.

20. As only male bittern verbalise during the spring booming period (September to November), detecting male bittern at other times of the year (and females at any time of the year) is difficult. For example, sound recorders are ineffective, and cameras can only sample over relatively small areas so are inefficient. The deployment of GPS-enabled devices on bittern has enabled a new

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[2] O'Donnell CFJ & Robertson HA (2016). Changes in the status and distribution of Australasian bittern (*Botaurus poiciloptilus*) in New Zealand, 1800s – 2011. *Notornis* 63: 152-166.

[3] Williams EM (2024). Conservation management of the critically endangered matuku-hūrepo / Australasian bittern: A review of threats and preliminary management techniques. Science for Conservation 341, Department of Conservation, Wellington. 64p.

[4] Williams EM (2018). Seasonal water levels and habitat requirements of Australasian bitterns at Whangamarino wetland. Contract report to Department of Conservation.

understanding of their behaviour, but only relatively few birds have had devices attached, and none in the Lake Taharoa area. Therefore, the combination of being difficult to detect, highly mobile, and reliant on a network of wetlands, means every wetland is potentially important for bittern, but it is difficult to prove they do (or do not) use a particular wetland.

21. Bittern usually breed in reedland close to the water level of wetlands, lakes and estuaries, and mainly nest from November to January. In wetlands and lakes, water level usually declines slowly over this period, but if it rises quickly, any nest containing eggs or chicks can be drowned. In contrast, a rapid decline in water levels may leave a nest 'high and dry', leaving it more vulnerable to more terrestrial-based predators (e.g. cats, ferrets).

22. Therefore, maintaining wetland habitat in high condition – clear water, dense reedland vegetation, plentiful food (fish and eels), with relatively stable water levels – is critical for sustaining bittern and allowing reproductive success. In some sites, introduced pest plants can seriously harm bittern habitat. For example, grey willow can achieve 100% canopy cover in some wetlands, making them increasingly unsuitable for bittern. Effective pest control of introduced predators may also increase breeding success.

23. The increased water extraction proposed for Lake Taharoa has the potential to lower water levels more rapidly than has occurred with previous consent conditions, potentially affecting the ability of bittern to successfully forage and breed in the wetland habitat that fringes Lake Taharoa, low-gradient streams flowing into Lake Taharoa and wetlands hydrologically connected to Lake Taharoa (Fig. 1).

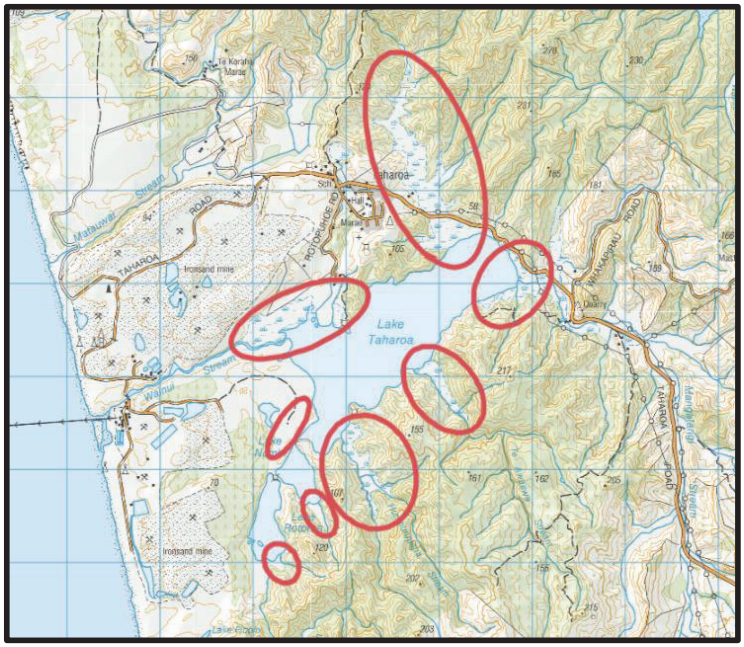

Fig. 1. Lake-fringe wetlands (red ellipses) likely to be hydrologically connected to Lake Taharoa, where wetland habitat and wetland bird monitoring should occur

24. I support the intention to undertake a Lake Taharoa wetland margin monitoring programme to monitor the health of the raupō and flax wetlands (App DD). However, it is uncertain whether the proposal is to undertake monitoring as soon as a 9.6mRL trigger is reached (Surface Water Take Proposed Condition 10), only once this has occurred for 30 consecutive days (as outlined in the SLR Consulting Natural Inland and Buffer Management Plan), or whether monitoring should only be confined to a period of 30 days. Details on exactly what the monitoring will entail, where it is to occur, the length of time it will occur for and what specific measures could be taken to minimise any adverse effects has not been outlined (Surface Water Take Proposed Condition 10(c)), so the effectiveness of the programme is uncertain. Condition 10(c) also refers to being reliant upon condition 11(b) which does not exist (this must be 10(b)).

25. The proposed sites for monitoring lake-fringe wetlands (Fig.1, Appendix DD) are constrained to the western shoreline of Lake Taharoa and Lake Numiti. I consider that all wetlands hydrologically connected to Lake Taharoa should be monitored (Fig. 1).

26. TIL proposes the addition of a minimum ‘stop take’ lake level at 8.53mRL, but I consider there is uncertainty regarding the level of adverse effect on lake-fringe wetland avifauna habitat at that lake level, and how quickly lake levels could continue to decline once this level is reached when there is an extended period

of little to no rain to recharge the lake. The uncertainty of effects at this lake level is also raised by other experts[5].

27. Several avifauna species are dependent on these lake-fringe wetlands. As this is such large and crucial habitat for wetland species in this area, I consider it is appropriate for there to be regular surveys of the bittern population in all wetlands within the site and hydrologically connected to Lake Taharoa (Fig. 1). This should be undertaken before any increase in water extraction from Lake Taharoa occurs, and repeated at least every 5 years for the duration of the consent. Only in that way can there be any confidence that the bittern population is not being adversely affected by the operation of the mining activities. Other wetland birds (spotless crake, marsh crake, fernbird) should also be included as they are potentially adversely impacted by any changes to wetland habitat also. Undertaking a management programme to respond to any weed infestations is also essential for the long-term suitability of these sites to maintain bittern and other wetland species.

28. The proposal to mine ironsands at increased depths than previous consents, and to within 30m of wetlands, raises uncertainty regarding the impact of water levels on the wetlands. If water levels of these waterbodies are affected, it is likely to have adverse effects on any bittern that may use the site, and other wetland birds such as spotless crake and marsh crake.

29. The applicant has also proposed that if wetland water levels are affected by the actions of the mine, additional water from storage sites at the mine can be pumped into the affected wetland to maintain water levels. However, the water in the storage ponds may contain high sediment loads or other contaminants. Wetland water needs to be clear in order for the habitat to be suitable for bittern, as they are visual predator and need to be able to see prey in the water column. The proposal to pump silty water into wetlands indirectly through ground soakage will have a high and long-term consequence for wetland avifauna and their habitat should anything go wrong and a large sediment load inadvertently enters a wetland. An increase in sedimentation may lead to rapid depletion of food resources, affect the ability of avifauna to catch any remaining food, and could also cause wetland vegetation changes to occur, eventually making the habitat unsuitable for birds currently using the wetland. For example, sedimentation can cause wetlands to become shallower, converting open water to vegetated reedland or flaxland. Such a change would cause the suite of

[5] Statement of Mr Blyth at [4.5]

avifauna species currently inhabiting that wetland to permanently change. In addition, if the water levels are irreversibly affected by mining operations, it is highly uncertain the affected wetlands could be continually managed for hydrological integrity once the consent has expired.

30. The use of wetlands to store water for mining operations is also likely to have adverse effects on wetland and waterbirds, as water levels are likely to change rapidly and water quality is uncertain. Any such actions may require additional offsetting to maintain avifauna habitat.

31. Other threatened birds utilise the lake habitat – pied stilt and dabchick. Maintaining these lakes in high quality condition is essential for both species.

32. Caspian tern is usually associated with marine shorelines, but can utilise freshwater habitat. The degree to which this species use freshwater habitat at this site is not addressed in the reports. Nevertheless, I consider Caspian tern could be affected by substantial changes to lakes and open-water wetland habitat at the site.

33. Other threatened species recorded – New Zealand dotterel and variable oystercatcher – are invariably found on the shoreline and should be largely unaffected by compliant mining activities. However, they nest in open sandy areas so could potentially nest in mining operational areas at this site.

34. I agree with the proposal to limit maintenance works within the Coastal Marine Area during the NZ dotterel and variable oystercatcher peak nesting times (September to January).

35. I agree with the proposed intent to avoid nesting birds when clearing wetlands, grassland and shrubland vegetation. However, the methods, timing and frequency of this approach needs to be set out before it can be commented on for its potential effectiveness.

