



HYDROGEOLOGY • GEOTECHNICAL ENGINEERING • ENGINEERING GEOLOGY

PIK/L3756-2/cam

12 October 2026

Expert Panel Chair
Central and Southern Block Mining Project
Taharoa Mine Expansion
C/- Environmental Protection Agency
Wellington

Attention: Dave Sergeant

Dear Dave

**RE: TECHNICAL PEER REVIEW OF HYDROLOGY/HYDROGEOLOGY JOINT
WITNESS STATEMENT - FOR FAST TRACK APPLICATION FTAA-2512-1153**

1. Review Brief

Earthtech Consulting Limited (ECL) has been requested to review the above Joint Witness Statement (JWS) dated 18 September 2026. This review has also included responses to Panel RFIs contained in Taharoa Ironsands Limited (TIL, 2026a¹ and b²).

The undersigned have adopted the scope guidelines outlined in paragraphs 6 to 8 of the JWS regarding points of agreement, disagreement and unresolved matters.

The undersigned also confirms that they have read the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2023 and referred to in the Fast-track Approvals 2024: Panel Conveners' Practice and Procedure Guidance 22 July 2025, and agree to comply with it. The undersigned confirms that the issues addressed in this JWS are within their area of expertise, unless stated otherwise.

2. Agenda Items

2.1 RFI 1: AUTH 14.01 (Water Permit – Divert Groundwater & Surface Water Take): Conditions 2-4 to be deleted and replaced

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- A. Condition to verify or revise the estimated 45L/s Mitiwai MALF and 31L/s Q₅ (using an external control catchment or other equivalent method) as part of baseline monitoring.**

¹ TIL (2026a). *Memorandum of Counsel on behalf of Taharoa Ironsands Limited providing an interim response to further RFIs 1, 2, 4, 10, 13 and 18. Appendix A – Schedule of Interim RFI Responses.* 8 September 2026.

² TIL (2026b). *Appendix A to a Memorandum of Counsel on behalf of Taharoa Ironsands Limited (providing a final response to the Panel's further RFI).* 1 October 2026.

In our view, two triggers are required for Mitiwai Stream augmentation to take place. These are summarized as follows:

1. Trigger 1 – Mitiwai stream depletion at 5% of Q₅ at Flow Site 3; and
2. Trigger 2 – Mitiwai stream flow at Flow Site 3 is less than 95% Q₅.

With respect to paragraphs 9 and 10 of the JWS, Samuel Kelsey proposes the following revision to condition 2 (in orange with deletions crossed out) of AUTH142035.14.01 based on that presented in TIL (2026b)³:

2) The Consent Holder shall monitor the ~~base flow in the~~ Mitiwai Stream at the locations shown in Figure 2 below (Flow Sites 2 and 3) to determine the Q₅ for the stream.

- a) The consent holder shall complete at least three years of baseline low-flow monitoring during February and March each year at Flow Sites 2 and 3 in order to:
 - a. assess Q₅ (adjusted for any stream depletion effects associated with mining operations);
 - b. establish the baseline (prior to any mining effects) relationship between the flows at both monitoring sites.
- b) While 'Pit 1' in the Central Block (shown in Figure 1) is open, if the baseline flow relationship between Flow Sites 2 and 3 shows a depletion effect at Flow Site 3 of more than 5% of Q₅ at that site, and no equivalent depletion is observed at Flow Site 2; then
- ~~c) If extraction of sand is occurring in the Central Block within 'Pit 3 1' as shown in Figure 1 below, and the base flow of the Mitiwai Stream during the summer months period from 1 December – 1 March May as measured at the upstream flow recording site in Figure 3 is 28.0 L/s or less, depleted by greater than 5% of the Q₅ as measured at the downstream flow recording site in Figure 2 below; and~~
- d) ~~if the flow of the Mitiwai Stream as measured at the upstream flow recording site in Figure 2 below is not depleted by greater than 5% of the Q₅ (and manual flow gaugings validate the difference in flows); then~~
- e) the ~~base~~ flow in the Mitiwai Stream must be augmented at Flow Site 2. Augmentation is to be with fresh water with an Electrical Conductivity not exceeding 1000µS/cm., to achieve 95% of the Q₅ ~~a base flow of 28 L/s or greater~~ as measured at the downstream flow recording site (Flow Site 3) shown in Figure 2.

