Letter to Te Rūnanga o Ngāti Waewae

TĀIKO CRITICAL MINERALS
WEST COAST NEW ZEALAND

Mining with the environment
Working with the community
A world class, high grade critical minerals deposit

4 March 2026

Te Rūnanga o Ngāti Waewae

By email: Waewae.admin@ngaitahu.iwi.nz

E te rangatira, tēnā koe

Tāiko Critical Minerals Limited – Barrytown Minerals Project – Fast-track Approvals Act 2024 application

1 As you are aware, Tāiko Critical Minerals Limited (**TCM**) is the authorised person with respect to the Barrytown Minerals Project (**Project**), which is a Schedule 2 listed project in the Fast Track Approvals Act 2024 (**FTAA**).

Consultation, notification and information requirements

2 Prior to the Fast Track Approvals Amendment Act 2025, the FTAA required TCM to consult with the relevant iwi authorities, hapū, and Treaty settlement entities, on a proposal to lodge a substantive application. The Fast Track Approvals Amendment Act 2025 will replace consultation requirements with the requirement to notify those parties on 31 March 2026, unless consultation has commenced before that date.

3 The purpose of this letter is to record consultation undertaken with Te Rūnanga o Ngāti Waewae (Ngāti Waewae) on an application that will be lodged after 31 March 2026 and seek any further feedback Ngāti Waewae may have on TCM's fast track application. Please note that TCM have also written to Te Rūnunga o Ngāi Tahu for this purpose.

4 TCM has engaged in extensive consultation with Ngāti Waewae on an ongoing basis over many years as the project has evolved from mineral resource testing work, to the resource consents granted for the Central Block (which were supported by Ngāti Waewae) through to the current fast track application. That consultation has included hui, site visits, sharing of information in relation to the project (including a draft hydrology assessment) and extensive discussion of consent conditions to ensure that the application meets the expectations of mana whenua, particularly in relation to proposed water management and environmental enhancement work.

5 TCM also recognises that Ngāti Waewae and TRoNT have a Mana Whakahono ā Rohe with the West Coast Regional Council, which establishes resource management participation arrangements including in relation to resource consent applications.

Project summary

6 A comprehensive project description is attached at **Appendix A.**

7 By way of summary, the Project is to undertake mineral sand mining to obtain ilmenite, garnet and other minerals across an area of the Barrytown Flats, in the Grey District. Resource consent has already been granted to TCM to undertake mineral sands mining to the north of the Project site, transport material from site to the Mineral Separation Plant at Rapahoe and for processing on site. Mining of the Southern Block is likely to take place over approximately 14 years, followed by rehabilitation of the site.

8 The application will seek all approvals for mining and related activities within the Southern Block, including (but not limited to):

(a) the extraction of sand using a floating dredge over approximately 280 hectares;

(b) remediation, rehabilitation and closure activities, including the establishment of a constructed wetland and reshaping of contours over 408 hectares.

9 Approvals sought include:

(a) Land use consents, water permits, and discharge permits related to mining activities normally required under the Resource Management Act 1991;

(b) Approvals normally required under the Wildlife Act 1953 for handling, salvage (including incidental killings) and relocation activities.

(c) Approvals normally required for under the Heritage New Zealand Pouhere Taonga Act 2014 to modify or destroy recorded and unrecorded archaeological sites.

10 This includes the taking of water from Canoe Creek to operate the Wet Concentrator Plant, (WCP) located on the Southern Block. This water take is currently consented for a duration of 12 years for the purposes of a WCP on the Central Block. That consent will be surrendered and replaced with a 35 year consent, in order to reflect the relocation of the WCP and extension of mining activities to the Southern Block. The conditions of the take are proposed to remain the same – see condition 22.1 of the proposed conditions, attached at **Appendix B**.

Technical advice and conditions

11 To assist with the design and assessment of actual and potential environmental effects associated with the Project, TCM has engaged a range of technical experts to assess effects in relation to landscape, transport, hydrology, water quality, ecology (freshwater and terrestrial), erosion and sediment control, noise, archaeology, coastal hazards, metallurgy and economics. The experts TCM has engaged have extensive experience in this area, including in the recent resource consent processes in the region. Draft management plans have been prepared in relation to the management of water, native freshwater fish, birds and lizards.

12 Please let us know if you would like a copy of any of those reports or draft management plans. A copy of the draft landscape mitigation package is attached at **Appendix C**.

13 These have been developed based on expert advice, consultation to date and the previous publicly notified resource consent process for the Central Block. TCM will adjust and update these draft conditions with feedback received through further consultation and further expert review and advice.

14 Key conditions that may be relevant to Ngāti Waewae include requirements to:

(a) Manage wildlife, including relocating fish from creeks and drains prior to stream diversions, developing an avian management plan and light management plan to manage potential effects on birds, erecting a penguin fence and undertaking annual penguin surveys of Pakiroa beach. You are to be consulted on the avian management plan (AMP) that will be prepared and will be consulted if any changes are made;

(b) Manage freshwater quality, including by:

(i) directing all contaminated stormwater and other contaminated water for recirculation and use in the processing plant and imposing water quality compliance limits for when water and contaminants are to be discharged directly into the mining void;

(ii) taking practicable measures to prevent uncontaminated stormwater entering the mining works and disturbed area to reduce the volume of water passing through the mining/settling pond system;

(iii) a comprehensive monitoring programme including continuous monitoring of the Mine Water Facility, keeping a record of inspections and sampling water to ensure all discharges will not cause effects on any receiving waterbody as well as engaging experts to prepare an annual Hydrological and Water Quality Report and macroinvertebrate and fish surveys; and

(iv) limiting exposed areas and implementing erosion and sediment control works;

(c) Reinstate existing creek and drainage patterns with riparian planting and construct a new wetland of approximately 50 hectares;

(d) Rehabilitate land in a manner that protects freshwater values associated with Canoe Creek, Clarke Creek, Granite Creek and Fagan Creek; and

(e) Manage any archaeological finds, including by adopting an accidental discovery protocol. You will immediately be advised if any findings and/or disturbance of Koiwi Tangata (human bones) or Taonga (artefacts, including pounamu).

Archaeological authority - Assessment of Māori values

15 The FTAA requires Māori values of archaeological sites to be assessed as part of the application for an archaeological authority. New Zealand Heritage Properties Ltd has undertaken an archaeological assessment, which is attached at **Appendix D**.

16 That report identifies in some Māori values including two recorded artefact find spots, potential midden/oven sites, and potential mining and historic-domestic sites. However, it notes that Ngāti Waewae are best placed to comment on Māori values of archaeological sites and suggests that the report be provided to you as part of consultation.

17 For completeness, the two recorded find spots are:

(a) K31/11 - part of a shaped patu and a small greenstone chisel.

(b) K31/12 - a shaped greenstone pendant.

18 The artefacts from both find spots have been removed and there is no evidence that further features or deposits relating to the site remain in situ.

19 We would be grateful if you could confirm whether Ngāti Waewae wishes to make any further comment or undertake any further assessment of archaeological values for the purposes of assessing TCM's application.