36. I agree with the proposal to undertake rehabilitation works within 3 months of mining completion. The sooner habitat can be restored the sooner it is likely to be used by avifauna, including open grassland habitat for New Zealand pipit.

<u>Lizard values</u>

37. Lizards have been searched for using two methods – artificial cover objects (ACO's) and hand searching. ACO's are materials usually placed on the ground, that can be easily checked for the presence of lizards. They provide a refugia from predators and though they can be made from a variety of materials,

onduline roofing material seem to be particularly attractive to skinks, as when placed in direct sunlight they absorb heat during the day and slowly release it at night. To make them more effective at attracting lizards, ACOs should be left out in suitable locations for at least 6 weeks during the Oct-April period when lizards become more active due to increased temperatures. A triple-stacked onduline ACO with suitable spacers between sheets also allows lizards to find a preferred location within the onduline, and is regarded as being more effective than single sheets of onduline.

38. The applicant has used onduline ACOs, and put them in place at least 6 weeks prior to survey, which I support.

39. However, the onduline used in the survey was only single sheets, whereas triple-stacked sheets should be used to be most effective. In addition, the 6 weeks 'bedding in' period is only a minimum recommended period; the longer they are in place before surveys, the more confidence can be placed in results.

40. Nevertheless, I agree with the applicant that, as they didn't detect any lizards, there appears to be a low level of lizards present at the sites that were surveyed (Mitiwai Stream and northern parts of the site).

41. However, large areas of the proposed mining site, particularly at the southern part of the block, were not surveyed for lizards, and other methods such as pitfall traps or minnow traps weren't used. These methods provide other options when, for whatever reason, ACOs may not be particularly effective.

42. The southern end of the block has long exotic grassland interspersed with some dense native vegetation. This vegetation has the potential to harbour lizards. The southern area is also well connected to more extensive native vegetation and exotic-dominated dune vegetation immediately outside the proposed mining area, potentially allowing lizards to disperse into the proposed mining area.

<u>Bat Values</u>

43. Long-tailed bats (Nationally Critical[6]) have been recorded at the site, mainly in the pine forest and wetland margin areas. No roosts have been found and there is little to no habitat available on the mining site that would provide suitable bat roost habitat.

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[6] O'Donnell C, Borkin K, Christie J, Davidson-Watts I, Dennis G, Pryde M, Michel P (2022). Conservation status of bats in Aotearoa New Zealand 2022. *New Zealand Threat Classification Series* 41, Department of Conservation, Wellington 18p.

44. I support the applicant implementing Bat Roost protocols during the harvest of the pine trees present at the site (section 8.1.12, Appendix M).

45. Lighting during night-time mining operations has the potential to adversely affect bats. Bats tend to avoid bright lights and are particularly sensitive to blue-rich or white LED lights, so will limit foraging near these sources. To minimise impact, stationary lights should be shielded from above so all light is trained downwards and have a colour temperature of 2700K or below.

Conclusions / Recommendation

46. The wetlands in the area within and surrounding the mining site, including Lake Taharoa and other lakes, represents significant wetland bird habitat. The proposed mining activities close to many of these dune wetlands sites risks hydrological change that will adversely affect wetland birds. Avoidance measures should be prioritised rather than relying on site-specific adaptive management and uncertain mitigation measures.

Appendix E: Effects management, offsetting and compensation assessment

Before the Fast-track Panel

Under: Fast-track Approvals Act 2024

In the matter of: FTAA-2512-1153 – Central and Southern Block Mining

Statement of advice: Dr Fleur Jennifer Foster Maseyk

Effects management, offset and compensation

Independent consultant – Conservation Scientist, The Catalyst Group

30 April 2026

Department of Conservation
Te Papa Atawhai

Te Kāwanatanga o Aotearoa
New Zealand Government

Executive Summary

1. This advice covers matters relating specifically to the proposed effects management package, including proposed measures to avoid, minimise, remedy, and offset or compensate residual adverse effects.

2. My key concerns are:

   i. While the identification of ecological values at the site is largely sound, the adverse effects on those values have been underestimated, and therefore the proposed measures to avoid, minimise, or remedy also fall short. Consequently, the residual adverse effects, including wetland loss and degradation due to mining operations, are greater than have been accounted for in the proposed wetland offset.

   ii. There are a number of issues with the proposed effects management package that require addressing, including:

      - The residual adverse effects are underestimated within the loss/gain evaluation and therefore the adequacy of the proposed offset has not been correctly evaluated.

      - The Biodiversity Compensation Model (**BCM**) used to evaluate losses and gains falls short of good ecological and offsetting model standards and is an inappropriate tool to evaluate ecological equivalence of high-value features.

      - Insufficient description and quantification of the biodiversity values that will be lost or impacted (due to residual adverse effects).

      - Given the inappropriate model used and the insufficiencies in the input data, the 'up to 10% net gain of biodiversity value' claim cannot be verified.

      - The very high level of uncertainty associated with the proposed offset (creation of 8.3 ha of wetland habitat adjacent to site 27). This uncertainty is too great as to be resolved through adaptive management.

- Notwithstanding the inappropriateness of the proposed offset site, it is only tentatively proposed. While this retains the opportunity to seek an alternative, more appropriate, site(s), the lack of confirmed offset site contributes to the uncertainty of the proposed offset.
- The proposed conditions of consent relating to the effects management response, including mitigation measures (e.g., planting in buffer areas, undertaking weed control) and the wetland offset proposal are inadequate, and the supporting management plan light on specific details required to ensure the effects management measures are implemented as intended.

iii. Models of insignificant ecological and mathematical robustness can perpetuate biodiversity losses. I emphasise that the use of the BCM is inappropriate as the model has been shown to fall short of standard modelling best practice. The BCM relies on an aggregated qualitative biodiversity value score and therefore cannot reasonably demonstrate that a no net loss or net gain outcome can be anticipated now, nor validate this claim in the future. Further, the outputs have been incorrectly and misleadingly interpreted. The use of a model creates a suggestion of rigour, whereas in this case, the implied rigour is in fact lacking.

Introduction

3. My full name is Fleur Jennifer Foster Maseyk.

4. I am a Conservation Scientist with The Catalyst Group, where I have worked since 2012. I am based in Wellington but work nationally.

Instruction

5. I have been requested to provide expert advice on behalf of the Department of Conservation (**DOC)** on the Central and Southern Block Mining Project Fast-track application.

6. Specifically, I have been asked to provide comment on Taharoa Ironsands Ltd's (**the Applicant**) proposed effects management proposal and proposed consent conditions.

7. I was brought onto the project team on the 27 March 2026 and my role in this project to date has included the review of application documents as relevant, discussions with the subject experts on the DOC team, and preparation of this statement of advice.

Qualification and Experience

8. I have a PhD (nature resource management and conservation decision-making) obtained from the University of Queensland; a Master of Environmental Science (ecology and conservation biology), and a Bachelor of Science (ecology and conservation) from the University of Auckland.

9. I have nearly 30 years of experience working in natural resource management and conservation, and have particular expertise in areas of biodiversity policy, biodiversity offsetting, natural capital focussed ecosystem services approaches to natural resource management, and integrating biodiversity into farm planning processes. I have published over 20 papers in peer reviewed journals on these topics. Prior to joining The Catalyst Group my previous roles included working for local government, private consultancy, and the Department of Conservation. I have also spent several years working overseas, for a conservation NGO, and in a research role at the University of Queensland. I have both in-field and desktop experience in vegetation and habitat mapping and the assessment of ecological value and significance, technical assessment of resource consent applications, and the evaluation of biodiversity offset proposals.

10. Of relevance to this statement of advice is my experience and qualifications relating to biodiversity offsetting and compensation. I led the development of an accounting system for the purposes of evaluating ecological equivalence in

biodiversity offset exchanges[1], was project leader and lead-author of the guidance document for biodiversity offsetting under the RMA[2] and a think piece on strategic mechanisms for delivery of biodiversity offsetting or compensation for the regional council Biodiversity Working Group[3]; I led the development of guidance on best practice for calculating credible 'risk of loss' estimates under the Environment Protection and Biodiversity Conservation Act for the Australian Department of Environment and Energy[4], and I have published several peer reviewed articles on the concepts and theory of biodiversity offsetting and the use of offset models. I regularly provide advice, review proposals, and deliver presentations and training sessions on effects management to local government or private consultants on effects management, biodiversity offsetting and compensation design, and the use of accounting systems.

