

To: Expert Panel considering TIL's Central and Southern Blocks Mining Project under the Fast-track Approvals Act 2025

From: Dr Hannah Mueller
Hamish Dean

SLR Consulting New Zealand Limited

cc:

Date: 22 June 2026

Project No. 880.017038.00001

RE: Taharoa Central and Southern Block Mining Terrestrial Fauna and Wetland Response

Introduction

This memorandum has been prepared to provide responses to the matters raised by invited parties in relation to the ecological aspects of the Fast-track application for Taharoa Ironsands Ltd's Central and Southern Blocks Mining Project (Application) that is currently before the Expert Panel. It addresses specific issues raised in comments concerning the assessment of ecological effects on wetlands and terrestrial fauna, certainty of proposed effects management, and mitigation and offsetting proposals.

Hannah Mueller (terrestrial fauna, wetlands)

My full name is Hannah Mueller, and I am a Principal Ecologist and Director of Phoenix Ecology, ecological consultants based in Raglan. I have been director of Phoenix Ecology since 2022. Prior to that, I worked as Principal Ecologist at 4Sight Consulting (now SLR). I have 15 years of experience in this field.

I hold the qualifications of Bachelor of Arts with Honours (Liberal Arts – Humanities and Life Sciences) from the University of Maastricht, a Master of Social Science with Honours (Environmental Policy), and a PhD in Biological Sciences (Freshwater Ecology) from the University of Waikato. My experience includes ecological impact assessments, ecological management plans and survey design across freshwater, wetland and terrestrial ecosystems. My wetland experience includes wetland delineations in accordance with the National Environmental Standards for Freshwater (NES-FW), preparing wetland monitoring plans, ecological effects assessments for wetlands, and wetland restoration plans. I also peer review technical assessments in support of resource consent and fast track applications, with past reviews focused on wetland, bat and avifauna assessments. I have also frequently prepared and presented expert evidence, including on wetland matters, at council hearings and before the Environment Court.

I undertook field surveys and authored the Terrestrial Ecology – Fauna Assessment (Appendix M of the Application).

In this technical memorandum I respond to comments received from invited parties relating to terrestrial fauna.

Hamish Dean (wetlands)

My name is Hamish Dean. I am a Principal Ecologist at SLR Consulting where I have been for five years. I have a Bachelor of Science (Ecology and Zoology) from Victoria University of Wellington, and Master of Science in Biological Sciences (Ecology) from the University of Waikato. I have worked in the fields of ecology and natural resource management for 23 years, working in consultancy, not for profit organisations and regional councils. I have experience in ecological assessment of terrestrial and wetland ecosystems, significance

assessments, ecosystem restoration, catchment management, and fauna survey. I have particular experience in a range of North Island terrestrial and wetland habitat types and wetland delineation under the National Policy Statement for Freshwater Management (NPS-FM) and NES-FW.

I prepared the Terrestrial Ecology – Wetlands and Vegetation Assessment (Appendix K of the Application) and the Draft Natural Inland Wetland and Buffer Management Plan (NIWBMP) (Appendix DD of the Application).

In this technical memorandum I respond to comments received from invited parties relating to wetland ecology.

Code of Conduct

The authors have read the Expert Witness Code of Conduct set out in the Environment Court Practice Note 2023. The authors have complied with the Code of Conduct in preparing this report. The content of the report is within the authors' area of expertise, and the authors have not omitted to consider material facts known to them that might alter or detract from the opinions expressed in the report.

Purpose

This memorandum responds to comments provided by the following invited parties relating to terrestrial fauna and wetland ecology:

- Waikato Regional Council (WRC);
- Te Nehenehenui;
- Te Ruunanga o Ngaati Mahuta ki te Hauaaauru Charitable Trust (NMKTH);
- Roy Wetini Whaanau Trust (RWWT); and
- Department of Conservation (DOC).

The purpose of this memorandum is to clarify, expand upon and, where necessary, update the terrestrial fauna and wetland assessments and proposed management measures submitted as part of the Application.

The responses draw on the findings of the Terrestrial Ecology – Wetlands and Vegetation Assessment (Appendix K) and Terrestrial Ecology – Fauna Assessment (Appendix M), which were prepared in accordance with the Environmental Institute of Australia and New Zealand Impact Assessment Guidelines (EIANZ, 2018).

Each section of this memorandum provides a targeted response to the ecological matters raised by invited parties, divided into relevant themes or topics, and supported by reference to the terrestrial ecology assessments provided as part of the Application, proposed consent conditions and draft management plans.

Waikato Regional Council

WRC has commented on wetland and bird buffer widths, baseline wetland monitoring, ecological monitoring, water-level monitoring, and trigger levels for monitoring of natural inland wetlands. We respond to WRC's comments in turn below.



Memo from Kaitlin Morrison – Wetlands – Appendix C of WRC Comments

Monitoring

Comment: Ms Morrison (page 5) emphasised the need for a full 12-month baseline hydrology dataset covering all seasons to provide a robust data set to inform trigger and water-level setting for wetland monitoring.

Response: Baseline hydrology monitoring is already provided for in Conditions 5 and 6 of AUTH142035.16.01, and included within the Draft Lake Level and Water Management Plan submitted with the Application (LL&WMP; Appendix EE of the Application, particularly Section 9) and the Draft NIWBMP (Appendix DD of the Application, particularly Sections 3.2 and 3.3).

It is agreed that a robust data set is required to inform appropriate triggers. The requisite baseline monitoring to produce this data set is already provided for in the proposed conditions. Conditions 5 and 6 of AUTH142035.16.01, along with measures included in the LL&WMP (Sections 7 and 9) and NIWBMP (Sections 2.3, 2.4 and 2.5), provide for 12 months of baseline monitoring of water levels at wetlands across the site. Data will be used to inform modelling and define seasonal water level triggers (Condition 5). Condition 6 requires that water levels within the wetlands do not fall below the natural seasonal range determined by baseline monitoring. To summarise, should water levels drop below the seasonal low for more than 14 days, dewatering in nearby pits must cease and/or supplemental water must be supplied to the affected wetlands to maintain water levels at or above the seasonal low.