For the purposes of (b) above, manual flow gaugings are to be undertaken at the start of December annually. If the manual flow gauging diverges from the current rating curve by +/- 10%, then additional rating gauging must be undertaken to update the rating curve.

Advice Note: The National Environmental Monitoring Standards should be used as a guiding document to help support quality data collection, but only to the extent the Standards are relevant and applicable in the context of sandy coastal streams.

The requested amendments in orange (above) are to provide clarity as to regarding the determination of Q₅ and when possible augmentation is to occur.

B. Condition to determine the minimum environmental flow for lower Mitiwai Stream.

Samuel Kelsey agrees with paragraphs 20 and 21 of JWS that the minimum environmental flow need not be determined, provided 5% of Q₅ is adopted as the augmentation trigger.

C. Limit conditions for Central Pit management (specifically maximum groundwater drawdown limits in terms of RLm – mAMS L for Stages 1 to 4 of Central Mine Pit).

Philip Kelsey and Samuel Kelsey disagree with paragraph 23 of the JWS and request that Central Mine Pit dewatering levels are conditioned as outlined in the ECL response to G below.

³ TIL (2026b). Appendix A to a Memorandum of Counsel on behalf of Taharoa Ironsands Limited (providing a final response to the Panel's further RFI). 1 October 2026.

- D. Conditions outlining revised stream low flow trigger level criteria and responses if Central Pit depletion effects on Mitiwai Stream greater than 10% MALF or appropriate criteria (such as minimum environmental flow).**

Samuel Kelsey agrees with paragraph 24 of JWS. As indicated in paragraph 10 of JWS, Mitiwhai Stream augmentation trigger to be based on a water loss of 5% of Q_5 .

2.2 RFI 2: AUTH 05.01 (Water Permit – Surface Water Take): Condition 7

- E. Confer and advise on whether 8.53 m RL as a cease take is needed and/or an appropriate level.**

Samuel Kelsey agrees with paragraph 26 of JWS supporting the 8.53mRL cease take Lake Tahaaroa water level.

2.3 RFI 6(1): AUTH 16.01 (Destroy, disturb, dewater natural inland wetlands): Conditions 5(a) and 5A

- F. Confer and advise on how baseline monitoring and trigger levels would be determined for water level management for groundwater connected wetlands for the purpose of AUTH 16.01 Condition (5a).**

Samuel Kelsey is in general agreement with paragraphs 35 to 38 of JWS. We note that specific baseline monitoring will be carried out within the proposed maximum drawdown envelope of effects outlined in section 2.4 below.

2.4 RFI 18: Hydrogeology: Maximum drawdown to define Envelope of Effects

Background

The Earthtech (2026)⁴ review of the Hydrogeology Appendix N of the SAR identified material gaps in the groundwater modelling associated with the conceptual groundwater model and permeability (hydraulic conductivity) settings. Although requested, insufficient information has been provided by TIL to address the specific matters raised. In our view, these information gaps result in significant uncertainty to the SAR prediction of groundwater effects.

WWLA, in TIL (2026a), states that they consider that the groundwater modelling predictions are conservative (actual effects are expected to be less than predicted).

To address groundwater model prediction uncertainty, the undersigned introduced a “maximum consented envelope of effects approach” at the Panel Facilitated Conference (PFC) on 22 July 2026.

Under such an approach the consenting assessment and associated compliance monitoring simply adopts the maximum extent of predicted effects. There was general support for the envelope of effects approach by the TIL groundwater experts at the PFC in terms of:

- i. Mine pit dewatering levels.