20 If any further questions or matters arise that you would like to discuss, please do not hesitate to contact me. We are happy to make our experts available for any questions or further discussions you consider necessary. We would appreciate your response by 27 March 2026.

21 We thank Ngāti Waewae for its meaningful contribution on the project to date.

Nāku, nā

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Project Director
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Appendix A

Project description

Barrytown Critical Minerals Project
Southern Block

Project description – draft for consultation
4 March 2026

1. Overview

1.1 This section sets out a detailed description of the Project to inform the applications made for approvals under Schedules 5, 7, and 8 of the FTAA.

1.2 Tāiko Critical Minerals (formally TiGa Minerals and Metals, the **Applicant**) holds various resource consents from the Grey District Council and the West Coast Regional Council authorising the extraction, processing, and transportation of mined material in the form of Heavy Mineral Concentrate (**HMC**) from the Central Block (**CB**) at Barrytown, as part of its critical minerals project on the Barrytown Flats. Minerals sought to be obtained through the process are ilmenite, garnet, zircon and gold.

1.3 The initial resource consent for mining, HMC production, transportation and associated ancillary activities was subject to a publicly notified process. Through this extensive process, all aspects of the company's operations were assessed against the relevant District and Regional Plans, the Resource Management Act 1991, and applicable national direction. This enabled full participation by interested parties and agencies and resulted in a robust set of consent conditions, which have informed the company's Fast-track application, including the substantive environmental data set the company has produced and which is ongoing.

1.4 Following the granting of the substantive resource consent for the CB (north of Canoe Creek), an additional resource consents have been granted for a Mineral Separation Plant (**MSP**) at Rapahoe. Consent for the establishment, operation and maintenance of a centralised Wet Concentrator Plant (**WCP**) adjacent to the Southern Block (**SB**), associated water management infrastructure (known as the Mine Water Facility (**MWF**)) and access road, is currently being processed by the Grey District Council. Consent for the earthworks component of this activity was granted by the West Coast Regional Council in February 2026. The MSP and WCP will process material from the CB and the SB.

1.5 In adopting this approach, the company has undertaken extensive consultation with the local community, mana whenua, Councils, and relevant agencies throughout these community-facing processes. This engagement has contributed to the development and acceptance of comprehensive consent conditions and management provisions. It has also enabled the assessment and approval of high interest matters, such as trucking activities on State Highway 6. As a result, the Fast-track application is focused on seeking all necessary approvals for the mining activity within the SB. **Plan A** shows the three resource blocks of the Barrytown Critical Minerals Project.

1.6 The SB comprises approximately 408ha on the Barrytown Flats as shown in **Plan B**. All land subject to this application is privately owned with access to the site approved by the respective landowners. Mining activity is proposed to occur on approximately 280ha of the total area, which is known as the 'mining disturbance area' and shown in **Plan B**. Earthworks will be undertaken on parts of the SB outside the mining disturbance area to assist with recontouring and rehabilitation.

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1.7 Mining on the SB will be undertaken using a floating dredge of modern design. Mining will be undertaken in three sections as follows (shown on **Plan C**), although only one section will be mined at a time:

(a) Section 1: Granite Creek North;

(b) Section 2: Granite Creek South;

(c) Section 3: Cargill Road.

1.8 Mining of the SB is expected to commence in approximately 2034 - 2035 once the mineral resource on the CB has been exhausted. The WCP and MWF will be used to process material from both the CB and SB.

1.9 Various measures are proposed for the avoidance, minimisation and mitigation of ecological (terrestrial and freshwater), landscape, visual, noise and dust-related effects. The Project also includes significant ecological and landscape enhancements in the form of an extensive wetland, realignment of creeks into natural patterns, riparian planting and stock exclusion fencing.

1.10 Mining of the SB is expected to take approximately 14 years (excluding preparation and rehabilitation), based on the extraction rate of 2,000,000 tonnes per year (producing 400,000 tonnes of HMC per year). This will extend the overall mining component of the Barrytown Minerals Project to approximately 30-35 years. Taking into account pre-mining construction works and post-mining final rehabilitation and mine closure works, it is anticipated that the Project will be completed between 2055 and 2060. Approvals are sought for 35 years to provide sufficient time for mining activity to occur over stages, final rehabilitation and operational factors to take place.

1.11 The anticipated work programme for the Project is as follows:

(a) Bunding and initial mitigation planting – 1 year (2027);

(b) Mining of the Central Block (consented) – 6 years (2029 – 2034);

(c) Mining Section 1: Granite Creek North (Stage 1) – 7 years (2035 - 2042);

(d) Mining Section 2: Granite Creek South (Stage 2) – 4 years (2043 – 2047);

(e) Mining Section 3: Cargill Road (Stage 3) – 3 years (2047 - 2050);

(f) Final rehabilitation – 3 years (2050 – 2053); and

(g) An operational contingency period of 6 years (2050 – 2056 followed by the final rehabilitation proposed in (f)).

2. Consents sought and relevant land parcels

2.1 All resource consents necessary are being sought, including for the following activities:

Consent type	Activity	Rule breaches
Grey District Plan		
Land use consents	Clearance of indigenous vegetation	Rule 19.7.5(vii): Clearance of indigenous vegetation exceeds

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		permitted activity volumes outside of an SNA
Decisions Version Te Tai o Poutini Plan Rules under appeal are noted with an * e.g. ECO-R1*		
Land use consent	Clearance of indigenous vegetation	ECO-R9*: the clearance of indigenous vegetation in the coastal environment and riparian margins will exceed the permitted activity volumes
	Earthworks within riparian margins	NC-R4*: because the earthworks will be undertaken across the mining disturbance area including creeks and their riparian margins
	Structures within riparian margins	NC-R5*: existing farm bridges will be replaced post mining which are not permitted under this plan
	Structures in the coastal environment	CE-14*: existing farm bridges will be replaced post mining which are not permitted under this plan
	Mineral extraction	GRUZ-R25*: do not comply with permitted activity rule due to volume of material to be extracted, mining to be undertaken within the riparian margins of creeks and wetlands, will disturb two historic heritage sites; undertaken within 250m of a sensitive activity on an adjoining site; and operate outside permitted hours.
West Coast Regional Land and Water Plan		
Land use consent	Earthworks within riparian margins; Earthworks in the non-erosion prone area outside riparian margins; Vegetation disturbance in riparian margins	Rule 16 WCRLWP: do not comply with permitted activity rule as earthworks will exceed permitted volumes and vegetation clearance will take place in riparian margins with creeks to be mined across the site
Land use consent	Activities within the bed of a river outside of a wetland identified in Schedule 1 or 2	Rule 35 WCRLWP: Creek beds will be reconstructed in the same or similar locations and represent meandering