The NIWBMP, at Section 3.2, specifies that monitoring of the wetland water levels will be ongoing until dewatering of adjacent pits is completed, and groundwater levels have returned to background conditions.

As such, the proposed baseline monitoring and trigger level approach, supported by vegetation monitoring (Condition 8 and 9 of AUTH142035.05.01; Section 2.5.3 of the NIWBMP), is considered appropriate to inform monitoring and maintenance of wetland condition. **Comment:** In addition to hydrological monitoring, Ms Morrison (page 3 - 4) also commented that there should be ongoing ecological monitoring, including for vegetation and fauna, of all potentially affected wetlands to ensure there are no effects on the ecology of the wetlands over time.

Response: As outlined above, the current proposal provides for hydrological monitoring across four wetland groups (and minimum five-yearly lake margin wetland monitoring) but does not include specific fauna monitoring.

Monitoring of lake edge wetland condition and vegetation change is proposed (Condition 8 and 9 of AUTH142035.05.01), at five-yearly intervals, with methods described in Section 2.5 of the Draft NIWBMP (Appendix DD). The monitoring methods outlined in the Draft NIWBMP (Section 2.5) include:

- Mapping and comparison of wetland extent e.g. through high quality drone imagery.
- The use of photopoints at set locations for comparison across monitoring events.
- Monitoring of wetland conditions, following a nationally utilised standard method.
- Repeat monitoring of vegetation plots established at set locations in each monitored wetland.

Ms Morrison notes in her comments (page 3) that the wetland monitoring methods proposed by the NIWBMP are appropriate and follow best practice for long-term wetland monitoring.



This monitoring approach is considered appropriate to detect changes in wetland extent and functioning when used alongside lake-level trigger monitoring (Condition 10 of AUTH142035.05.01), which would identify prolonged periods of low lake levels that would trigger additional ecological monitoring (Condition 10(b) of AUTH142035.05.01 and see also Section 2.3 of NIWBMP, Appendix DD).

Overall, these measures will provide useful information on the ecological functioning of these wetlands and any changes that may occur over time.

Additional fauna or ecology monitoring in the lake margin wetlands is not considered necessary, as the monitoring approach is adequate to ensure ecological functioning of the wetlands and any change in function, including as a habitat for wetland fauna, can be identified. Furthermore, fauna monitoring, especially for highly mobile fauna such as bittern, may not necessarily be an indicator of wetland health for the representative wetlands monitored, as other factors such as predation and landscape habitat loss also impact wetland fauna.

Comment: Ms Morrison (page 3) also commented that the conditions should clearly address baseline monitoring for all wetlands and include clear triggers for any potential adverse effects on the health of retained wetlands and the offset site.

Response: In our view, baseline monitoring and triggers are already addressed in Conditions 5 and 6 of AUTH142035.16.01 and in the NIWBMP (see Sections 2.5 including 2.5.4 of Appendix DD in particular). The relevant requirements are discussed in more detail above in our response to Ms Morrison's other comments on monitoring.

It is acknowledged that the baseline and ongoing wetland monitoring currently focuses on the lake edge wetlands. We recommend that the baseline and five-yearly vegetation monitoring is extended to include a representative sample of other potentially affected wetlands. These changes are reflected in new condition 5A and amended Condition 6 of AUTH142035.16.01. Monitoring wetland water levels, condition, and health is important to confirm that hydrological function and wetland value, including as habitat for fauna is maintained.

We maintain that provided the hydrological functions of retained wetlands are monitored and maintained (Conditions 5 and 6 of AUTH142035.16.01), and planting (Condition 7 of AUTH142035.01.01) and predator control (Condition 16(b) of Schedule 1: General Conditions) are implemented and successfully maintained, as also set out in the NIWBMP, adverse effects on wetlands and associated fauna are expected to be appropriately managed.

Wetland buffers

Comment: Ms Morrison (page 2) commented that no scientific basis was provided demonstrating that a 30 m buffer is either sufficient or insufficient to comprehensively protect vulnerable fauna species from mining effects.

Response: Ms Morrison is referring to the proposed setback of 30m from all retained natural inland wetlands within the Consent Area (see Conditions 2(d), 5 of AUTH142035.01.01).

Condition 7 of AUTH142035.01.01 additionally requires the consent holder to establish and maintain a planted buffer area within 30m of the natural inland wetlands.

The same setback and planting requirements apply to perennial waterbodies within and adjacent to the Consent Area (see Condition 2(c) of AUTH142035.01.01 and Condition 7 of AUTH142035.01.01).



Details of the plant and tree species to be planted and/or maintained within the 30 m buffer of all retained natural inland wetlands must be set out in the Draft NIWBMP (condition 16 of the Schedule 1: General conditions).

There is no clear scientific evidence available in a New Zealand context for any particular buffer width that would be sufficient to manage adverse effects on avifauna, other fauna species, or wetland systems. However, the proposed planted buffer is broadly aligned with the width commonly used to buffer effects from human activities (including urbanisation and infrastructure). For example, ecological management plans for infrastructure projects use a 25 – 50 m exclusion zone for discovered active nests, and ecological corridors used in Hamilton City (as part of the Peacockes Structure Area Plan Change) are a minimum of 25 m. For the TIL site, the 30 m planted buffer is considered to be sufficient to reduce mining-related effects on bird species present in these wetlands.