11. I have a good understanding of the subject matter on which I provide advice and am familiar with the Waikato Region. Work that is especially relevant to my role in this application includes:

    i. Recently, I been involved in providing advice to the Department of Conservation on effects management and offsetting associated with

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1 Maseyk FJF, Barea L, Stephens RTT, Possingham HP, Dutson G, Maron M. 2016. A disaggregated biodiversity offset accounting model to improve estimation of ecological equivalency and no net loss. Biological Conservation 204:322–332.
This model is available at: https://www.doc.govt.nz/about-us/our-policies-and-plans/guidance-on-biodiversity-offsetting/biodiversity-offsets-accounting-system/

2 Maseyk F, Usser G, Kessels G, Christensen M, Brown M 2018. Biodiversity offsetting under the Resource Management Act. A guidance document. Prepared for the Biodiversity Working Group on behalf of the BioManagers Group.
Available on the Local Government NZ website:
https://www.lgnz.co.nz/news/publications/biodiversity-offsetting-under-the-resource-management-act/

3 Available on the Local Government NZ website:
https://www.lgnz.co.nz/news/publications/improving-outcomes-from-the-delivery-of-biodiversity-offsets-and-compensation/

4 Maseyk FJF, Evans MC, Maron M 2017. Guidance for deriving 'Risk of Loss' estimates when evaluating biodiversity offset proposals under the EPBC Act. Report to the National Environmental Science Programme, Department of Environment and Energy. Threatened Species Recovery Hub, Project 5.1 'Better offsets for threatened species'. Centre of Biodiversity and Conservation Science, University of Queensland.
Maseyk FJF, Maron M, Gordon A, Bull JW, Evans MC. 2020. Improving averted loss estimates for better biodiversity outcomes from offset exchanges. Oryx 1–11.

several projects (including a quarry, a mine, and a housing development) under the Fast-track Approvals Act 2024.

ii. I have provided advice to the Panel on a substantial wetland offset proposal within a housing development being processed under the COVID-19 Recovery (Fast-track) Consenting Act 2020.

iii. I provided expert evidence on effects management (for Te Rūnanga o Ngāti Whātua) in relation to the appeals on the Auckland Regional landfill at Wayby Valley (Waste Management NZ Ltd.) before the Environment Court.

iv. I provided expert evidence on effects management (for Manuhiri Kaitiaki Charitable Trust) on the appeals relating to sand extraction within the Mangawhai-Pākiri Embayment before the Environment Court.

v. I was engaged by Auckland Council to provide technical expert evidence in relation to biodiversity offsetting in the matter of Brookby Quarries Ltd. appeal to the Auckland Unitary Plan before the Environment Court.

vi. I regularly provide advice on offset design or undertake reviews of biodiversity offsetting and effects management packages including for roading projects, and housing developments, and have provided review and technical advice into the development of biodiversity offsetting legislation and policy.

Code of conduct

12. Whilst it is acknowledged this is not an Environment Court proceeding, I confirm that I have read the Code of Conduct for expert witnesses contained in the Environment Court Practice Note 2023. I have complied with the Code of Conduct in the preparation of this advice. Unless I state otherwise, this advice is within my area of expertise, and I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

Scope of advice and expert opinion

13. My expert advice relates to the following:

    i. Comment on the adequacy of the Applicant's assessment of effects, as informed by the topic experts on the DOC project team, in the context of evaluating the adequacy of the effects management proposed.

    ii. Review of the Applicant's effects management in response to their assessment of effects, including the offset proposal and the model used to evaluate the adequacy of the proposed wetland offset.

    iii. Adequacy of the proposed offset mitigation and offset measures, including feasibility and level of uncertainty associated with the anticipated outcomes.

    iv. Comments on conditions.

14. My advice does not extend to matters relating to water quality, or marine ecology.

Material Considered

15. In preparing this advice I have reviewed the following documents:

    i. Taharoa Ironsands (TIL) Mine - Central and Southern Blocks Mining Project [Substantive Application].

    ii. Appendix J: Site/Project Map.

    iii. Appendix L: Freshwater Water Ecology Assessment.

    iv. Appendix K: Terrestrial Ecology – Wetlands and Vegetation Assessment.

    v. Appendix T: Draft Environmental Management Plan.

    vi. Appendix BB: Proposed Resource Consent Conditions and Memorandum.

    vii. Appendix DD: Draft Natural Inland Wetland and Buffer Management Plan (**NIWBMP**).

16. I have not been on site, as the site visit was already arranged when I was engaged and I was not available. I have however, viewed site photographs taken by the

DOC project team who attended the site visit, and discussed the site in the context of the application with them.

17. I have also considered the advice provided by the DOC project team including on the following matters:

    i. Groundwater, Nicole Calder-Steele and Matthew Jones (Aqualinc).

    ii. Hydrological monitoring, James Blyth (Collaborations).

    iii. Terrestrial Fauna, Dr Rhys Burns (DOC).

    iv. Terrestrial and Wetland Ecology (flora), Dr Catherine Beard (DOC).

    v. Freshwater, Nigel Binks (DOC).

Summary

18. The assessment of ecological values at the site is described across the Application and supporting documents. The subject experts within the DOC project team[5] have concluded that the assessment of values is:

    i. Mostly accurate for terrestrial and wetland values assessment, notwithstanding the deliberate exclusion of areas of wetland not meeting the National Policy Statement for Freshwaters definitions for natural inland wetland, or in use in operational processes (see statement of advice of Dr Catherine Beard, and advice from Nicole Calder-Steel and Matthew Jones).

    ii. Provides a generally adequate high-level description of surface water features, groundwater systems, and wetland types, but there is an absence of information to inform on fish populations. (see statement of advice of Nigel Binks).

    iii. Mostly adequate for identification of terrestrial fauna, although noting that large areas of the proposed mining site that has the potential to harbour lizards were not surveyed. The value of wetland habitat

[5] See the statements of advice of the relevant topic expert.

(including modified and/ or degraded habitat) to wetland avifauna species is under emphasised (see statement of advice of Dr Rhys Burns).

19. The Application identifies the following adverse effects on terrestrial and aquatic ecosystems and fauna:

    i. The unavoidable, and complete loss of 4.25 ha of wetlands (Wetlands 5, 6, 7, 17, 20, 23, and 25), comprising 3.47 ha of palustrine seepage wetland (a naturally uncommon habitat type), 0.58 ha palustrine shallow water wetland, and 0.2 ha of palustrine swamp.

    ii. The potential loss, injury, or disturbance to wetland avifauna during mining of the above areas of wetland.

    iii. Loss of all vegetation cover within the mining footprint, including habitat for New Zealand pipit, pīhoihoi (*Anthus novaeseelandiae*), and potential habitat for lizard species.

    iv. Potential disturbance and harm (injury or death) of New Zealand pipit during operation of the mine.

    v. Potential disturbance of wetland species, particularly Australasian bittern, matuku-hūrepo (*Botaurus poiciloptilus*) due to dust, vibration, and noise from the mining operations.

    vi. Potential impact (disturbance, injury, or death) on New Zealand dotterel, tūturiwhatu (*Anarhynchus obscurus*) should maintenance or emergency pipeline works be required in the dune and beach areas during the breeding season.

    vii. The loss of ~ 80 ha pine plantation, an area known to be used by long-tailed bats for foraging and potentially roosting.

    viii. A reduction in instream habitat availability through changes in water depth and wetted stream width.

    ix. Changes to aquatic habitat due to changes in water quality caused by flow reduction, including water temperature fluctuations (increases)

due to the loss of cooler groundwater inflows and associated reduction in dissolved oxygen levels.

x. Limitations to native fish passage opportunities, during both upstream and downstream migration periods, due to reduced water depths or channel dewatering.

xi. Variation in the saltwater/freshwater transition zone and potential for saltwater intrusion upstream, potentially impacting available spawning habitats for fish such as īnanga.

20. In contrast to the Applicant's assessment, the DOC subject experts have noted an incomplete assessment of adverse effects on identified ecological values due to the mining operation. Notably, there is a lack of considering hydrological implications of the proposed activity on ecological values (e.g., change of flows instream and change of water levels within wetland systems on aquatic fauna).

21. I share this opinion and am of the view that the Application understates the magnitude and type of adverse effects on ecological features. I reach my conclusion from the reviews written by DOC's subject experts and my own reading of the Application documents.

22. In response to the adverse effects identified within the application, the following management measures are proposed by the Applicant to address adverse ecological effects.

i. Retention of the existing 100 m set-back (buffer) from the Mean High-Water Springs, to avoid adverse impacts on indigenous dune vegetation on the active and stable dune system (naturally rare ecosystems), and Wetland 15 (0.09 ha of seepage wetland within the coastal buffer).

ii. Retention of the 30 m setback along the Mitiwai Stream to retain long-tailed bat habitat.

iii. Establishment and maintenance of a 30 m set-back (buffer) around retained wetlands (Wetlands 9, 10, 11, 16, 21, the lake shore, and the Wainui Stream wetlands) to project these features from operational impacts (other than groundwater drawdown).

iv. Implementation of a biosecurity programme to ensure clean machinery to avoid the introduction and spread of invasive species into the site.

v. Establishment of lake-level indicators within monitoring programme that trigger water supplementation to mitigate loss of water in lakes and wetland due to groundwater drawdown.

vi. Implementation of an indigenous planting programme with the 30 m set-back zone, to provide habitat for fauna, including avifauna, lizards, and long-tailed bats (*Chalinolobus tuberculatus*).

vii. Development of a pest plant management plan to be implemented across the dunes, wetlands, and buffer areas.

viii. Pest control across the site to protect plantings and retained indigenous vegetation and reduce pressure on indigenous fauna from mammalian predators.

ix. The creation of 8.3 ha of wetland habitat to offset the loss of 4.25 ha of wetland, anticipated to generate 'up to 10% net gain in biodiversity value'[6], although noting the lack of a completed offset design and that this claim is 'indicative only'.

x. Monitoring of lake and wetland levels coupled with an engineered rewatering regime when water levels drop by (as yet not set) trigger levels to address groundwater drawdowns and reduced flows in-stream.