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		pathways, and water will be drained during diversions
Water permit	To take and use water for the purpose of mineral sand processing	Rule 55 WCRLWP: the take and use of water from Canoe Creek to operate the Wet Concentrator Plant is a restricted discretionary activity
Water permit	To take and use ground water for the purpose of mineral sand mining and processing	Rule 56 WCRLWP: to take and use groundwater intercepted during mining to pump run-of-mine material to the Wet Concentrator Plant.
Land use consent	Diversion of water	Rule 58 WCRLWP: five creeks across the SB will require diversion which is a discretionary activity
Discharge permit	To discharge water to the mining void	Rule 71 (discharge to water and land) WCRLWP: to discharge water to the mining void is a discretionary activity due to the augmentation of lime
Regional Air Quality Plan		
Discharge permit	To discharge dust to air from stockpiling and handling gravel, sand and soil	Rule 16: consent being sought as precautionary measure to authorise unanticipated dust emissions
Freshwater NES		
	Vegetation clearance within, or within a 10m setback from, a natural inland wetland	Section 45D(1)
	Earthworks within, or within a 10m setback from, a natural inland wetland	Section 45D(2)
	Earthworks outside a 10m, but within a 100m setback, from a natural inland wetland that will result in partial or complete drainage of the wetland	Section 45D(3)
	Diversion of water within, or within a 100m setback from, a natural inland wetland	Section 42D(4)

	Discharge of water into water within, or within 100m setback from, a natural inland wetland	Section 45D(5)
	Reclamation of bed of rivers	Section 57

^For completeness it is noted that the mining activity relies on a number of permitted activity rules in the district and regional plans.
*Rule under appeal.

2.2 The application relates to the following land parcels:

Legal description
Section 4-6 Block V Waiwhero Survey District contained in Record of Title WS2D/1085
Section 7-8 Block V Waiwhero Survey District contained in Record of Title WS2D/855
Lot 1 DP 3548 and Rural Section 2927 contained in Record of Title WS8C/143
Part Section 2928 Block V Waiwhero Survey District and Defined on DP 764 contained in Record of Title WS1A/1166
Lot 1 DP 2719 and Lot 2 DP 339364 contained in Record of Title 161879
Section 2929 and Part Section 2634 – 2635 Block V Waiwhero Survey District and defined on DP 764 contained in Record of Title WS2A/228
Rural Section 2930 contained in Record of Title WS1B/293
Rural Section 2931,2932,2933,3316 and Part Rural Section 2639 contained in Record of Title WS8B/528
Section 4033 Block V Waiwhero Survey District contained in Record of Title WS1A/892
Part Section 5 Block IX Waiwhero Survey District contained in Record of Title WS2B/591
Lot 1 DP 406050 contained in Record of Title 486401.

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3. Initial works

3.1 Initial works on the site will be undertaken prior to the commencement of any mining. These include:
(a) Bunding, planting (associated with noise bunds) and fencing; and
(b) Establishment of the mine starter pit.

3.2 A mine starter pit is required in each of the three sections to establish the initial dredge pond in which the floating dredge will operate. Separate starter pits are necessary because the sections are divided by physical features that will not be disturbed i.e. Granite Creek separates Sections 1 and 2, and Cargill Road separates Sections 2 and 3. These starter pits enable the dredge to begin operations independently within each section.

3.3 The floating dredge will be transported to each mine starter pit using conventional mining equipment transport methods in order to avoid adverse effects on the surrounding environment. This approach is consistent with the methodology proposed for transporting the dredge to the Application area and for its initial assembly.

3.4 The mine starter pit will be developed by excavating into the water table. An area of approximately 100m wide x 300m long, and up to 10m deep will be excavated using an excavator and trucks, removing approximately 270,000m^3 of material. This size allows for:

(a) A dredge pond (mine void) of approximately 100m x 100m;
(b) A 100m x 50m area behind the dredge for the deposition of tailings following processing; and
(c) A 100m x 100m area in front of the dredge pond at various stages of excavation, ready to be mined.

3.5 The first mine starter pit will be located in Section 1: Granite Creek North. Material extracted from the starter pit will be used for the construction of the noise control bunds adjacent to Lot 2 DP2178 and another near Warren Road, located along the eastern boundary. Both bunds will be approximately 3m high with a 4.8m crest. The Warren Road bund will extend approximately 280m. Constructing the bunds at this early stage enables associated planting to be carried out in advance and allows time for vegetation to establish. The location of the starter pit is shown in **Plan D**. The construction of both the starter pit and the Section 1: Granite Creek North bunds are anticipated to take approximately two months.

3.6 A similar approach will be taken for Sections 2 and 3, with a mine starter pit excavated prior to the commencement of mining in each section. For Section 2, material excavated from the starter pit will be used to construct an 'L-shaped' noise control bund on the northern side of Cargill Road. For Section 3, material excavated from the starter pit will be used to construct a noise control bund along the southern side of Cargill Road near 101 Cargill Road. Both bunds will be approximately 3m high with a 4.8m crest.

3.7 The location of the noise bunds are shown in **Plan E**. Any excess material not required for bund construction will be stockpiled for future processing and rehabilitation.

4. Indicative mining sequence and setbacks

4.1 Following construction of the mine starter pit, the dredge will extract ore in strips. The indicative mining sequence, showing the anticipated pattern and extent of mining over time, is shown in **Plan D**. Mining will generally progress in a north/ south direction, although there will be some mining in an east/west direction where the dredge turns to commence a new strip. **Plan D** also shows the location of each mine starter pit.

4.2 The indicative mine path is influenced by both ore grade distribution and the long-term rehabilitation of the site. Commencing mining in areas with higher ore grades provides an earlier return on investment for the company. Mining from the western (coastal) side and progressing eastward allows previously mined areas to be progressively rehabilitated back to existing ground levels while maintaining natural drainage gradients towards the coast. Land on the western side of the site will be rehabilitated to existing ground levels.

4.3 As mining advances inland, ground levels will be progressively lowered contributing to the formation of a constructed wetland as part of the final landform across Sections 1 and 2

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(Stages 1 and 2). To achieve the post-mining contours across all three Sections (Stages), material will be sourced from areas outside the mining disturbance area but within the wider application boundary. Approximately 110 hectares within the application area provide a readily accessible source of fill material. These areas will be selectively cut and regraded, with suitable material transferred over short haul distances, typically within approximately 100m, using bulldozer "cut and carry" methods. This material will be progressively redistributed into backfilled mining areas to recontour the landform, achieve stable final ground levels and integrate rehabilitated areas with the surrounding landscape.

4.4 Each mining strip will be approximately 100m wide and excavated to a depth of 10m below ground level noting that the depth of mining is dependent on the ore distribution. The coloured strips on **Plan D** represent the expected extent of mining for each year. The total disturbed land area at any one time will be 16ha. Disturbed land means the land within the application area that has been directly affected by mining or associated activities, including areas subject to vegetation disturbance, topsoil stripping, excavation and active mining in the mining void, tailings deposition, overburden placement, bund construction or areas undergoing progressive rehabilitation prior to the re-establishment of stable landform and 80% vegetative cover.

4.5 The dredge is expected to progress at an average rate of approximately 2,200 metres per year or approximately 166 metres per month or 6 metres per day (based on 26 working days in a month). This rate will yield 2,000,000 tonnes of raw material per year and is subject to variation depending on the depth of the ore body, the average grade of the ore encountered and the need to ensure that the total disturbed area for mining is no more than 16ha. Weather conditions can impact progressive rehabilitation, i.e., influencing the rate of growth of vegetative cover (see Section 7 for progressive rehabilitation and vegetation cover).