The 30 m mining setback from perennial water bodies was imposed by WRC itself in the (now expired) resource consents for the mining activities issued to NZ Steel in 2006 – hence the 30 m setback has been carried forward into the current proposed conditions. There is no evidence to suggest it is ineffective. In addition, the proposed management approach relies not only on the implementation of planted buffers (Condition 7 of AUTH142035.01.01), but also on broader fauna management measures (Conditions 31 to 35 of Schedule 1: General Conditions), including habitat restoration and a comprehensive predator control programme (Condition 16(b) of Schedule 1: General Conditions). Together, these measures are expected to minimise mining effects, restore habitat quality of retained wetlands, and improve breeding success, particularly for ground-nesting wetland birds, compared with current site conditions.

For these reasons, maintaining a 30 m planted buffer around all retained wetlands, alongside restoration and predator control, is considered appropriate to manage the adverse effects of mining activities on wetland birds.

Comment: Ms Morrison (page 2) suggested that all retained wetlands should have a 30 m planted buffer.

Response: As noted above, the requirement for a 30m planted buffer is already reflected in proposed condition 7 of AUTH142035.01.01 with species to be set out in the NIWBMP (condition 16 of the Schedule 1: General conditions).

Offset site

Comment: Ms Morrison (page 4) has raised concerns about the long-term viability of the offset site, particularly if water supplementation is required to maintain site hydrology. She also suggests an adaptive approach for the offset calculations to allow for adjustments, should the effects of mining be greater than anticipated.

Response: Conditions 3 – 4 of AUTH142035.16.01 specify the requirement to establish a minimum of 8.3 hectares of new natural inland wetland habitat. The specifications for the offset are proposed to be included in the NIWBMP required under Condition 16 of the Schedule 1: General Conditions.

We note that one potential offset site (expansion and enhancement of a remaining historic dredge pond) has been discussed in the Substantive Application (see Figure 8, page 52) and expanded in the Draft NIWBMP (Section 4) as proof of concept. The proposed consent conditions deliberately do not lock that site in, to allow another location to be used if it is found to be more appropriate. We assume that Ms Morrison's comments on "the offset site" relate to the site discussed in the Substantive Application and respond accordingly.



The Draft NIWBMP specifies that the new wetland be formed and then water levels monitored for a year to ensure that the desired landforms and wetland typologies can be achieved (Section 4.3, Appendix DD). This monitoring is expected to establish the relationship between the location and groundwater level, to inform contouring to create the offset wetland, while also capturing natural seasonal variation. These measures are intended to ensure that the minimum wetland offset area and wetland values anticipated will be achieved.

This offset site is expected to remain viable in the long-term because, once mining in the southern pits is complete, groundwater levels are expected to return to normal. At that stage, supplementary water is not expected to be required, and no supplementation should be needed beyond the term of the consent.

The wording of Condition 4 (AUTH142035.16.01) is specific and targeted, requiring the wetland habitat to be “designed, implemented, and maintained to achieve no net loss of wetland habitat and ecological function”. Should wetland monitoring show that there are greater effects on wetlands than anticipated, then the scale of the wetland offset site would need to be changed in order to ensure compliance with this condition. Condition 4 is proposed to be amended to specifically refer to the types of measures that could be implemented to maintain the new wetland habitat. This could include, for example, additional planting, weed control or hydrological adaptations. As noted above, the drafting of the conditions also allows for the selection of an alternative or additional site for additional wetland creation or restoration, should this be necessary. Condition 16(c) of the Schedule 1: General Conditions also requires that the NIWBMP includes a requirement for the maintenance of a minimum of 8.3 ha of new wetland, as one of the “management actions to minimise, remedy, offset or compensate for the loss of natural inland wetlands”.

Pre-clearance bird nest monitoring

Comment: Ms Morrison (page 2) commented on the seasonal timing of bird nest searches and the proposed nest buffer width (as set out in Condition 31 of Schedule 1: General Conditions). Her view was that works directly in wetlands should occur outside the peak wetland bird breeding seasons, and searches by suitable qualified ecologists should be undertaken to detect any wetland birds present before any work occurs within wetlands at other times. She noted that work should cease around nests (including a buffer, preferably greater than 30 m around particularly sensitive species such as bittern, crakes) until the nest is completed / fledged.

Response: The currently proposed approach, namely undertaking pre-clearance nest searches during the peak breeding season (1 September to 31 January) and retaining a minimum 30 m buffer around any discovered active nests, as outlined in Condition 31 of the Schedule 1: General Conditions, is broadly consistent with fauna management practices used across a range of infrastructure projects. The use of accidental discovery protocols outside this period (as provided for under Condition 32 of Schedule 1: General Conditions) is also a common management practice, and based on previous project experience, on-site teams and environmental managers have been successful in detecting active nests of various avifauna species using these methods.

Condition 32 provides for accidental discovery protocols and the briefing of relevant on-site staff and contractors on how to identify nests and requirements for the establishment of buffer areas around any active nests. However, Condition 32 does specify that accidental discovery protocols apply to NZ dotterel and NZ pipit only. It is agreed that this condition should be expanded to include reference to wetland bird species, to align with condition 31 which requires surveys to be undertaken for wetland birds (in addition to NZ dotterels and



NZ pipit). Condition 32 has been updated to reflect this, along with conditions 33 and 34 (which also refer to the accidental discovery protocol).

Te Nehenehenui

Te Nehenehenui commented on wetland hydrology, particularly in relation to water abstraction and reporting requirements. Te Nehenehenui's comments do not appear to have been supported by review or input from an expert ecologist.

Comment: Te Nehenehenui (paragraph 8, Hydrology, page 9 - 10) comment that if the level of Lake Taharoa drops below RL 9.6 m, TIL offers management responses to reduce as far as practicable the water being taken and to engage a suitably qualified and experienced ecologist to monitor and report on adverse effects, with resulting amendments to the Draft Lake Level and Water Management Plan (LLWMP). The proposed condition requires the consent holder to engage a suitably qualified and experienced ecologist to monitor and report on the extent and health of the raupo and flax wetlands on the margins of Lake Taharoa adjoining the Taharoa C Block, if the level of Lake Taharoa is less than 9.6 metres RL Moturiki Vertical Datum for a continuous 30-day period. Te Nehenehenui note that there is no timeframe specified for the ecologist to be engaged or for the ecological report to be completed.