⁴ Earthtech (2026). *Technical Peer Review Report No. 1 for Fast Track Application FTAA-2512-1153 – Appendix N: Hydrogeology Assessment, Appendix I: Hydrology Assessment*. Letter report dated 29 May 2026. Ref L3756-1 Rev A.

- ii. Maximum extent of mining and dewatering as determined by WWLA Figures A1 to A6 dated 15 July 2026.
- iii. Maximum groundwater electrical conductivity of $1,000\mu S/cm$ when pumped mine water was to be discharged to any freshwater environment.

The subsequent TIL responses outlined in RFI 18 (TIL, 2026a and b) represent a departure from the general agreement at the PFC.

The following provides a review of associated TIL responses.

G. Review and comment on draft condition:

The consent holder shall not drawdown groundwater within the Central and Southern Mine pits below the following levels (levels in terms of RLm Moturiki vertical datum):

A. Central Mine Pit:

- i. Pit 1 – RLm TBA
- ii. Pit 2 – RLm TBA
- iii. Pit 3 – RLm TBA
- iv. Pit 4 – RLm TBA

B. Southern Mine Pit:

- i. Pit 1 and 2 – RLm TBA
- ii. Pit 3 – RLm TBA
- iii. Extension 1 – RLm TBA
- iv. Extension 2 – RLm TBA
- v. Extension 3 – RLm TBA

Extent of mine stages as presented on Figure 1 of WWLA Appendix N drawing dated 22 August 2025.

(RLm stage levels to be provided by TIL.)

Philip Kelsey agrees with paragraph 42 of the JWS (NC-DoC) which states that there should be a clear connection between groundwater model predictions and resource consent conditions. The determination of the consent relies on the groundwater effects presented in the SAR.

WWLA Figures A1 to A6 dated 15 July 2026 show that the proposed mine pits will result in up to 30m of groundwater level drawdown associated with mining to up to 40m below mean sea level (TIL RFI 48 response dated 17 July 2026). The primary driver of groundwater drawdown effects is the proposed pit groundwater levels. Therefore, the above proposed condition should be adopted as a primary control of the extent of predicted groundwater drawdown effects.

The consented maximum dewatering levels within the mine pits also provide protection against aquifer saline intrusion as discussed below.

Philip Kelsey does not agree with the effects based approach as discussed in paragraphs 39 and 40 of the JWS in the absence of conditions that control mine pit dewatering levels.

H. Review and comment on draft condition:

The consent holder shall not cause dewatering of ground outside of mine pit areas greater than the predicted groundwater levels (levels in terms of RLM Moturiki vertical datum) presented on WWLA Figures A1 to A6 dated 15 July 2023.

Philip Kelsey agrees with paragraph 42 of the JWS (NC-DoC) which supports the use of the WWLA Figures A1 to A6 to define the extent of groundwater drawdown effects and paragraph 44 (FP-Mātauranga Māori) which proposes that “conditions focus on managing predicted effects within an acceptable operational envelope”.

The WWLA Figures A1 to A6 are considered key to defining the maximum envelope of groundwater effects. For consent compliance, groundwater monitoring bores are proposed. The proposed bore locations together with coordinates are shown on attached Figure A and are summarised as follows:

i. Central Mine Pit

Two monitoring bores MBC1 and MBC2 located on western and eastern margins of mine extent.

ii. Southern Mine Pit

Three monitoring bores MBS1, MBS2 and MBS3 located on western, eastern and southern margins of mine extent.

For all bores, groundwater level triggers (in terms of mAMSL) would be based on the WWLA Figures A1 to A6 predictions. For compliance, continuous monitoring of groundwater levels using level loggers is recommended. This compliance monitoring would provide the primary means of ensuring that sand mine dewatering stays within the maximum consented drawdown envelope.

Philip Kelsey does not agree with paragraphs 39 and 40 of the JWS which appears to support an effects based approach in the absence of a consented drawdown envelope.