4.6 It is proposed to set mining back from key environmental features and boundaries as follows:

(a) 20m from the consent boundary;
(b) 20m from Granite Creek;
(c) 20m from Fagan Creek;
(d) 50m from Mean High Water Springs (MHWS);
(e) 20m from the proposed SNA PUN-049, which is adjacent to Section 2 (Granite Creek South);
(f) 20m from all private property boundaries not within the consent area; and
(g) 200m from dwellings other than where noise bunds are proposed.

4.7 These setbacks are shown on **Plan F**.

5. Mining methodology

5.1 Once the mine starter pit has been constructed, the following steps will be undertaken to enable the extraction of ore:

(a) Removal of pasture, small areas of farm vegetation and wildlife checks;
(b) Stripping of topsoil and overburden;
(c) Diversion of streams and drains;
(d) Extraction of run of mine material;
(e) Initial screening of run of mine material and deposit of waste material;
(f) Pumping of run of mine material to WCP.

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5.2 This process is illustrated by **Figures 1** and **2** below and discussed in detail in the following sections.

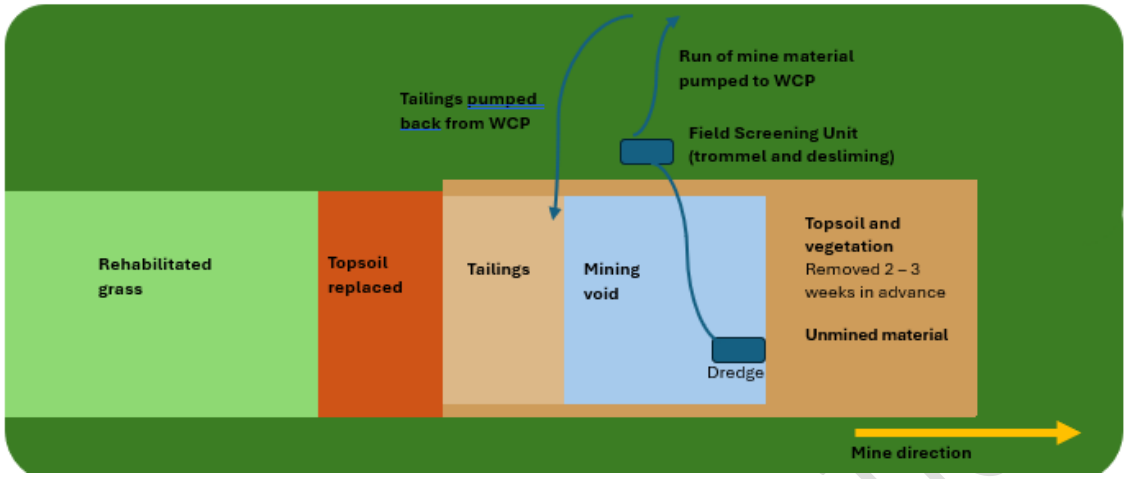

Figure 1: Schematic representation of the mining methodology in plan view

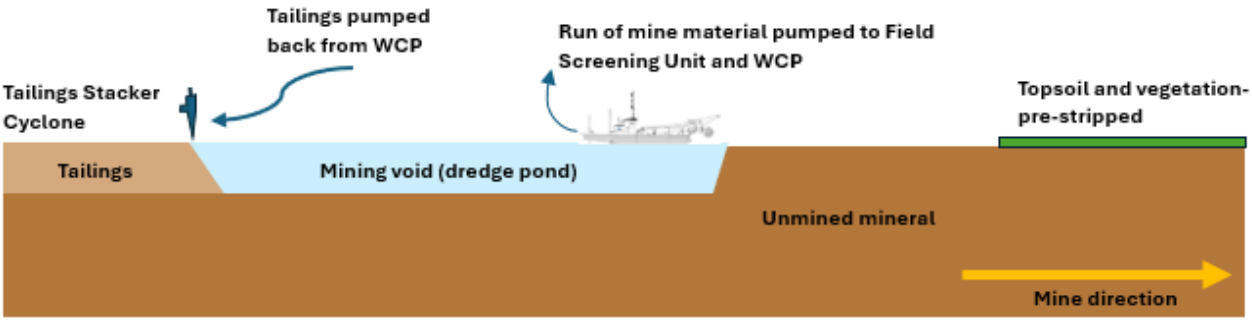

Figure 2: Schematic representation of the mining methodology in profile view

Archaeological Assessment

5.3 An archaeological assessment of the SB has been carried out. The SB was extensively dredged and modified in the 1930's and 1940's and then humped and hollowed for farming purposes. There are two recorded archaeological sites (find spots) within the mining disturbance area. The artefacts from both find spots have been removed and there is no evidence that further features or deposits relating to the site remain in situ. Earthworks on site will proceed under an archaeological authority.

Vegetation removal and wildlife checks

5.4 There are small areas of vegetation located around some creeks, drains and former dredge ponds, which will need to be removed at the same time as topsoil is removed (i.e., 2 – 3 weeks prior to mining). Some of that vegetation has been identified as potential habitat for lizards. In addition, open pasture can potentially be used by breeding birds. **Plan G** shows the waterbodies on site.

5.5 It is proposed to undertake regular surveys of areas scheduled for mining before and during the breeding season to identify any breeding behaviour in the area. Where those surveys identify that nesting is possible, birds will be discouraged from establishing nests through methods such as walkovers, visual cues, audible bird scarers and machinery placement. These actions will be undertaken more frequently and at a greater distance

from the mining front than in traditional mining operations, reflecting the operational requirements and movement patterns of the floating dredge. Where monitoring identifies the presence of Kororā (little blue penguin), relocatable fencing will be erected around the active mining area (including stripped area, mining void, tailings deposition area and contoured land awaiting resowing) to prevent penguin access and minimise risk of harm.

5.6 Lizard monitoring will be undertaken by a suitably qualified ecologist prior to mining an area of potential lizard habitat. If lizards are confirmed to be present, it is proposed to capture and relocate the lizards to suitable habitat as close as practicable to the site, but outside the mining disturbance area.

5.7 Prior to the commencement of any stream diversion or streamworks activities, native freshwater fish present within affected watercourses or wetland habitats will be salvaged and relocated. Similar to any lizards found, salvaged fish will be relocated to suitable habitat as close as practicable to the site but outside the mining disturbance area.

5.8 Once wildlife (if any) has been appropriately managed, any vegetation useful for rehabilitation will be removed. Where it can be, vegetation will be transferred and used as part of the progressive rehabilitation in the planting around creek mouths, diverted creeks or the constructed wetland.

Topsoil and overburden stripping

5.9 Once vegetation has been removed, topsoil (to approximately 0.2 - 0.6m deep) and overburden will be removed 2 – 3 weeks prior to mining, using an 85-tonne excavator and 40 tonne articulated trucks. The area of topsoil and overburden stripping is shown in Figure 1 above.

5.10 Some of the removed material will be used to create small 1m high safety bunds (to prevent vehicles from driving into the mining void and provide stormwater control) along either side of the mining void. The mining void is the area comprising the dredge pond, the area behind the dredge pond for deposit of tailings after processing, and the area in front of the dredge pond from which run of mine material is being extracted. The remainder of the material will be used for rehabilitation. Initially, that material will be stockpiled for later use, but once mining commences fully, it will be trucked to the rear of the mining void to be used as part of the progressive rehabilitation. The safety bunds provide the separation between stormwater and mine water (mine water being water that is being discharged back into the mining void).