23. Monitoring and reporting to support the above measures to address effects on wetlands is also recommended within the wetland assessment (Appendix K) including monitoring plans to:

i. Monitor and manage water levels in wetlands.

ii. Monitor lake margin wetlands near Taharoa C Block, including baseline monitoring, ongoing 5-yearly monitoring, and additional monitoring triggered by extended periods of low lake levels.

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[6] Appendix K, wetland assessment PDF page 5

24. The Draft NIWBMP accompanying the Application, sets out the methods for the above monitoring programmes, the specifications for the planting of the wetland and stream buffer areas, a description of the intended pest animal control programme, and a high-level indication of the intention of a yet to be pest plant programme. The Draft NIWBMP also includes a draft 'indicative' offset plan as 'a proof of concept' only.

25. It is my view that the proposed effects management proposal does not provide an acceptable level of confidence that the adverse effects of the application will be avoided, minimised, remediated, offset or compensated. This is because:

    i. The actual and potential adverse effects of the operation on wetland ecological and biodiversity values have been understated. Effects on aquatic fauna and aquatic habitat values appear to have been disregarded, in part due to the failure to consider the relationship between hydrological effects and consequential effects on ecological values. This issue is compounded by the hydrological modelling and groundwater advice[7] indicating the potential drawdown of groundwater within the wetland systems is greater than described by the Applicant. (Nicole Calder-Stelle & Matthew Jones, James Blyth).

    ii. The effects management response has therefore been inadequately and inappropriately designed; uses indefensible modelling to support the anticipated outcomes; relies on the creation of wetland habitat to offset losses, the success of which is highly uncertain and beyond the scope of adaptative management to address; and is not well supported by proposed conditions of consent.

26. I am aware that the NIWBMP acknowledges the proposed offset (creation of 8.3 ha wetland habitat of moderate – high value near Site 27) as 'indicative only', stating that the wetland offset will be determined after the consents have been granted, and once the necessary hydrological and engineering work has been completed. However, it is poor practice to leave confirmation of effects

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[7] Draft Advice provided to the Department of Conservation by Nicole Calder-Stelle and Matthew Jones (Aqualinc) 10 April 2026 and James Blyth (Collaborations) 7 April 2026.

management to post-decision. This substantially reduces certainty that the eventual offset will be adequate, appropriate, and achievable. Deferring confirmation of effects management to after consents are granted provides little confidence that important ecological values will be avoided and protected and risks permanent ecological losses and ongoing degradation of biodiversity values.

Key Issues

27. I have focused on the areas of the Application where I consider there to be key issues, as discussed below. These include the follow matters:

    i. Inadequacy of assessment of effects.

    ii. Inadequacy of the offset proposal.

    iii. Inappropriate model used to support offset proposal.

    iv. Inadequacy of the proposed consent conditions and management plans.

    v. Concerns with the rehabilitation plan.

Inadequacy of assessment of effects

28. This matter has been well-traversed by DOC's subject experts. In addition, the inadequacy of this assessment is a concern from an effects management perspective as inadequate assessments (not identifying or underplaying effects) have a consequential impact on the design and evaluation of the effects management package, including any offset or compensation measures. A proposed effects management package is unlikely to be ecological adequate if the losses have been underplayed or narrowed in scope.

29. My concerns that the adverse effects on wetland habitat, and consequently wetland fauna, are being downplayed is further exacerbated by advice from the groundwater and hydrogeologist experts.

30. Further areas where I think the scale of adverse effects has been downplayed includes:

i. Underplaying the potential effects (including cumulative effects) from the drawdown of groundwater on the lake and wetland systems.

ii. Largely ignoring the high level of uncertainty associated with potential adverse effects on wetland fauna (e.g., impacts of changing lake levels on the breeding success of Australasian bittern), and consequently leaving the management of those effects to chance.

iii. Underplaying potential impacts on aquatic invertebrate and fish species due to a lack of information on these values and consequently lack of assessment of effects on those values.

iv. Failing to account for the relationship and interplay between hydrological effects and consequential impacts on aquatic biodiversity and aquatic habitat.

v. Failing to account for impacts on wetland and lake systems present on the boundary, but outside the development footprint.

Inadequacy of offset proposal

31. It is my view that the proposed wetland offset is inadequate, for the following reasons:

i. **Indefensible modelling**

The proposed wetland offset relies on indefensible modelling (see para 32 onwards) to support 'up to a 10% net gain in biodiversity value'. The input values used in the model are insufficiently reflective of wetland values or on the ground measures that are responsive to management intervention (offset actions). Therefore, we cannot in the future verify whether the offset did generate a net gain.

ii. **Inappropriate aggregation**

An aggregated biodiversity value score is used within the offset modelling, which is inappropriate for high-value, high-concern elements of biodiversity. Aggregation obscures trade-offs and increases the risk of out of kind exchanges and loss of biodiversity. The aggregated biodiversity

value score used within the BCM allows seepage wetlands to be lost in exchange for gains within other wetland types (suggesting an interchangeability that does not exist), with an implication that attributes of seepage wetlands will be offset by default. This is unproven and unlikely.

There is a lack of clarity or clear relationship between the intention for outcomes from the proposed wetland offset (and additional effects management responses) and the management plan describing actions to get there. The proposal introduces confusion and inconsistencies where on the one hand it acknowledges that seepage wetlands are not able to be created, and on the other it suggests that in creating new wetland habitat the lost seepage wetlands have been offset. For example, the claim[8] that the created wetland will contain 6.72 ha (81% of the total proposed wetland offset) seepage wetland, yet the design of the offset site does not describe specific actions or otherwise show attempts to create this habitat – regardless of whether there can be any confidence in outcomes from these actions or not.

The level of aggregation used within the proposed wetland offset reflects poor offsetting design practice[9], and will contribute to ongoing declines for the biodiversity elements which are not explicitly accounted for within offset exchanges.

iii. **High degree of uncertainty in success**

The proposed wetland offset site itself, although not confirmed, presents a very high level of uncertainty that anticipated ecological outcomes can be achieved. This includes the practical feasibility of the wetland creation and the proximity of the site to ongoing operations.

The (tentatively) proposed offset site (adjacent to Site 27) will still be subject to the indirect effects of mining, in particular drawdown of

8 Page 19, NIWBMP.

9 There is always some degree of aggregation when accounting for biodiversity within an offset. However, it is good practice for aggregation to only occur below the level of 'what we care about' and not beyond to explictly account for those matters of interest, and to avoid concealed or unequivalent trades.

groundwater and fluctuations of water levels within the wetland system. This risk is supported by the hydrological and groundwater advice.[10] It is also unclear whether the 'pond' located within what would be the proposed offset wetland site will still be used for water supply for the mining operations and associated activities. It is nonsensical to locate an offset site where there is any risk that ongoing operational pressures could undermine or alter anticipated restoration and recovery trajectories (e.g., from groundwater drawdown) or where there would be temptation to manage the site for its utility (e.g., water supply) rather than ecological outcomes.

It appears that the wetland offset proposal includes an assumption that the creation of additional wetland habitat will have benefits for aquatic fauna and habitat. However, this is not explicitly accounted for or described, and there is uncertainty as to whether effects on these values will be adequately addressed via the proposed offset. This uncertainty is amplified by the lack of data on the aquatic ecology and fauna values present. The lumping of the wetland sites creates further challenges for describing values and determining effects. The loss of aquatic insects will also impact on the available food source for fish, long-tailed bats, and other wetland fauna.

There is also uncertainty around some of the proposed enhanced and protection measures. For example, the use of the augmentation of water levels within the wetland and lake systems to replicate hydrological regimes that are ecologically suitable are unproven, and unlikely. Further, the measure has a high risk of generating perverse outcomes. The ecological, chemical, hydrological and biosecurity risks associated with this proposed measure are further described in the freshwater statement of advice.[11]

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[10] Draft Advice provided to the Department of Conservation by Nicole Calder-Stelle and Matthew Jones (Aqualinc) 10 April 2026 and James Blyth (Collaborations) 7 April 2026.

[11] Draft Statement of Advice – Freshwater, Nigel Binks 21 April 2026.