I. Review and comment on draft condition:

The consent holder should carry out sand mining activities which maintain Electrical Conductivity of water within all mine pits at less and equal to 1,000uS/cm to control potential saline intrusion of iron sand aquifer.

The WWLA responses to hydrogeological related comments dated 11 June 2026 stated that: “In general terms we found little risk of saline intrusion beyond a brief period of possible incursion into the mine pit when it is near the coast during the excavation of the Southern Block, and no risk of saline intrusion causing adverse effects on water users or the environment under the management regime set out in the proposed conditions.”

In Appendix A of TIL (2026a) – RFI 18, TIL noted that, “the risk of saline intrusion has only been identified with respect to excavation in Pit 1 and 2 in the Southern Block.”

The WWLA Figure A4 dated 15 July 2023 indicates dewatered groundwater levels up to 6m below mean sea level in close proximity to the coastline (western edge of Extension 2, Southern

Block – adjacent to the coast), indicating a potential saline intrusion risk. In response to questions at the PFC, TIL groundwater experts also confirmed that the groundwater modelling drawdown predictions included significant transient (time-dependent) effects. In such cases, if the duration of the mine excavation (prior to backfilling) was longer than modelled, the saline intrusion effect could be greater.

On the basis of the information provided, the following amended draft conditions are proposed:

- i. The consent holder should take all practical measures to maintain the electrical conductivity of pit water at less than or equal to $1,000\mu S/cm$ to control potential saline intrusion into the sand aquifer.
- ii. If mine pit water exceeds an electrical conductivity of $1,000\mu S/cm$, no discharge of such water should be allowed into any lake, stream or aquifer freshwater environments.

Note that the above assumes that all augmentation water to streams and/or wetlands is conditional and limited to freshwater only, with electrical conductivity not exceeding $1,000\mu S/cm$.

Philip Kelsey disagrees with paragraph 47 of the JWS and considers that the above amended condition is still required to provide salinity control on the pumped mine water.

The above opinion has not changed following the review of the final RFI 18 responses provided in TIL (2026b).