5.11 The total area stripped of topsoil and overburden in advance of mining will be approximately 100m x 100m.

Stream diversions/ removal of drains

5.1 Diversions to, and reconstruction of the existing creeks will be required to enable mining Drainage channels across the site will be diverted to enable mining, and will be reconstructed where required to maintain catchment drainage patterns.

5.12 The specific creeks requiring diversion are shown in **Plan G** and are:

(a) Northern Creek;
(b) Central Creek;
(c) Clarke Creek;
(d) Wasabi Creek; and

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(e) Southern Creek.

5.13 Productive farming practices have resulted in a network of drainage channels developed across the site. As mining progresses, these drains will be diverted to avoid the active mining area.

Little Granite Creek runs along the eastern boundary of the site before joining Granite Creek. These two creeks, Little Granite Creek and Granite Creek, will remain undisturbed and are not proposed to be diverted as part of the mining operation. Canoe Creek and Fagan Creek will also remain unaffected by the activity.

5.14 The diversion methodology differs for each creek or artificial drain depending on their orientation, sequence of mining activities and future purpose (in regards to artificial drains these may be retired or a new 'creek' constructed to manage drainage).

(a) North–south oriented creeks and drains will be diverted into a previously mined area before mining reaches the creek or drain (except where mining is adjacent to the coastal setback boundary). This may require adjustments (widening or narrowing) of the mine path to facilitate this. A permanent reconstructed channel will be built in advance as part of the rehabilitation of the mined land, and the flow will be redirected into it in a single 'livening' event. Refer **Figure 3** for further detail.

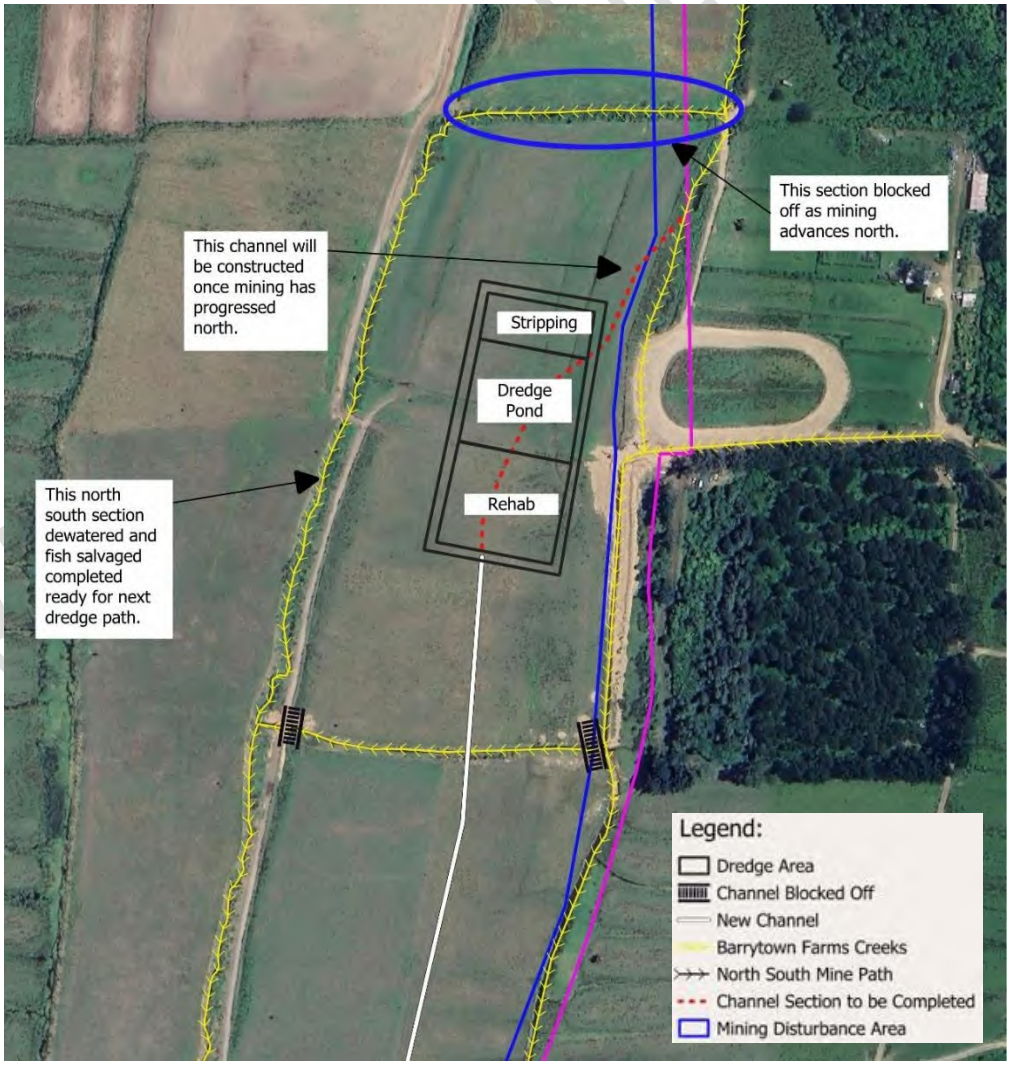
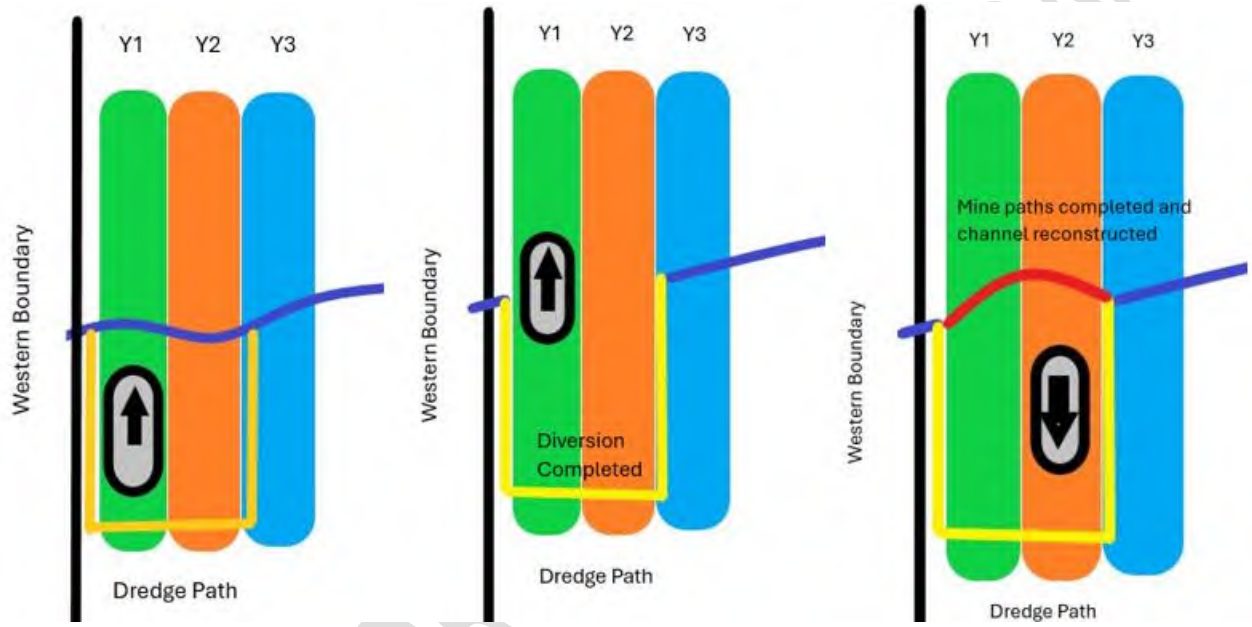