Response: The proposed condition (Condition 10(b); AUTH142035.05.01) requires the consent holder to engage a suitably qualified and experienced ecologist to monitor and report on the extent and health of the raupō and flax wetlands on the margins of Lake Taharoa adjoining the Taharoa C Block if triggered by the lake level remaining below 9.6 m RL for a continuous 30-day period.

As discussed above, this trigger, with associated wetland monitoring, is considered appropriate to identify changes in wetland vegetation where low lake levels persist for prolonged periods. The wetland monitoring programme (required by Conditions 8 – 10 of AUTH142035.05.01 and outlined in Section 2.5 of the Draft NIWBMP, Appendix DD) is designed to detect any shifts in wetland health. The consent conditions also set out required management responses to monitoring results. In particular, consent condition 10(c) AUTH142035.05.01 requires the Consent Holder to review and update the LL&WMP to identify measures that can be implemented to address any identified adverse effects.

Condition 10(b) specifies that the wetland monitoring report be provided to Waikato Regional Council within 10 working days of completion. However, it is acknowledged that the conditions do not specify timeframes for the engagement of an ecologist. An amendment to Condition 10 is recommended, requiring an ecologist to be engaged to monitor lake margin wetlands within 10 working days of becoming aware that lake levels have dropped below 9.6m RL for a continuous 30-day period.

Te Ruunanga o Ngaati Mahuta ki te Hauaauru Charitable Trust

In relation to wetlands, Te Ruunanga commented on wetland and stream buffer widths, stock exclusion, the appropriateness of the wetland offset package and the value of the pines for long-tailed bats. Their comments do not appear to have been supported by review or input from an expert ecologist.

Comment: NMKTH (paragraph 49h, page 14; pdf pages 29 - 30) commented on the need for stock exclusion and buffer planting and state that a 100 m buffer should be retained along the Mitiwai Stream and around wetlands.

Response: NMKTH's comments on stock exclusion and buffer planting to protect and restore terrestrial habitats surrounding wetlands and streams are reasonable, and we agree



that, in principle, stock exclusion and buffer planting are an effective management tool for protecting and enabling restoration of habitats. However, there are practical and economic issues with effectively installing and maintaining fencing on the site – which are addressed in the planning response prepared by Grant Eccles (Tonkin + Taylor).

There are currently no specific conditions proposed requiring fencing of wetland or stream buffers in the consent conditions. However, fencing of wetland offsetting areas is intended (unless livestock can be kept out of this area by TIL). The Draft Natural Inland Wetland Management Plan NIWBMP (Section 5.2 of Appendix DD) has been updated to clarify this point. The NIWBMP also indicates the type of fencing that would be required on site.

In response to NMKTH's comment regarding the need for buffers to be retained, we note that there is a requirement for a 30 m setback from any perennial waterbodies (Condition 2(c) of AUTH142035.01.01) and retained natural inland wetlands (Condition 2(d) of AUTH142035.01.01) as well as the establishment and maintenance of a planted buffer area within 30 m of natural inland wetlands and perennial water bodies (Condition 7 of AUTH142035.01.01).

With respect to buffer width, as discussed above, the 30 m buffer is considered adequate to address adverse effects, including effects on streams, provided it is fully planted as proposed, and planting begins as soon as practicable.

Comment: NMKTH (pdf page 31-32) also state that the wetland offset package proposed to address wetland loss does not replace the ecological function of the existing wetlands.

Response: A total of 4.25 ha of wetland is proposed to be lost, though some of these areas are highly degraded and fragmented (though still a threatened ecosystem type and providing important ecological functions). By contrast, the offset site is proposed to become a contiguous wetland of higher ecological value, approximately 8.3 ha in extent, supported by predator control (Condition 16(b) of Schedule 1: General Conditions). While the specific characteristics of wetlands lost cannot be directly re-created, proposed wetland restoration is expected to account for the habitat functions lost and expected to provide high-quality fauna habitat in the long term.

Comment: NMKTH (pdf page 39) emphasised the importance of long-tailed bats and stated that retention of the pine forest is required to maintain bat and other terrestrial fauna habitat.

Response: While retaining the pine forest would be beneficial for long-tailed bats, the overall effects on bats were assessed as being appropriately managed through tree removal protocols, planted buffers, restoration planting, and predator control, all of which are expected to improve potential foraging habitat.¹

Roy Wetini Whaanau Trust

Roy Wetini Whaanau Trust commented on the importance of the pine trees for long-tailed bats, the value of stock exclusion to protect buffer plantings and buffer widths. Their comments do not appear to have been supported by review or input from an expert ecologist.

Comment: RWWT (page 20) emphasised the importance of long-tailed bats and stated that retention of the pine forest and planted buffers is required to maintain bat habitat.

Response: As noted above, while retaining the pine forest would be beneficial for long-tailed bats, the overall effects on bats were assessed as being appropriately managed through tree

¹ Terrestrial Ecology – Fauna Assessment (Appendix M), section 5.1.



removal protocols, planted buffers, restoration planting, and predator control, all of which are expected to improve potential foraging habitat.²

Comment: RWWT (page 20) considered stock exclusion necessary for restoration planting.

Response: The proposal for stock proof fencing is addressed above in response to NMKTH's comments.

Comment: RWWT (page 23) expressed concern about the adequacy of the 30 m setback for the Mitiwai Stream and all wetlands and instead supported a 100 m setback.

Response: As discussed above in relation to wetlands, the 30 m buffer has been assessed as appropriate to address adverse effects, including effects on streams, provided it is fully planted as proposed, and planting begins as soon as practicable. The adequacy of the 30 m buffer for the Mitiwai stream is addressed in SLR's response to comments relating to freshwater ecology.