It is my view that the uncertainty in outcomes associated with the proposed wetland is too high to have sufficient confidence that the uncertainties can be managed post-consenting via adaptive management. This is particularly so in the absence of comprehensive consent conditions and time-bound contingency measures.

iv. **Deferral of confirmation of offset site and actions to post-consenting**

The ecological risks of deferring confirmation of appropriate effects management until post-consenting cannot be overstated. Having confidence that adverse effects have been comprehensively considered, and appropriate responses designed with a reasonable level of confidence in anticipated outcomes is fundamental. This is because granting of consent in the absence of sound effects management locks in occurrence of adverse effects without the assurance of managing or offsetting those same effects. The end point is continued loss and decline of ecological features and biodiversity values.

Inappropriate model used to support offset proposal

32. The Application cites the lack of data availability to justify use of the BCM, a compensation model deemed to be 'less detailed' than an offset model (Appendix K, page 57). I note here the confusion generated by using a compensation model to support a proposed outcome that, based on the use of offsetting concepts and language (e.g., net gain), is assumed to be an offset (not compensation). However, I put that confusion to one side and focus instead on the inappropriate use of the BCM model within the Application.

33. The BCM has some merit as an early-stage sense check to gauge the potential level of effort required to manage residual effects. However, the BCM is not an offset model and its use outside of its intended purpose and capabilities has been brought into question through other consenting processes. The risks to

biodiversity of poorly designed offsetting models (including the BCM) have recently been discussed in the peer-reviewed published literature[12].

34. The criticism of the BCM centres around its lack of modelling rigour and standards. The BCM is based on the previously established, peer-reviewed Biodiversity Offsetting Accounting Model (BOAM)[13] in the sense that the BCM largely replicates the mathematical formulations within the BOAM. However, the BCM construction removes or ignores the constraints and standards built into the BOAM to deal with the known limitations of area by conditions. In doing so, the BCM violates the primary assumptions of the mathematical formulations uplifted from the BOAM, severely undermining rigour and reliability of the BCM model. Comparison to the BOAM bolsters credibility while obscuring and sidelining the limitations of the BCM.

35. Further, the BCM relies on an aggregated biodiversity score based on a rank for input data. The use of ranks is typically subjective. They lack an objective basis, obscure transparency as to which elements are being considered in determining the assigned rank, are subject to user bias, and are too coarse to meaningfully describe values. This issue is compounded when combined with an aggregated currency[14]. The use of an aggregated score within the BCM is an illustration of

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12 Corkery I, Barea LP, Giejsztowt J, Maseyk FJF, Mealey C 2023. Poorly designed biodiversity loss-gain models facilitate biodiversity loss in New Zealand. New Zealand Journal of Ecology 47(1):3548. Maseyk FJF, Barea LP, Mealey C, Corkery I, Giejsztowt J 2025. Facilitating better ecological outcomes from high-stakes decision-making requires evaluation of biodiversity models to address risk and transparency. New Zealand Journal of Ecology 49(1):3592.

13 Maseyk FJF, Barea L, Stephens RTT, Possingham HP, Dutson G, Maron M. 2016. A disaggregated biodiversity offset accounting model to improve estimation of ecological equivalency and no net loss. Biological Conservation 204:322–332.
Accessible from: https://www.doc.govt.nz/about-us/our-policies-and-plans/guidance-on-biodiversity-offsetting/biodiversity-offsets-accounting-system/

14 Currencies are used to express, in a common form, the measures of the biodiversity lost to development with the biodiversity predicted to be gained via the offset. Currencies can be either more disaggregated (e.g., where each element of biodiversity of interest is individually accounted for) or more aggregated, where biodiversity measures are bundled into a composite unit that serves as a surrogate measure of multiple aspects of biodiversity; increasing the risk of concealed trades.

how the BCM violates the constraints of the mathematical formulations of the BOAM (upon which the BCM is based).

36. The BCM falls short of good ecological and offsetting model standards and is an inappropriate tool to evaluate ecological equivalence of high-value features. Outputs from models are only reliable if model assumptions are met and outputs are interpreted and discussed in the context of limitations and assumptions.

37. It is important to note that the use of 'black box' contingency multipliers with the BCM do not overcome the failings of the model. The absence of quantitative data increases the level of uncertainty associated with BCM outputs. However, contingencies are a weak method for addressing uncertainty and the input data used within the BCM as contingencies bares no mathematically or ecologically meaningful relationship to overcoming poor outcomes for biodiversity due to uncertainty.

38. In addition, BCM's output has been incorrectly interpreted. The BCM output is a value score, not a direct measure of biodiversity. The difference between the input value score and the output value score are just that – a change in value score. The value scores do not represent actual measures and do not translate meaningfully to specific biodiversity values 'on-the-ground'. That is, a 10% change in input and output biodiversity value scores in the BCM and given the lack of clarity as to what constitutes the 'biodiversity value' within the BCM, cannot be tied back to specific measures or elements of biodiversity. This interpretation of the BCM's outputs is somewhat misleading and obscures the failure to account for important values within the offset, such as seepage wetlands.

39. Thus, the BCM cannot be relied upon to support an offset design as it cannot reasonably demonstrate a net gain (or no net loss) outcome now, and there is no ability to confirm this assertion in the future.

Inadequacy of consent conditions and management plans

40. In a general sense, the proposed conditions can improve in their description of the various areas within the site (those areas to be avoided, location of setbacks

and buffer planting areas, etc), and specific actions (planting, pest control) that is to occur within them. This is required to provide, via the consenting process, ecological protections as well as improved effects management.

41. I support the inclusion of monitoring conditions, provided they adequately describe the full range of necessary monitoring (including cumulative effects, outcome monitoring etc.), and that monitoring programmes are explicitly tied to reporting requirements and trigger time-bound actions. The DOC subject matter experts have identified further detailed amendments necessary to improve respective monitoring conditions, and I support those recommendations.

42. Conditions relating to enhancement planting (within buffer areas), weed management, and pest management are required to specify desired outcomes and time-bound performance measures (e.g., vegetation structure, canopy closure, indigenous dominance etc.), along with specific contingency plans triggered by failures and shortfalls.

43. Turning specifically to the proposed wetland offset, the proposed consent conditions are lacking by default given that the offset proposal itself is inadequate. However, I make the following high-level observations regarding the gap between the proposed offset conditions and more comprehensive, good practice offsetting conditions to support a net gain outcome. I note these same requirements largely hold for all effects management actions, including mitigation measures. The proposed conditions relating to the proposed wetland offset:

    i. Do not adequately describe the required outcome (type, condition) of the created wetland, time-bound targets and actions to bring about required gains and described outcomes, performance targets to track progress and trigger subsequent actions, and monitoring and reporting coupled with time-bound contingency measures when progress is not tracking as anticipated.

    ii. Do not explicitly tie the proposed management actions (site creation, planting, weed management, pest control etc) to the creation of different wetland types within the offset site as proposed.

iii. Rely on monitoring and a supposed adaptive management system to resolve the high level of uncertainty associated with the offset site and proposed offset actions. The level of uncertainty associated with the proposed offset is currently too high to be addressed by consent conditions, and this conclusion is compounded by the uncertainty inherent in the proposed monitoring and trigger system itself.

44. The elements identified above cannot be relegated solely to a management plan(s) but must also be replicated within consent conditions. Relying on management plans alone to secure these key elements of offset design and other enhancement actions and success dilutes clarity on the outcomes to be achieved, how, and by when and obscures compliance. Allowing compliance reporting against management plans rather than consent conditions also provides opportunity for management plans to be finalised, or updated, during the life of the consent in a manner that compromises or undermines the effects management outcomes required to adequately address effects. This risks leaving adverse effects on ecological matters and indigenous biodiversity values unresolved and contributing to ongoing losses and declines. Further, the draft NIWBMP lacks the specificity required to align management actions (for both the proposed offset and the other enhancement actions) with management objectives in the context of the diversity of wetlands and hydrological processes present.[15]

45. I am of the view that management plans, when well written, are highly valuable to provide detail on the actions and methods required to achieve the required outcomes and uplift in biodiversity, and are an important tool to secure effects management outcomes, but only when coupled with conditions of consent that explicitly secure described outcomes and the actions to achieve those outcomes. They cannot stand alone.

46. Adaptive management can be a useful tool to reduce specific uncertainties and learn by doing, although requires extra care when applied to effects management. This is because high levels of uncertainty cannot be addressed by

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[15] For further detail see Statement of Advice – Terrestrial and Wetland Ecology (flora), Catherine Beard 20 April 2026.

adaptative management and this carries higher risk in a consenting context when the impacts have been guaranteed (via granting of consent) but the proposed positive outcomes are unproven and uncertain. It is my view that relying on adaptive management to address adverse effects associated with this Application is not appropriate as the uncertainty associated with the proposed effects management package is too considerable and the ecological risks of deferring resolution of these matters to the future is too great.