Figure 3: Diversion methodology for north south waterbodies

(b) East–west oriented creeks and drains will be diverted into previously mined areas (behind the mining void) and into the adjacent mine path (to the east as mining moves inland), prior to mining progressing through the creek or drain's existing alignment. This requires a temporary diversion of the creek or drain around the active mining area. Once mining has advanced beyond the alignment, a permanent reconstructed channel can be constructed and the creek, and where required drain, can be reinstated.

Creeks and drains will likely be disturbed several times, with temporary diversions occurring each time the active mining area intersects these waterbodies, potentially once per year for up to 3 months at a time per waterbody. Diverting the creek or drain around two sections of mine path at a time reduces the number of diversions required. Refer **Figure 4** for further detail.



As the dredge approaches the creek or drain, a temporary diversion (shown in yellow) is constructed behind the mining void.

The creek or drain is then diverted into this temporary channel, allowing the dredge to continue along its planned path.

Once the mining void has progressed beyond the proposed reconstructed alignment, the diversion is redirected into the newly rehabilitated channel (shown in red).

Figure 4: Diversion methodology for east west waterbodies

5.15 Fish relocation will be undertaken onsite as part of the diversion process as specified in 4.7.

5.16 The five creeks that will be diverted and mined are Northern Creek, Central Creek, Clarke Creek, Wasabi Creek and Southern Creek. Each of these creeks will be reinstated during progressive rehabilitation. **Table 1** identifies the creeks that are to be diverted, and their pre-mining and indicative post mining lengths. The diversion methodology to be applied has also been identified.

5.17 Some of the original artificial drainage channels may be reinstated, particularly if land contouring alone does not provide sufficient drainage. Creeks and drains will be connected to the constructed wetland area or re-established natural creek systems to support site hydrology and ecological function.

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Table 1: Creek extent pre and post mining

Creek	Length pre-mining (based on continually or intermittent flow extent)	Length post-mining (indicative but not less than the pre-ming length)	Diversion methodology to be applied
Northern Creek	1,088m	1,100m	East West
Central Creek	650m	700m	East West
Clarke Creek	680m	700m	North South
Wasabi Creek	727m	750m	North South / East West
Southern Creek	1,088m	1,100m	East West

Extraction of run of mine material

5.18 Following the removal of topsoil and overburden, the floating dredge can extract the run of mine material (**ROM**) from the newly stripped area from within the mine void without the use of other machinery.

5.19 The floating dredge will sit in a 1ha dredge pond, located in the mining void. The maximum depth of the mining void is 10m, which will maintain a natural water level approximating the ambient water table height. A picture of the type of floating dredge that will be used in the Project is shown in **Figure 5** below.

Figure 5: Floating dredge proposed to be used

5.20 The dredge has a suction cutter at the end of the dredge arm. The suction cutter will excavate the pit face by cutting into the bank and breaking down consolidated material. The loosened material will be drawn in through the suction head below water level, immediately mixed with water taken from the dredge pond to form a slurry and pumped to the field screening unit within the safety bund area.

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5.21 The dredge is capable of precise cutting and will cut slopes at approximately 1 vertical to 3 horizontal (1V:3H), which is consistent with industry standards for cutter suction dredging and provides for stable batters. The presence of water in the mining void provides sufficient pressure to ensure slope stability, as does the progressive tails deposition in the rear of the mining void. Safety bunds around the outside of the mining void will ensure that heavy machinery does not operate on the edge of the mining void, creating pressure on the slopes.

Initial screening of run of mine material and deposit of initial waste materials

5.22 The Field Screening Unit undertakes the initial screening of the ROM. Slurry passes through a trommel (a rotating cylindrical screen), which separates larger, coarser materials and debris (+2mm) from finer particles. Oversized material captured by the trommel is removed from the process stream to prevent damage or blockages in downstream equipment.

5.23 The slurry then enters the desliming circuit, which removes very fine silt and clay particles (referred to, when mixed with water, as "slimes"). By eliminating these particles, the desliming circuit improves the recovery of valuable heavy minerals and reduces the load on the WCP.

5.24 The large reject material from the trommel and the slimes will be returned to the rear of the mining void to be used in the progressive rehabilitation (see Section 7 for further discussion).

5.25 After screening and desliming, ROM is pumped as a slurry to the WCP for further processing.

6. Processing of run of mine material and transportation to market

6.1 Authorisations for further processing and transport are not being sought through this Fast-track application, as they have already been granted (or applications are being processed), as outlined in Sections 1.2 – 1.5. The resource consents and other permissions that have been obtained provide for a full mine to market process that results in finished product being exported to markets around the world. The following information is provided to explain the overall processing methodology and to place the proposed activities within the full operational context.

6.2 Following extraction, ROM will be processed in two stages. The first stage of processing will be undertaken on site at the WCP to extract Heavy Mineral Concentrate (HMC). The HMC will then be transported by truck to the MSP at Rapahoe to undergo the second stage of processing.

6.3 Consent for the MSP at Rapahoe was granted by the Grey District Council in October 2025.

6.4 Consent from the Grey District Council for the establishment, operation and maintenance of the WCP and access road is currently being processed and is expected to be granted prior to lodgment of this application. Consent for the earthworks component of this activity was granted by the West Coast Regional Council in February 2026.

Stage 1 processing - WCP

6.5 Mined ore will be pumped as a slurry from the mining void to the WCP, a fixed processing facility that receives material from mining activities across the resource area. At the WCP, valuable heavy minerals are separated from sand and silt using a water-based gravity

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separation process. This produces three material streams: HMC, middles and tails ('middles' and 'tails' are referred to generically as 'tailings' in this application).

6.6 Tailings are returned to the mining void as slurry, while clean water is managed and reused within the process. The HMC is dewatered to 10-15%, temporarily stored and transported off site by heavy vehicle for further processing at the MSP at Rapahoe.

Stage 2 processing - MSP

6.7 Processing at the MSP enables the extraction of concentrated garnet and ilmenite products.

6.8 The MSP has been strategically located at Rapahoe to ensure proximity to rail where product will be transported in containers to Lyttleton or Timaru Port for export to global markets. Waste material from the MSP (which has come from the SB) will be transported by heavy vehicle back to the WCP at the SB. That material will be deposited within a bunker at the WCP before it is pumped back to the mining void as a slurry to be used to backfill the mine pit for rehabilitation.