Department of Conservation

DOC raises concerns around adverse effects on wetlands that it considers are not adequately addressed, insufficient certainty that irreversible loss or functional degradation will be avoided, and concern around vulnerable wetland bird species.

Invertebrates

Comment: In DOC's overarching comments (paragraph 4.16), DOC raised concerns (attributed to DOC freshwater ecologist Mr Binks) about the loss of natural inland wetlands that are naturally uncommon, functionally irreplaceable, and potential habitat for threatened freshwater invertebrates. At Paragraph 4.16 a species-level assessment of each independent inland wetland was recommended.

Response: No further detail on the concerns relating to potential adverse effects of habitat loss for threatened invertebrates was provided in the DOC comments. DOC has not provided a technical assessment to support the statements attributed to Mr Binks. However, the threatened nature of wetlands in general has been acknowledged above and in the Application. The proposed effects management approach, through buffer planting, restoration efforts and habitat replacement were designed accordingly, and has been assessed to be adequate in the site context. As such, a species-level assessment of each independent wetland is not deemed to be required, as each wetland was assessed to be a threatened system regardless of its state of degradation; and management proposed accordingly.

Dr Rhys Burns – Terrestrial fauna assessment – Appendix D of DOC comments

Wetland fauna monitoring

Comments: Dr Burns (paragraph 16 – 18) noted that bittern is a vulnerable species and that changes to hydrology may place critical foraging and breeding habitat at risk.

Dr Burns (paragraph 21 -22) emphasised the need for high quality wetland habitat for this species.

² Terrestrial Ecology – Fauna Assessment (Appendix M), section 5.1.



Dr Burns (paragraph 27) commented on the potential adverse effects on bittern and other wetland bird species and suggests bittern monitoring as a way to assess whether mining activities are having adverse effects on this species.

Response: As discussed above, the proposed monitoring is considered adequate to ensure that wetland hydrology, and therefore habitat provision, is maintained, and that any changes in water levels are detected before long-term effects on wetlands occur.

Based on the Hydrology Assessment prepared in respect of TIL's Application (Appendix I of the Application), trigger levels have been established to ensure that lake water levels are not drawn down to a level that would alter wetland hydrology in the long term.

Dr Mueller acknowledges the concern raised about bittern as a vulnerable species that could be adversely affected by the proposed activities and recognises their complex habitat requirements and the broader threats they face across the wider landscape. However, she does not recommend bittern monitoring as an adverse-effects monitoring tool because this species is highly mobile, as acknowledged by Dr Burns. Changes in monitoring results may not reliably reflect the effects of the proposed activity and could instead reflect other pressures in the wider landscape, such as predation or habitat loss elsewhere.

As stated above, the proposed planted buffers around all wetlands and lake margins (Condition 7 of AUTH142035.01.01), together with predator control (Condition 16(b) of Schedule 1: General Conditions), are adequate to manage potential adverse effects on wetland birds. Monitoring wetland water levels, condition, and health, as proposed by conditions (Condition 5 of AUTH142035.16.01; Conditions 8 and 10 of AUTH142035.05.01), is important to confirm that hydrological function and wetland values, including as habitat for fauna, is maintained.

Sedimentation

Comment: Dr Burns (paragraphs 29 – 30) raises a concern about sediment loads reaching wetlands through water level augmentation.

Response: We acknowledge the risk of increased sedimentation in wetlands if sediment-laden or contaminated water were to be introduced artificially or via groundwater. Any supplementary water added to wetlands, including the offset site, should therefore be free of sediment and contaminants.

A new condition to deal with this has been drafted to be included in the wetland disturbance consent (AUTH142035.16.01) as follows:

7. *The Consent Holder shall undertake baseline temperature, pH, turbidity and electrical conductivity measurements:*
 - (a) *Within 3 months of the commencement of this consent at retained natural inland wetlands on the Central and Southern Blocks; and*
 - (b) *Within 6 months after establishment of the new wetland habitat required by Condition 3 above*

Any augmentation of water levels in the wetlands referred to in 7(a) and 7(b) above shall be with freshwater (electrical conductivity of less than 1,000 µS/cm) and shall not raise the temperature of the water in the wetland by more than 3 degrees Celsius or the turbidity of the water in the wetland by more than 10%. The pH of the water to be discharged to the wetland shall be between 6 and 9.



Dr Catherine Beard – Wetland assessment – Appendix C of DOC comments

Wetland loss

Comment: Dr Beard (paragraphs 48 – 51) raises concerns with respect to the potentially irreversible loss of threatened wetland ecosystems, and uncertainty regarding the proposed effects management.

Response: As noted above, a total of 4.25 ha of wetland is proposed to be lost, though some of these areas are highly degraded and fragmented (though still a threatened ecosystem type and providing important ecological functions). By contrast, the offset site is proposed to become a contiguous wetland of higher ecological value, approximately 8.3 ha in extent, supported by buffer planting and predator control (Condition 16(b) of Schedule 1: General Conditions; Draft NIWBMP). While the specific characteristics of all wetlands lost cannot be re-created, proposed wetland restoration is expected to account for the habitat functions lost and to provide high-quality fauna habitat in the long term.

It should also be taken into consideration that while all wetland systems are threatened and of important ecological function, the wetland areas proposed to be lost are located within a highly modified landscape and have long been subject to mining activities in the past. The proposed restoration programme and establishment of an offset site is considered to be an appropriate approach to managing adverse effects associated with the loss of these areas.

Comment: Dr Beard raises concern (paragraphs 29 – 32) that seepage wetlands were not recognised as a naturally uncommon and endangered ecosystem type, leading to understatement of the ecological significance of these wetlands.