47. In addition to my comments above, I support the recommendations relating to avoidance of and mitigation measures for impacts on terrestrial fauna (e.g., long-tailed bat and lizard protocols), consent conditions, management plans, and monitoring programmes as provided by the other DOC subject matter experts; with a particular reiteration of the need for additional caution and controls where high levels of uncertainty remain and the ecological consequences of failure to manage effects would be high (such as permanent loss).

Conclusions and Recommendations

48. The incomplete assessment of effects reduces confidence that proposed offset is either appropriate (will generate the right type of biodiversity gain) or adequate (will generate enough biodiversity gain of the biodiversity types of interest). This lack of confidence is compounded by the lack of defensibility inherent in the loss/gain calculations used to support the offset proposal due to understating actual or potential losses and poor choice of model to estimate gains. In addition, there is an unacceptably high level of uncertainty that the created wetland, as proposed, will generate and sustain the required gains.

49. Consequently, it is my view, that we can have little confidence in the effects management proposal, and thus little confidence that the adverse effects on important biodiversity elements have been addressed. This poses a considerable ecological risk over the life of the consent and may result in the permanent loss or degradation of:

    i. Critically endangered seepage wetland habitat.

    ii. Lake-margin wetland.

iii. Wetland avifauna habitat, including Australian bittern habitat.

iv. Wetland bird populations, including Threatened and At-Risk species.

v. Aquatic habitat and aquatic insect populations (with consequential impacts across trophic levels).

vi. Food source for long-tailed bats.

50. Given the lack of confidence in outcomes associated with the (tentatively) proposed offset site, and the potential adverse impact of ongoing mining operations on the created wetland, I recommend that an alternative site(s) is investigated, alongside a redesign of the offset taking into account the full raft of potential effects and using a more appropriate method to balance losses and gains.

51. In addition to increased offset effort, compensation will be required to address any residual adverse effects not able to be offset. How much compensation, or for what, cannot be determined until the issues with the application of the effects management hierarchy as outlined above have been resolved and the offset redesigned accordingly.

52. The proposed conditions of consent need redrafting to address the shortfalls set out above – specifically:

i. Describing outcomes as well as the actions required to achieve those outcomes (including specific plant species to avoid within buffer planting and rehabilitation plans).

ii. Including targets and performance measures (for all effects management measures).

iii. Including mechanisms that are responsive to the results of targeted monitoring programmes and can thus trigger measurable, time-bound contingency measures.

iv. Providing for updated knowledge, observations, and understanding.

53. Refinement of the proposed monitoring conditions is also recommended in-line with those recommendations provided by the DOC subject experts.

Appendix F: Existing environment legal opinion

KATE SHEPPARD
— CHAMBERS —

MEMORANDUM

Date: 18 May 2026

To: Department of Conservation c/- Amy Robinson

From: Sarah Ongley, Barrister

Subject: Taharoa Central and Southern Block Mining application

Introduction

1. The above application has been made under the Fast-track Approvals Act 2024 (FTAA). In accordance with clause 17(1) of the FTAA, section 104 of the Resource Management Act (**RMA**) is a matter that an Expert Panel must take into account.

2. I have been asked to review Appendix CC to the application: "*Memorandum: Assessment of the Existing Environment for Taharoa Ironsands Limited Central and Southern Blocks Fast-track Project*", Minter Ellison Rudd Watts (**Memorandum**). The Memorandum states that the 'environment' for the purpose of assessing environmental effects of the project includes the condition of the land at the end of the term of the regional resource consents[1] "*as contemplated by the conditions of those consents*", and specifically:

    a. Progressive recontouring, and other rehabilitation activities required by the Land Management and Rehabilitation Plan and Site Closure Plan will have been completed.

    b. Planting will be in place (as contemplated by the Land Management and Rehabilitation Plan).

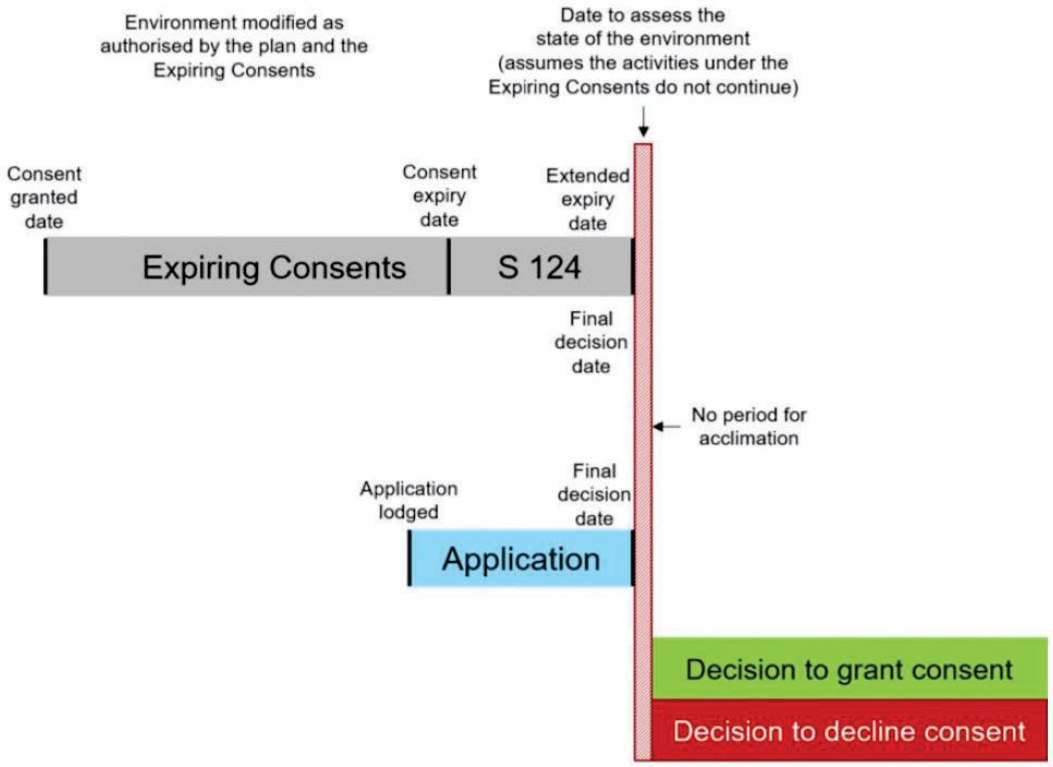
    c. The Dam in the Wainui Stream and associated infrastructure will have been removed and consequently the water level in the lake will have dropped to pre-dam levels.

    d. The water take and discharge will have ceased, but the environment will still be acclimated to the presence of the water take and discharge.

[1] Being the end of rights to operate under s124 of the Resource Management Act 1991.

e. The cessation of mining and removal of existing infrastructure is likely to have initiated advserse effects on some ecology on the site, particularly around the Dam and Wainui Stream.

3. A diagram is provided in the Memorandum as follows:



4. The Memorandum relies on caselaw including *Queenstown Lakes District Council v Hawthorn Estate Limited* [2006] NZRMA 424 (CA) and *Ngāti Rangi Trust v Manawatu-Whanganui Regional Council* [2016] NZHC 2948, [2016] ELHNZ 297.

Factual Background

5. The applicant proposes to continue existing mineral sand extraction, including extracting ironsand material using dry and wet-mining techniques.

6. The landform is heavily modified and has been affected by past lawful activities for some years (i.e. modified sand dunes, new wetland and marginal terrestrial habitats). While parts of the freshwater environment have been influenced by historic and ongoing mining activities, the area retains freshwater habitats of high ecological significance, particularly where natural inland wetlands, seepage systems, and lake margins persist (N Binks, DOC, '*Taharoa Technical Report - FT-0154-SUB, Central and Southern Block Mining*').

7. The Wainui Stream meanders through the centre of the mine, between the Central and Southern Blocks, and is the out-flow from the Taharoa Lakes. The level of Lake Taharoa is artificially raised by a dam on this Stream - the dam constructed in the

early 1970s by NZ Steel (predecessor to the current applicant). It is located ~500 m from the sea and forms a reservoir that merges with Lake Taharoa. Under the existing (damming and discharge) consent, lake levels have been required to be maintained above RL8.5. Lake Taharoa water levels are ~2.5m higher on average.

8. Freshwater environments that are influenced by this altered lake level including the Taharoa lake margin (littoral) zone, natural and induced wetlands. Wetland environments that have established have become habitat for a range of species. I understand that species have adapted (acclimated) to a higher lake operating range.

9. Were the dam to be removed, it is expected that there would be some positive and some negative effects. An example of a positive effect is that fish would be able to freely migrate upstream and downstream.[2] An example of a negative effect is that some wetlands may no longer exist (or would be significantly altered). I understand that in some instances, it is difficult to differentiate natural wetlands from those that were created following the construction of the dam. I also understand there to be other effects of the dam beyond ecological, such as cultural and potential archaeological effects.