6.9 The MSP represents a critical component of the long-term viability and growth of the sand mining industry on the West Coast. The MSP provides significant value-add by enabling on-shore, and in-region, refinement of mineral products prior to export.

7. Management of processing water and stormwater

7.1 Water will be required for the processing of ROM at the WCP. Water used for processing, as well as stormwater captured on the WCP site, will be managed through a MWF located adjacent to the WCP.

7.2 The MWF will include lined treatment ponds and thickener tanks that enable sediment and fine particles to settle out of return water using biodegradable flocculants. Treated (clean) water will be recycled back into the processing system, while settled solids will be combined with tailings and returned to the mine pit as a slurry to support backfilling and rehabilitation.

7.3 The MWF is part of the ancillary infrastructure required to operate the WCP and will be authorised by the consent for the WCP.

Processing water

7.4 Processing water will be sourced from the existing water take location on the CB, unless further investigation identifies a practical alternative water source on the SB through future testing. Consent GDC-3154-23 / WCRC-2023-0046 authorises the abstraction of water for processing CB-mined material at the WCP for a 12 year duration. A new consent is being sought via this application to ensure the water take is available to the newly located WCP, and to support longer-term mining of the SB. It is proposed that the existing consent be surrendered as part of the grant of the new take. The approximate water take location on the CB is indicated on **Plan H**.

7.5 Water taken will be used to fill the ponds at the MWF, storing water for when it is required to be used for processing ROM at the WCP. The peak water take will occur when the WCP is restarted to process material from the SB or following maintenance or shutdowns. This is because the tanks and pipelines of the WCP must be filled with water prior to material being processed. During these periods, the full take of 63l/s will be required, likely over several days.

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7.6 Once processing is underway, water demand will significantly decrease. Water is recycled and reused throughout the plant, reducing the need for a continuous fresh supply. Only intermittent top-ups will be required to offset the water that remains in the HMC, and therefore lost from the site. It is estimated that approximately 10-15% of water drawn from the bore will be retained in HMC. This makes up the largest water loss within the system.

7.7 To compensate, make-up water will be drawn down at an average rate of 9.5l/s for the duration of processing. In practice, make-up water will be taken in short bursts of typically 15-20 minutes at a time, two to three times per day, at the peak rate of 63l/s.

7.8 Tailings will be mixed with water to form a slurry to be pumped back to the mine void. Tailings will be deposited at the rear of the pit by cyclone and the water will re-enter the mine void and rejoin the surrounding hydrological system.

7.9 The slurry circuit (the pumping of ROM to the WCP and tailings back to the mine void, all undertaken as a slurry) is considered to have a largely neutral effect on the water level in the mining void. The water that returns with the tailings help maintain, or even increase, water levels in the void, offsetting any lowering of the water table caused by the removal of the slurry from the mine void.

7.10 The MWF is designed to treat and temporarily hold process water before it is recycled for use in the WCP. After processing, excess water is treated via a thickener tank, which serves as the primary treatment stage. Fines and suspended sediment are separated from the water in the thickener tank. This water then flows into the forebay and ponds for further settling and storage. A flocculant may be added to enhance the settlement of fine particles. Fines and slimes collected in the thickener tank and forebay are pumped back to the mining void and mixed with coarse tailings for use in rehabilitation. Clean water is recycled back into the WCP for reuse in mineral separation processes or for transporting tailings as a slurry back to the mining void.

7.11 There is no discharge from the MWF treatment ponds to any surrounding water bodies. The only discharge is to the mining void.

7.12 If necessary to maintain capacity in the MWF excess water may be pumped back into the mining void to dissipate naturally.

7.13 It is possible that dissolved metals could be liberated and mobilised because of the mechanical processes of mineral separation and sand and slimes deposition during backfilling of the worked excavation. Lime augmentation (i.e. lime dosing) of tailings and slimes at the time of emplacement within the void, and the inclusion of lime boulders in creek reconstruction will mitigate these effects. Both groundwater and surface water quality and quantity monitoring will be undertaken across the site as set out in the Water Management, Monitoring and Mitigation Plan.

Stormwater

7.14 Stormwater captured within the mining disturbance area will be contained on site by the safety bunds constructed on either side of the mining void. It will either be allowed to infiltrate into the sandy subsoils, or directed to discharge into the mining void where there is sufficient capacity for the water to assimilate into the ground water.

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7.15 Stormwater generated in the WCP area, including runoff from roofs, hardstand areas, stockpiles, and processing surfaces, will be collected via a network of drains, bunds and sumps, and directed to the ponds at the MWF. To maintain operational capacity during high rainfall periods, treated stormwater may be pumped to the mining void to dissipate naturally.

8. Rehabilitation and mine closure

8.1 Rehabilitation of the SB will be undertaken in three stages:

(a) Mined land will be progressively rehabilitated as the mining void advances;

(b) Each section will be rehabilitated as it is completed and mining moves to the next section; and

(c) Final rehabilitation and mine closure will be undertaken once mining of the SB is fully completed.

Progressive rehabilitation of mining void

8.2 The total area of disturbed land is proposed to be limited to 16ha within the SB at any one time, for the purposes of mitigating potential effects relating to dust, landscape, visual and sedimentation/ water quality.

8.3 The 16ha limitation for the mining area means that the site will be progressively rehabilitated by filling the mining void with waste material as mining advances, replacing topsoil and re-grassing the mined area. The 16ha limitation is proposed to only apply to those disturbed areas with less than 80% vegetative cover and mined land will be removed from the disturbed area calculation once that level of vegetative cover has been reached. The disturbed area limits include contingency for any periods of slow growth that may occur (e.g. during winter or a cold wet spring).

8.4 Rehabilitation of the mining void will take place at the same time as mining occurs and is expected to be completed within 12 months of the conclusion of mining in that location. The waste material (known as "tailings") produced by the initial screening of raw material at the Field Screening Unit will be pumped back into the rear of the mining void immediately. Any tailings from the WCP will also be pumped back and deposited at the rear of the mining void. Waste material from the MSP that has been transported back to the SB will also be pumped from the WCP to the mining void and deposited with the tailings to assist with rehabilitating the landform.

8.5 The tailings will be deposited at the rear of the mining void using dewatering cyclones which assist in separating water from solids to create a more stable land surface suitable for rehabilitation. The water separated from the tailings as they are dispersed is discharged back into the mining void.

8.6 The material to be returned to the excavated area includes un-mineralised sand, clay slimes, and gravel and rock greater than 2mm. Tailings will be allowed to naturally beach (spread) out. The cyclone will be moved as required to distribute the tailings evenly across the area.

8.7 Tailings will then be levelled and contoured, as per a surveyed final landform design, with the use of excavators and bulldozers ready to receive the pre-stripped overburden and topsoil. This topsoil and overburden, as well as material from outside the mining disturbance area within the wider application area and the bunds as they are retired, will be spread out and used as a growing medium for rehabilitation of the site. Once overburden

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and topsoil are replaced, the land will be re-vegetated with grass and other vegetation that was removed prior to mining, where possible and appropriate.