Response: Five wetlands were classed as seepages in the Terrestrial Ecology – Wetlands and Vegetation Assessment (SLR wetlands 5, 6, 7, 15, & 25; Figure 6 of Appendix K of the Application) and the ecological value of these wetlands was assessed, as a group, as being moderate (on a Low, Moderate, High as per the EIANZ guidelines³). Dr Beard is correct that seepage wetlands were not specifically identified as endangered, however given the dominance of exotic plants, low representativeness, and only moderate diversity, the overall moderate value assigned to these sites remains valid. Of the three true seepages (i.e. sloping wetlands fed by groundwater; Wetland 5, 6 & 15 in Appendix K), two have formed as a result of large scale topographical change during previous mining and are likely fed by water percolating through from the adjacent tailings dam.

Comment: Dr Beard questions the reliance on the existing environment ‘construct’ in paragraphs 35 – 37 of her memo and points out the risk of overstating baseline resilience and adaptive capacity.

Response: It is assumed that Dr Beard is referring to the adaptive capacity and resilience of lake margin wetlands to fluctuating water levels as all the other wetland sites are away from actively managed areas (or were at the time of assessment) and not subject to ongoing management inputs. However, we are unclear why Dr Beard considers that our approach risks overstating baseline resilience. Although the ‘existing environment’ concept includes a somewhat hypothetical future state, we have assessed the effects with reference to the current state of the site, which is subject to ongoing change and stressors – which provides certainty with respect to the potential effects of the application against the “existing environment”. We therefore do not consider that the “existing environment” concept introduces ecological uncertainty or overstates baseline resilience.

³ Roper-Lindsay, J., Fuller, S.A., Hooson, S., Sanders, M.D. and Ussher, G.T., 2018. Ecological impact assessment. EIANZ guidelines for use in New Zealand: terrestrial and freshwater ecosystems.



Comment: Dr Beard criticises the wetland survey and evaluation approach in paragraph 38 – 39 of her memo, and was concerned that the numerous ponds and water bodies on the site were not considered.

Response: As set out in Section 2.2 of the Terrestrial Ecology – Wetlands and Vegetation Assessment, all water bodies on the site were surveyed but those that had no hydrophytic vegetation or clearly met the NPS-FM constructed water body exclusion⁴ were disregarded early in the process. The mine uses and re-uses a large volume of water which is stored in temporary ponds all over the site (and this is proposed to continue). Various temporary stormwater ponds are also used and proposed in the future. None of these are wetlands.

Comment: Dr Beard raises a concern (paragraphs 40 – 41) that the values of wetlands beyond the mine boundary that are likely to be impacted were not adequately identified or assessed.

Response: The wetlands beyond the mine boundary comprise the Lake Shore wetlands (Lake Taharoa, Lake Numiti & Lake Rotoroa), Lake Piopio, Wetland 19 and Wetland 18. These wetlands were all clearly mapped and assessed in the Terrestrial Ecology – Wetlands and Vegetation Assessment (Appendix K of the Application). The ecological value of all these wetlands was assessed as Very High. Not all the wetlands on the margins of the lakes were closely inspected but they were all considered in the effects assessment set out in the Terrestrial Ecology – Wetlands and Vegetation Assessment.

Comment: In Paragraphs 52 – 56 of her memo, Dr Beard outlines her view regarding the sensitivity of wetland habitats to water-level change and the need for precautionary management and for more protection than relying on minimum water-level thresholds.

Response: The potential for adverse effect on the retained wetlands from water level changes was identified in the Terrestrial Ecology – Wetlands and Vegetation Assessment (Table 11; Appendix K of the Application). While it is agreed that there is a level of risk in water supplementation, proposed Condition 5 of consent AUTH142035.16.01 requires that baseline monitoring of hydrological conditions in each wetland is undertaken to determine seasonal low water levels for each wetland, and Condition 6 requires that water levels within the wetlands do not fall below the natural seasonal range determined by baseline monitoring. To summarise, should water levels drop below the seasonal low for more than 14 days, dewatering in nearby pits must cease and/or supplemental water must be supplied to the affected wetlands to maintain water levels at or above the seasonal low. These measures will minimise changes in wetland habitats due to hydrological variability.

Comment: In paragraphs 57 – 58 Dr Beard comments that cumulative and long-term ecological effects of water level fluctuations and drawdowns have not been explicitly assessed or managed.

Response: A number of measures are proposed that will minimise the risk of cumulative effects on wetlands. These include the baseline and ongoing monitoring of water levels in the retained wetlands (Conditions 5 and 6 of AUTH142035.16.01), the monitoring of lakeside wetlands (Condition 2(d) of AUTH142035.01.01 and (Condition 10(b) of AUTH142035.05.01) and the new wetland monitoring sites proposed in our response to feedback from Kaitlin Morrison (see page 3 of this document). Management responses, such as changes to water abstraction or water supplementation, are then triggered by any adverse changes identified through these monitoring programmes. Together, these measures will detect changes and prevent cumulative effects from occurring.

⁴ “a wetland that has developed in or around a deliberately constructed water body, since the construction of the water body” NPS-FM 2020 section 3.21



Comment: Dr Beard raises concerns over rewatering as an ecological mitigation measure (paragraphs 59 – 64). She points out the challenges with replicating existing hydrological regimes such as diffuse sub-surface flows which are important to some wetland types.

Response: We agree that water supplementation is a temporary solution and, if required, carries a level of risk, but advice from WWLA⁵ is that it is an appropriate method for maintaining wetland hydrology and measures included in the proposed conditions will ensure any risk is effectively managed. Conditions 5 and 6 of AUTH142035.16.01 specify requirements to maintain wetland water levels within seasonal levels and Condition 10 of AUTH142035.05.01 includes management and monitoring triggers should lake levels fall below 9.6 m RL. Dr Beard's concern in relation to wetlands relying on sub-surface flows is somewhat overstated because only Wetland 15 (on the shoreline in the southern part of the site; see Figure 6 of Appendix K of the Application) relies on seepage flow percolating from the adjacent tailings dam in the mine site. Other high value wetlands are upslope of the mine and, although there may be drawdown, seepage inflows to those wetlands will be unaffected and supplementation of surface water can maintain appropriate water levels, should that be necessary.