10. Existing Consents 10899-100910 and 111002 (**Existing Consents**) are subject to general conditions that require the consent holder to develop a Conceptual Site Closure Plan, to be reviewed and updated in 2007 and 2011 and within 6 months of any decision to cease mining.[3] This plan is required to address, as a minimum:

    a. Future landforms following all mining activities at the site.

    b. Future groundcover following all mining activities at the site.

    c. Reporting prrocedures.

    d. Review procedures.

11. A Site Rehabilitation Plan is also required.[4] This Plan is to cover progressive rehabilitation, erosion control, pest and weed control etc. As at 2024, Waikato Regional Council reported several non-compliances with this Site Rehabilitation Plan.[5]

12. Under the Existing Consents, New Zealand Steel provided a Conceptual Site Closure Plan in 2007.[6] This Plan noted that the Wainui Stream and the dam would be the most contentious environmental issue upon site closure. Applications for consents would be required, following consultations with affected or interested parties. An

[2] N Binks, DOC, reports there are reasonably significant issues with the existing fish pass structure, which exhibits a lack of maintenance.
[3] Condition 8(i).
[4] Condition 8(ii).
[5] Filed Note of Joshua Evans, Waikato Regional Council 17 April 2024 "Taharoa Ironsands Limited – Rehabilitation Review' (2017 to 2023).
[6] Under cover of Letter 28 August 2007 from New Zealand Steel to Waikato Regional Council (Mr Jorge Rodgiguez).

AEE would need to be drafted in advance of any decision to close the mine. It was stated that discussion with Waikato Regional Council had confirmed that the stream and dam would be their principal areas of interest in such a resource consent application (the costs of such consent application were therefore incorporated into closing costings estimates). The Report attached "*Taharoa Closedown Option Concept Study"* Beca Simons Ltd, Nov 2003 and referred to email exchanges with Waikato Regional Council (also attached to that Report) stating that removal of any infrastructure would need to occur in a controlled manner[7] (although it is not entirely clear whether this comment related to the removal of the dam, removal of coastal infrastructure, or both).

13. The current proposed conditions of consent would require Taharoa Ironsands Limited to prepare a Site Rehabilitation Plan and Conceptual Site Closure Plan as component plans of the overarching Environmental Management Plan (EMP). A Site Closure Plan dated March 2024 was provided to WRC (as part of the previous RMA consenting process) but is not yet certified. This Plan states:[8]

    3.7 Wainui dam and fish pass

    The removal or modification of the Wainui Stream dam and associated fish pass is subject to ecological assessment and discussion with the landowners and stakeholders. As the dam bridges the Wainui Stream options for local access will be considered in the discussion.

    The freshwater ecologists contracted for the ongoing ecological monitoring required under the mine resources consents will be utilised to produce the assessment to support the removal or retention decision. The assessment will consider the data collected year on year through the monitoring programme and the expected impact on the water level of the stream and the freshwater population is supports. Requirements for ongoing maintenance of the fish pass will also be considered.

    If removal is determined to be the most appropriate option a plan will be prepared with the advice of freshwater ecologists to ensure a schedule and methodology that will have minimal impact on the Freshwater ecology of the Wainui Stream and that is acceptable to the ley stakeholders

    (Emphasis)

14. I also understand that there are additional closure obligations contained in the lease but I have not reviewed that lease.

15. In summary, it has not been decided whether the Wainui dam will be removed upon mine closure. If it is removed, it is likely to be removed subject to a carefully managed process following consideration of positive and negative effects, community consultation and application(s) for resource consents.

[7] Email from Claire Jewell to Maurice Atcheson 16 July 2003.
[8] Provided to DOC by Taharoa Ironsands Limited (Email Tom Atkins to Amy Robinson 5 May 2026).

Legal advice

16. I agree with the statement in the Memorandum that the existing environment against which the effects are to be assessed, is not the natural environment that existed prior to the activity being established. It is not an 'edenic' environment (the phrase used in *Alexandra Flood Action Society Inc v Otago Regional Council* ENC Christchurch C102 05, 20 July 2005 discussed below).

17. I agree, therefore, that the ongoing effects of past mining (and other) legitimate activities are part of the existing environment.[9]

18. The Memorandum states that the existing environment, or 'baseline' against which effects are to be assessed, must assume that progressive recontouring and other rehabilitation activities required by the Land Management and Rehabilitation Plan and Site Closure Plan will have been completed. I agree that is a conservative approach. (It does not mean however that the decision-maker should ignore past non-compliances with rehabilitation activities – those non-compliances may warrant more robust and clear conditions on rehabilitation requirements.[10])

***Ngāti Rangi* and other precedent**

19. As stated in the Memorandum, in *Ngāti Rangi Trust v Manawatu-Whanganui Regional Council* (above-cited), the High Court found that the existing environment was to be imagined as if the dam structure were removed. That case concerned the run-of-the-river Raetihi Power Scheme. The High Court commented that it was *feasible* to assess the environment without the scheme, by examining upstream conditions.[11] The High Court cited with approval the following extract from page 610 of the text Environmental and Resource Management Law, stating:

> *Accordingly, the existing environment cannot include, in the context of a renewal application, the effects caused by the activities for which the renewal consents are sought, unless it would be fanciful or unrealistic to assess the existing environment as though those structures authorised by the consent being renewed did not exist.*

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[9] This is limited to past authorised activities in that an applicant has not been able to rely on a degraded environment that has occurred due to its non-compliant activities to claim that the reconsenting will be an improvement over a current (illegal) scenario: *Lake Road Preservation Society Inc v Auckland Council* [2020] NZEnvC 027, a case where it was argued that to grant a new consent would enable improvement over the existing situation and (unauthorised) effects that had occurred as a result of activities over 30 years (that argument was rejected).

[10] See *Alexandra Flood Action Society Inc v Otago Regional Council* ENC Christchurch C102 05, 20 July 2005 at [67]: "*A regional council may look at "past effects" of the former activity and (subject to reasonableness, efficiency and other tests we come to later) add conditions to control future adverse effects, and in some cases to clean up the effects of past activities by the consent-holder which were not covered before."* See also *Remediation (NZ) Ltd v Taranaki Regional Council* [2026] NZHC 55 at [144]: *"As a matter of logic and commonsense, RNZ's past operation of the site was relevant to the potential effects from its continued operation of the site and the likely effectiveness of the proposed conditions."*

[11] At [68].

20. The reference to 'fanciful or unrealistic' was not elaborated upon by the High Court.

21. The reasoning of the High Court was that if the right to dam the Makotuku River was included in the 'baseline' for the purpose of assessment, that would undermine the sustainable management objectives of the Act[12] - resource consents having a limited term of 35 years.

22. A recent Fast-track decision distinguished *Ngāti Rangi,* relying on an earlier decision *Alexandra Flood Action Society Inc v Otago Regional Council* ENC Christchurch C102 05, 20 July 2005 to say that existing dam structures should be *included* as part of the existing environment.[13]

23. In *Alexandra*, a case dealing with the Clutha dam, the Environment Court found that the most realistic existing environment was the current state of the environment, as opposed to the imagining the environment as if the dam did not exist. The Court adopted counsel's description of the scenario of the dam's gates fully opened with an uncontrolled release, as an 'Armageddon' scenario. The evidence was that it might take decades for the lakes and river to recover ecologically and visually from this scenario.[14] The potential significant adverse downstream effects from an uncontrolled release, and the need to authorise such effects by way of consent, meant this scenario was unrealistic. The 'Eden' scenario - imagining the environment as if the scheme were not in place – was also unrealistic.[15] The scheme's utmost importance for energy generation meant it was unrealistic that it would be removed. The Court cited the *obiter* statement in the Court of Appeal's decision in *Arrigato Investments Ltd v Auckland Regional Council* that, assessments of the relevant environment and relevant effects are essentially factual matters, not to be overlaid by refinements or rules of law.[16]

24. In *Remediation (NZ) Ltd v Taranaki Regional Council* [2024] NZEnvC 213 the Environment Court considered case concerned 're-consenting' of discharges of contaminants from a composting plant. Unlike in *Ngāti Rangi*, it was not was *feasible* to assess the environment without the discharges by simply examining upstream conditions (the headwaters of the stream having being affected by the discharges and a generally highly modified stream environment meaning it was difficult to say whether adverse ecological effects on the stream were caused by the discharge activity).[17] The Environment Court erred on the side of caution, and found the existing discharges were having significant adverse effects on aquatic life. This assessment was challenged in the High Court (in *Remediation (NZ) Ltd v Taranaki Regional Council* [2026] NZHC 55), on the ground the

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[12] At [63].

[13] Application by Genesis Energy for the Tekapo Power Scheme. At [84.4] of the decision the Panel found the "existing environment" for consideration of the effects of the TPS reconsenting application included:

a. the TPS existing structures;
b. associated water takes, uses, diversions, damming and discharges as managed subject to the present conditions; and
c. existing environmental processes and conditions reflecting these matters.