Yours sincerely

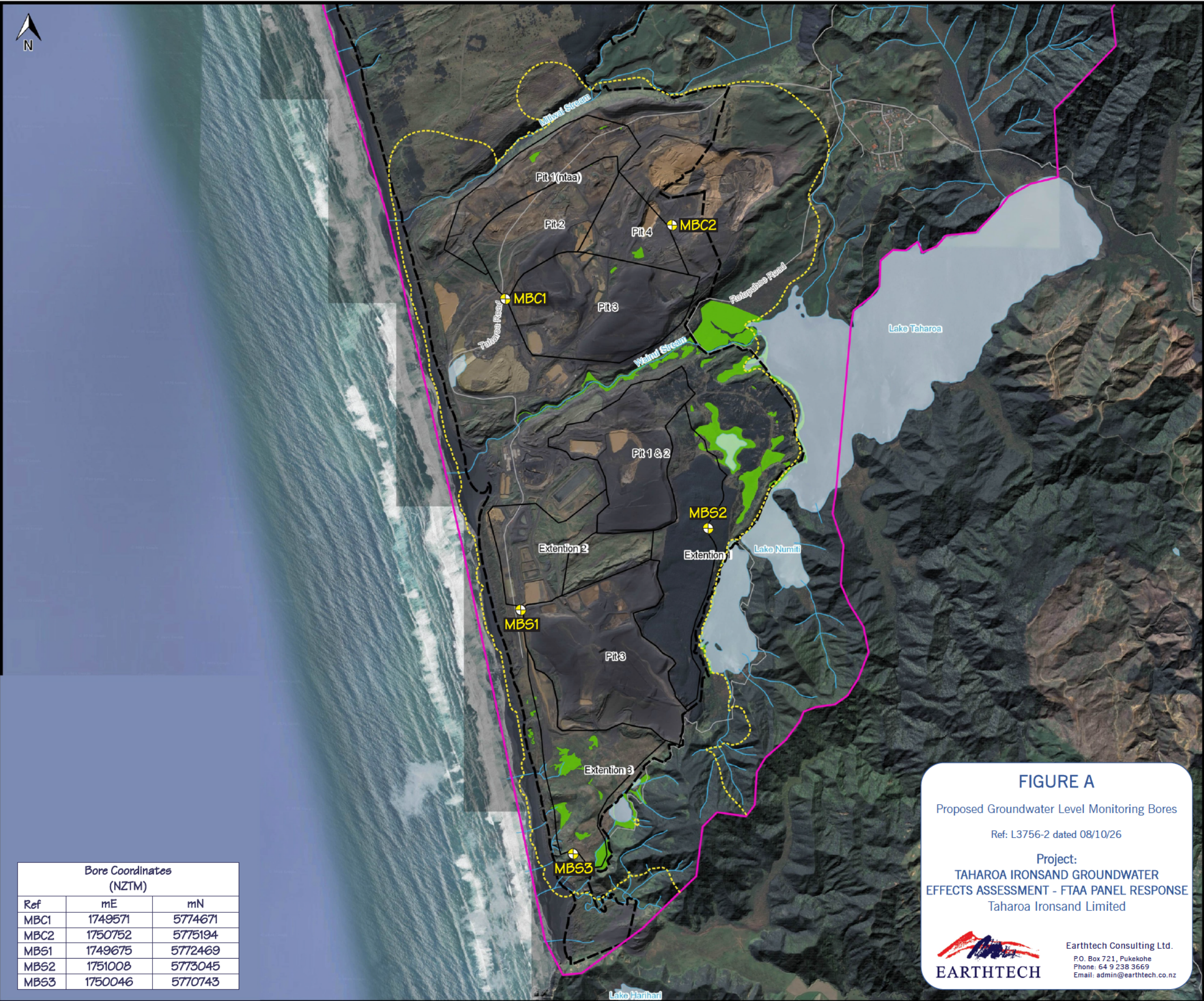


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Encl. Figure A – Proposed Groundwater Level Monitoring Bores



Bore Coordinates (NZTM)		
Ref	mE	mN
MBC1	1749571	5774671
MBC2	1750752	5775194
MBS1	1749675	5772469
MBS2	1751008	5773045
MBS3	1750046	5770743

FIGURE A

Proposed Groundwater Level Monitoring Bores

Ref: L3756-2 dated 08/10/26

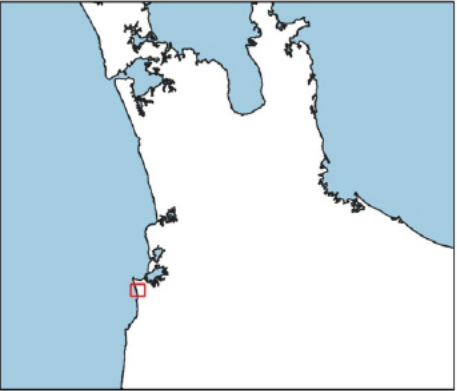
Project:
TAHAROA IRONSAND GROUNDWATER
EFFECTS ASSESSMENT - FTAA PANEL RESPONSE
Taharoa Ironsands Limited

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Map Title:
Maximum extent of 0.2 m drawdown over full mining sequence

Project:
Taharoa Ironsands Groundwater Effect Assessment - FTAA Panel Response

Client:
Taharoa Ironsands Limited



Legend

- Road
- Streams
- Lakes
- Study Area
- TIL Property Boundary
- Mining blocks
- Wetlands
- 0.2 m drawdown contour (full mining sequence)

Groundwater Level Monitoring Bores

Data Provenance
GIS Layers

Drawn by: Jake Scherberg
15/07/2026

Layout & Project File
Taharoa Iron Sand Mine-Hydrogeological Modelling