Comment: In paragraphs 65 – 69 of her memo Dr Beard questions the adequacy of the proposed 30 m buffer around wetlands. She states that buffers should be designed specifically for each individual wetland and to perform a specified purpose, and that hydrological protections should be considered.

Response: As set out above in response to other comments, a 30 m buffer around wetlands is adequate for its purpose. None of the wetlands have steep slopes between them and the mine which would warrant a wider buffer. Buffers are not intended to help with maintaining wetland hydrology during mining, and are focussed on limiting physical disturbance, runoff, weed invasion and fauna disturbance, as stated in the wetland impact assessment (Appendix K and Appendix M of the Application). Hydrological protection of wetlands is provided for in the proposed consent conditions ((Condition 2(d) of AUTH142035.01.01 and (Condition 10(b) of AUTH142035.05.01) and other provisions of the Draft NIWBMP, as outlined throughout this response.

Comment: Dr Beard criticises the coarseness of the planting plan and planting zones in paragraphs 70 – 72 of her memo and comments that post-disturbance planting cannot be relied on for seepage wetland restoration.

Response: The NIWBMP is in draft, and the actual location of the offset wetland is not yet determined (while the requirement for a minimum of 8.3 hectares of new wetland habitat is secured through Conditions 3-4 of AUTH142035.16.01, the location of the site is deliberately not locked in at this stage to enable another location to be used if appropriate). It is unreasonable to expect that the draft planting plan would be refined to the level that Dr Beard expects at this stage of the consenting process. It is very difficult to map fine-scale plant placement when planning such a restoration, and in fact much of the fine-scale placement of plant species during a planting programme is done by skilled personnel on site during the planting. It is also accepted practice when undertaking a restoration to plan to establish a vegetation framework or starting point through planting pioneer or easily propagated species from which natural succession processes can build. In addition, with the Taharoa Lakes and a large number of wetlands in the wider landscape, natural colonisation by a wide range of wetland plant species will certainly occur over time.

⁵ WWLA 2025. Taharoa Mine Expansion. Assessment of Groundwater Effects. Pg 41. Appendix N to the substantive application.



Seepage wetland creation is acknowledged as a challenge and the comprehensive hydrological assessment and monitoring prior to designing the offset site (Condition 16 of Schedule 1 – General Conditions) will be critical to establishing viable seepages. It is also worth noting that a number of wetlands within the site have formed over time within areas previously subject to mining and may also form once mining ceases and groundwater levels return to normal.

Dr Fleur Maseyk – Effects management, offsetting and compensation assessment – Appendix E of DOC comments

Dr Maseyk has provided comments on the proposed effects management package in relation to effects on wetlands. In particular, Dr Maseyk questioned the model used to evaluate wetland losses and gains of the proposed wetland offset approach, and the ability to successfully create the offset wetland.

Wetland offset proposal

Comment: Dr Maseyk (paragraphs 32 – 39) questions the application of the Biodiversity Compensation Model (BCM) to calculate and confirm the proposed wetland offset area.

Response: The BCM model has been used to inform offset and compensation packages for a number of recent large scale infrastructure projects, as summarised in Baber et al., 2025 and we consider it is appropriate in this context.⁶ The proposed approach and anticipated outcomes are also largely in line with the offsetting principles of the National Policy Statement for Indigenous Biodiversity (NPS-IB) and NPS-FM although strictly speaking would be compensation because of the uncertainty around offset site and its characteristics

The use of this model and the methods used to establish a quantum is discussed in Section 6.6.3 of the Terrestrial Ecology - Wetlands and Vegetation Assessment (Appendix K).

The Biodiversity Offset Accounting Model (BOAM)⁷ is commonly applied by DOC, however, we understand that it has not commonly been used in project development at the consenting stage⁸. The BOAM is considered to be the best practice quantitative model for offsetting but requires a significant amount of data to be collected. It is a disaggregating model that looks at different components of biodiversity – it seeks to create an exact like for like offset. The BCM model is an aggregating model and imports greater use of expert opinion, although is grounded in information collected during site assessments. The BCM has been shown to 'generate better ecological outcomes than alternative compensation approaches and even the BOAM, based on direct comparisons to date'⁸.

In the context of this project, we consider this is an appropriate model to use because it makes meaningful use of the available ecological field survey data. While there are limitations to the model, it complements professional judgement on required compensation to achieve adequate ecological outcomes.

To access the ironsand to the south of the Southern Block, several wetlands will be unavoidably lost. These wetlands have been assigned a moderate ecological value; however, it is worth noting that the wetlands are located within a highly modified landscape

⁶ Baber, M., Quinn, J., Craig, J., Bramley, G., Lowe M., Webb, C., Ussher, G., Whiteley, C., Kessels, G., Davies, F., Markham, J., Miller, D., van Winkel, D., Wedding, C. and Chapman, S (2025) The Biodiversity Compensation Model: a framework to facilitate better ecological outcomes. New Zealand Journal of Ecology (2025) 49(1): 3591.

⁷ Maseyk F, Maron M, Seaton R, Dutson G 2015. A biodiversity offsets accounting model for New Zealand. Prepared by Catalyst for the Department of Conservation. Contract report No. 2014–008. 73 p.

⁸ Baber et al. 2025



and have been subject to mining activities in the past. The wetland offset package proposed will be informed by hydrological baseline monitoring and will result in the formation of almost double the area of wetland lost, with extensive enhancement planting and buffer planting proposed that is intended to ultimately result in a wetland habitat with higher biodiversity values and improved habitat diversity for wetland birds and aquatic fauna. Overall, the proposed restoration programme and establishment of an offset site is considered an appropriate approach to managing adverse effects associated with the loss of these wetlands.