[14] *Alexandra* at [51].

[15] *Alexandra* at [52].

[16] *Alexandra* at [58] citing *Arrigato Investments Ltd v Auckland Regional Council* CA84/01, 11 September 2001, (2001) 7 ELRNZ 193, [2002] 1 NZLR 323, [2001] NZRMA 481 at [38].

[17] *Remediation (NZ) Ltd* [2024] NZEnvC 213 at [272]-[276], [282]-[286] (and 'Issue 44').

Environment Court had not made the necessary assessment of the 'existing environment'. The High Court considered that the Environment Court had made factual findings that were available to it on the evidence.[18] The case indicates that a forensic approach to the baseline may not be required in cases where there are difficulties in assessing the 'existing environment'.

25. Finally, I note that for renewable energy generation assets, such assets are now to be recognised as part of the existing environment.[19]

Application of the law

26. The existing caselaw under the RMA is relevant to effects assessment under the FTAA. Unfortunately, existing caselaw places the current case in a grey area. Here, it has not been decided whether the dam would be removed were the mining activity to cease. Site Closure Plans anticipate that the dam may stay in place. Neither scenario is 'unrealistic'.

27. Further, the experts acknowledge that it is difficult to differentiate 'natural' wetlands from wetlands that were created following construction of the dam, making it more difficult to distentangle the effects on an environment imagined as if the dam was absent (and to identify which wetland values would persist or recover).

28. For the purpose of ecological assessment, it is my opinion that the environment against which effects should be assessed must include the ecological values of the current lake level and fluctuation regime, and not an unacclimated environment following sudden removal of the dam (following cessation of s124 rights), as is proposed by the Memorandum. First, that is unrealistic - closure plans indicate that the dam structure would not be removed without consents taking into account (and addressing) the ecological effects upstream. Secondly, that approach has similarities to the Armageddon scenario rejected in *Alexandra*. In my opinion, effects should be assessed against an acclimated environment, not an environment under stress due to a sudden change in water levels.

29. For the freshwater environment, Policy 1.6(3)(b) of the National Policy Statement Freshwater Management 2020 (Amended 2025) states that "*if the information is uncertain, must interpret it in the way that will best give effect to this National Policy Statement"*. There is uncertain information here - uncertainty as to what will occur when the mine ceases and uncertainty on wetland values that are 'natural' (as distinct from those that established following damming and diversion).

[18] At [90]-[91] (the applicant in that case has sought leave to appeal to the Court of Appeal).
[19] Recent amendment to the National Policy Statement for Renewable Electricity Generation 2011 (Dec 2025) includes the policy that "*[f]or reconsenting, upgrading and repowering of existing REG assets and activities, decision-makers must: (1) recognise that existing REG assets form part of the existing environment …"* (Policy H).

30. Due to the uncertainty, taking an approach that is most consistent with giving effect to that National Policy Statement would, in my opinion, require assessment of the applications against the current wetland values.

Ngā mihi

Sarah Ongley

BARRISTER

[redacted]

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31.

Appendix G: Initial Comments on Conditions

Appendix G: Initial Comments on Conditions

Section 53 Comments reference	Issue / Recommendation	Relevant Conditions (without limitation)	Key Issue Identified	Required Amendment (without limitation)
Paragraph 7.1(a)	Monitoring regimes specified in conditions	Schedule 1: 14, 44–45; AUTH142035.01.01: 10; AUTH142035.02.01, .03.01, .05.01, .14.01	Monitoring largely deferred to EMP and management plans, with limited specification of methods or quality assurance	Amend Schedule 1 Conditions 14 and 44–45 to prescribe monitoring methodologies, frequency, quality assurance requirements, and reporting standards
7.1(b)	Early-warning wetland indicators	AUTH142035.05.01: 8; AUTH142035.16.01: 5–6; Schedule 1: 16	Monitoring focused primarily on water levels, with limited ecological indicators	Amend AUTH142035.16.01 Conditions 5–6 and Schedule 1 Condition 16 to include ecological indicators (e.g. vegetation health, and measurement of hydrological change within wetlands). These measures need to account for lag effects between hydrological variation and ecological effect.
7.1(c)	Two-tier trigger framework	AUTH142035.05.01: 10; AUTH142035.16.01: 5–6; AUTH142035.02.01: 4–6	Trigger levels and monitoring methodology – requirement to use two-tiered alert system	Amend hydrological trigger conditions to incorporate a standardised two-tier trigger framework (10th percentile alert and 5th percentile alarm), with defined thresholds and responses

Section 53 Comments reference	Issue / Recommendation	Relevant Conditions (without limitation)	Key Issue Identified	Required Amendment (without limitation)
7.1(d)	Enforceable response mechanisms and hard limits	AUTH142035.05.01: 10; AUTH142035.02.01: 5–6; AUTH142035.16.01: 6	Responses discretionary with few enforceable limits	Amend conditions to include mandatory response actions, defined timeframes, and environmental bottom lines that require activities to be ceased or relocated where thresholds are exceeded
7.1(e)	Effects management hierarchy and offsetting	AUTH142035.16.01: 3–4; Schedule 1: 13–14, 16	Effects management and offset framework lacks equivalence, specified timeframes and enough detail to ensure no net loss is achieved	Amend conditions to require explicit following of the effects management hierarchy and strengthen offset requirements
7.1(f)	Fish pass effectiveness	AUTH142035.03.01 Conditions 2–4; Schedule 1 Condition 17	DOC's freshwater technical advisor, Mr Binks, has advised that the existing fish pass is no longer effective or functional as per its original design and intent. The proposed conditions assume that effectiveness can be achieved through monitoring, maintenance, and minor modification, but do not require a fundamental review of whether the structure remains fit for purpose.	Amend conditions to require a comprehensive independent technical review of the fish pass within a defined timeframe, including assessment against current best practice for fish passage. If the review identifies that the fish pass is not fit for purpose, the Consent Holder must design and install a replacement structure (or alternative mitigation) and obtain all necessary consents for doing so.

Section 53 Comments reference	Issue / Recommendation	Relevant Conditions (without limitation)	Key Issue Identified	Required Amendment (without limitation)
7.1(g)	Limitations on adaptive management	Schedule 1: 13–14, 28	Adaptive management used inappropriately without adequate detail	Amend to define triggers for effects management and environmental bottom lines
7.1(h)	Reduce reliance on EMP and certification	Schedule 1: 13–29	Key controls deferred to post-consent management plans	Amend certification framework and embed key limits in conditions. E.g., effects are understood and predictable within a defined range; and monitoring can reliably detect change before significant or irreversible effects occur. Outcomes of the proposed adaptive management should be linked to regular review (e.g., through Condition 28, the EMP review condition or more frequently as appropriate). Linked to the outcomes of that review there should be the ability to s128 review any adaptive management measures that are not performing
7.1(i)	Integrated hydrology and cumulative effects	AUTH142035.05.01; .02.01; .03.01; .14.01; Schedule 1: 17	No cumulative effects framework	Amend to require integrated hydrological management, e.g., require development and maintenance of a site wide conceptual and numerical model incorporating key hydrological features, extent of water take and use and defined intervention thresholds and

Section 53 Comments reference	Issue / Recommendation	Relevant Conditions (without limitation)	Key Issue Identified	Required Amendment (without limitation)
				measures when thresholds are breached.
7.1(j)	Drafting clarity and enforceability	Multiple conditions	Ambiguous wording reduces enforceability	Undertake global drafting review and define terms. For example, amend AUTH142035.02.01 – Condition 6 and AUTH142035.03.01 – Condition 2(a) to include set timeframes rather than "as soon as practicable". There are multiple examples of similarly vague language.
General comment	Monitoring review	Schedule 1: 42, 44–45	Limited oversight	Require review on behalf of the Consent Authority, of monitoring methodologies, periodic and triggered audits of monitoring data and reporting, and publication of raw monitoring data in accessible formats to enable independent verification;
General comment	Clear response pathways	Multiple conditions. E.g., • AUTH142035.02.01 Condition 5–6 • AUTH142035.05.01 Condition 10 • AUTH142035.16.01 Condition 6	No or vague effects management where thresholds are breached	Introduce escalation response framework. E.g., Wainui Stream (AUTH142035.02.01 Condition 5–6) • Trigger: residual flow persists below minimum • Response:

Section 53 Comments reference	Issue / Recommendation	Relevant Conditions (without limitation)	Key Issue Identified	Required Amendment (without limitation)
				○ monitor ecology ○ “identify measures” ○ implement “as soon as practicable”. Terms such as “identify measures” and “as soon as practicable” are vague and potentially unenforceable. Amend conditions to address vague terminology where it occurs.
General comment	Rehabilitation and closure success criteria	Schedule 1: 20–21, 46–58	Outcomes qualitative and weakly linked to bond	Amend including measurable success criteria and link to bond release