Certainty of success

Comment: Dr Maseyk (paragraph 31 iii) questioned the certainty of the successful formation of the offset wetland, raising concerns of hydrological changes during mining, whether hydrology in the formed wetland will be maintained, and whether the wetland would have benefits for aquatic fauna.

Response: We agree that the offset wetland design and creation will require understanding of hydrological conditions in the location chosen and careful design to ensure the anticipated successful implementation. As previously noted, the proposed General Conditions 3 – 4 of AUTH142035.16.01 specify the requirement to establish a minimum of 8.3 hectares of new natural inland wetland habitat within the Consent Area, with specifications for the offset to be included in the NIWBMP. Condition 16 of the Schedule 1: General Conditions sets out the matters that must be included in the draft NIWBMP in relation to the wetland offset area. The draft NIWBMP specifies that the proposed new wetland areas have water levels monitored for a year to ensure that the desired landforms and wetland typologies can be achieved (Section 4.3, Appendix DD). These measures are intended to ensure that the minimum wetland offset area and wetland values anticipated will be achieved and maintained.

Once the wetland formation and associated wetland and buffer planting is completed and establishes, the wetland can reasonably be expected to provide additional habitat for aquatic fauna and wetland bird species that are known from the area.

Comment: At paragraph 30(ii) Dr Maseyk asserts that the scale of adverse effects has been downplayed by largely ignoring the high level of uncertainty associated with potential adverse effects on wetland fauna, consequently leaving the management of those effects to chance.

Response: The potential adverse effects of wetland loss and mining activities on wetland avifauna were discussed and assessed in the Terrestrial Ecology – Fauna Assessment, attached as Appendix M of the Application (Section 4.2.2). That assessment noted the potential for native wetland bird disturbance including when mining would impact several wetlands (4.25 ha in total). Those wetlands were identified as of degraded quality (from a terrestrial fauna perspective) and were unlikely to provide habitat for any vulnerable wetland bird species.

Mitigation measures to avoid and minimise adverse effects on wetland fauna are addressed through pre-clearance nesting checks (Condition 31 of Schedule 1: General Conditions), maintaining, restoring and protecting retained wetlands through a planted buffer of all wetlands (Condition 7 of AUTH142035.01.01), including those that were found to provide habitat for vulnerable wetland bird species; and the establishment of a wetland offset site to replace lost wetland habitat (Conditions 3 – 4 of AUTH142035.16.01).

The management approach of predator control (Condition 16(b) of Schedule 1: General Conditions) and buffering from mining operations (Condition 7 of AUTH142035.01.01), was deemed to be sufficient and appropriate to manage the expected effects, despite any uncertainties with respect to the exact buffer width as discussed above.



Comment: At paragraph 30(v) Dr Maseyk asserts her view that the scale of adverse effects has been downplayed by failing to account for impacts on wetland and lake systems present on the boundary, but outside the development footprint.

Response: The wetlands beyond the mine boundary comprise the Lake Shore wetlands (Lake Taharoa, Lake Numiti & Lake Rotoroa), Lake Piopio, Wetland 19 and Wetland 18. These wetlands were all clearly mapped and their ecological value assessed as being very high. The potential adverse effects on these systems were assessed in the Terrestrial Ecology – Wetlands and Vegetation Assessment (Table 14 of Appendix K), but we agree that the magnitude of effect of hydrological change on these sites could potentially have been assessed as moderate, rather than low. While this finding would have yielded a high level of effect pre-mitigation, the implications of this on the mitigation approach proposed for the Application are negligible because effects on lake margin wetlands are already proposed to be managed to reduce them to an acceptable level. No changes to the mitigation measures proposed would be necessary as a result.

Mitigation measures include long term ecological monitoring of lake margin wetlands and management responses to low lake levels (AUTH142035.05.01 Conditions 8 – 10); establishing baseline hydrological conditions in retained wetlands (Conditions 8 and 9 of AUTH142035.05.01) and a requirement for wetland water levels to remain above seasonal lows (Condition 10 of AUTH142035.05.01); supplementing water flows into the wetlands if necessary (AUTH142035.05.01), and the establishment of 30 m buffers around all retained wetlands (Conditions 2(d), 5 of AUTH142035.01.01). It has also been proposed in response to Kaitlin Morrison's feedback (provided on behalf of WRC) that ecological monitoring of retained wetlands will also be included (see page 3 of this response).

Conclusion

Overall, the concerns raised by the parties have been addressed in the proposed conditions and associated management plans. The comments made have not changed our original assessment and conclusions set out in the Terrestrial Ecology – Wetlands and Vegetation Assessment and the Terrestrial Ecology – Fauna Assessment.

As we discuss above, we have recommended a small number of changes to the proposed conditions in response to comments, addressing any inconsistencies and supplementing the existing management measures. We have recommended the following amendments:

- New Condition 5A and amendment to Condition 6 (AUTH142035.16.01) to require ecological health monitoring of a representative sample of potentially affected wetlands, to align with hydrological monitoring
- Amendment of Condition 4 (AUTH142035.16.01) to specifically refer to the types of measures that could be implemented to maintain the new or enhanced wetland habitat (e.g., additional planting, weed control or hydrological adaptations)
- Amendment of Conditions 32, 33 and 34 of Schedule 1: General Conditions to include wetland bird species in addition to NZ pipit and dotterel for accidental discovery protocols
- Update of the NIWBMP to clarify fencing of wetland areas
- A new condition in the wetland disturbance consent (AUTH142035.16.01) covering monitoring of water used for water level augmentation in wetlands.

We conclude that the assessment and recommendations made in the Terrestrial Ecology – Wetland and Vegetation Assessment, conditions and associated management plans are robust, and adequately address the expected adverse effects. Overall, the loss of several



small, highly modified wetlands which are currently grazed will be well compensated for by the establishment of a new 8.3 ha wetland on the site.

Regards,

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