8.8 Initial vegetative cover will be established as soon as practicable (potentially using hydroseeding) to minimise any erosion potential. This will be followed by the establishment of longer term, permanent pasture species.

Progressive rehabilitation of each section

8.9 As the mining of each section is completed, the section will be rehabilitated to its final landform which includes a proposed wetland of approximately 51.7ha on the eastern boundary of Sections 1 and 2, which will be constructed in stages (addressed in Section 7.17 below).

8.10 Approximately 5.6 million tonnes (equivalent to 2.6 million cubic metres at a bulk density of 2.2 g/cm^3) of HMC will be removed from the mining disturbance area over the life of the project for further processing and export., To achieve the proposed post-mining contours, material will be sourced from areas located outside the mining disturbance area, from the higher terrace, to be used as fill to reconstruct the final landform. When balanced against the available redistribution material, the final change in landform equates to an average reduction in land height of approximately 0.63m across the entire 408ha consent area.

8.11 The western boundary will be returned to its current ground level to minimise any effects from coastal hazards. Restoring this area to its natural elevation maintains the existing buffer between the active coastal environment and the inland mined area and future farmland. This helps to ensure that the rehabilitated land is not at increased risk from coastal hazards such as erosion or ponding from storm surge events.

8.12 The site is naturally wet and exhibits poor drainage, despite the presence of a humped and hollowed landform and an established network of creeks and drains throughout the area. Following mining activities, the site will be rehabilitated to improve drainage and soil conditions, enabling its return to more productive farmland use.

8.13 The final landform will be contoured to slope towards reestablished creeks to improve drainage and ensure the future productive use of the site. The five diverted creeks (Northern Creek, Central Creek, Clarke Creek, Wasabi Creek and Southern Creek – refer section 4.16 – 4.17) will be reconstructed along more natural, meandering paths, as opposed to their straight and rectified channels, to enhance ecological and hydrological values while maintaining current catchment drainage patterns. Post mining creek extent will ensure no loss of extent or value. Some existing drains may be reinstated if contouring alone is insufficient. Some modified humping and hollowing will be incorporated, though it is intended to be less pronounced than the existing humping and hollowing, and will include the raising of the low areas (hollows) above the water table to reduce sediment and nutrient runoff from future farming activity providing long-term ecological benefits and improved drainage across the site.

8.14 Fences, internal farm roads, bridges and culverts will be reinstated as required.

8.15 The anticipated final land contour is illustrated in **Plan I**.

8.16 A Work Programme will be submitted to the Grey District Council and West Coast Regional Council annually, which will specify rehabilitation works to be undertaken in each 12-month

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period. This will include a summary of the rehabilitation completed during the previous 12 months. This is standard practice for mining activities on the West Coast.

Proposed wetland

8.17 The proposed wetland will be constructed in two stages as follows:

(a) The first stage of the wetland will be constructed on Section 1: Granite Creek North, north of Granite Creek and south of the WCP, following completion of Section 1;

(b) The second stage of the wetland will be constructed on Section 2: Granite Creek South, north of Cargill Road and south of Granite Creek, following completion of Section 2.

8.18 The new wetland will be established along the eastern boundary, planted in native species and fenced from stock.

8.19 There will be an increase in the extent and integrity of wetland across the site due to the construction of the new wetland area. Indigenous biodiversity values are expected to increase at the site, including a net gain in wetland area and indigenous vegetation cover.

8.20 The proposed wetland is shown in **Plan J**.

Proposed planting

8.21 The Applicant has engaged Glasson Huxtable Landscape Architects to assess the potential landscape and visual amenity effects of the proposal. The Landscape Assessment identifies areas where current vegetation should be retained and additional planting, associated with the restoration of creeks and construction of the wetland area, is to be undertaken. These plantings have been designed both for ecological and landscape mitigation for the project and will have long term ecological benefits in terms of stream health and habitat for indigenous species.

8.22 Due to the distance of the mining activity from public viewpoints for the majority of its operation, bunding and planting works are restricted to managing the effects of noise. There are four noise bunds also proposed as set out in Section 7.23. Bunds will have an inward facing grassed slope with dense planting on the crest and outward facing slope.

8.23 Planting and bunding includes:

(a) Lot 2 DP2178 bund - 3m high with a 4.8m wide crest (24m width) approximately 500m long;

(b) Warren Road bund – 3m high with a 4.8m wide crest (24m width) approximately 900m long ;

(c) Cargill Road bund - at the eastern edge of the site stretching north – 3m high with a 4.8m crest (24m width) approximately 460m long;

(d) 101 Cargill Road bund – on the western boundary - 3m high with a 4.8m wide crest (24m width) approximately 440m long.

8.24 Retention of key vegetation has been identified at:

(a) Planting clusters near the WCP;

(b) Planting clusters along the eastern application area boundary north of Cargill Road;

(c) Planting patch adjacent to 101 Cargill Road; and

(d) Riparian vegetation adjacent to Granite Creek;

Closure sequence

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8.25 Final rehabilitation of Section 3 (Cargill Road) will occur following the completion of mining activities in this area.

8.26 As progressive rehabilitation will be undertaken across the SB there will be limited final contouring and blending required once mining is complete. Any final contouring/blending at the southern end of the mining disturbance area will use material from within the wider application area as required.

9. Plant and machinery

9.1 The following machinery listed in **Table 2** is likely to be required to undertake mining, pumping and rehabilitation of the site (although specific models may differ).

Table 2: Mining machinery list

Type	Supplier	Model	Number
Bucketwheel Cutter Suction Dredge	Neumann Contractors	Series 350	1
Dozer	Komatsu	D71PX-24	2
Grader	Komatsu	GD655-7	1
Integrated Tool Carrier	Hitachi	ZW220-5	3
Artic 6wd 45 Truck	Hitachi	B45E	3
Excavator (Long stick)	Hitachi	ZX890LCH	2
Excavator (30 or 40 tonne)	Hitachi	ZX345USLC	2
Field Screening Unit (trommel)	Bespoke		1

9.2 Additional mining equipment and vehicles will be used on site, including a variety of pumps (including land-based, floating and submersible) and light 4-wheel drive vehicles for the transport of mining personnel.

10. Site operation

10.1 This section describes how the site will be operated, in terms of hours of operation, site configuration, transport, lighting, dust management and hazardous substances use.

Hours of operation

10.2 Mining activities associated with the extraction of material will be undertaken during daylight hours only, consistent with the existing consent granted for the CB.

10.3 Hours of daylight are between 30 minutes before sunrise to 30 minutes after sunset[1].

10.4 Mining shall not occur between the hours of 0600 and 0700 within 500m of the dwellings located at:

(a) Lot 2 DP2178;
(b) 37, 41, 43 and 50 Warren Road;
(c) 64, 86 and 101 Cargill Road.

10.5 There will be no mining on Sundays.

[1] *Sunrise and sunset times can be found at* https://www.sunrise-and-sunset.com/en/sun/new-zealand/westport/2023/june

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Site configuration

10.6 Access tracks will be required within the mining area. These will be formed to provide light vehicle and machinery access for the preparation, mining and rehabilitation of various areas as mining progresses. These access tracks will move as mining progresses.

10.7 It is proposed to retain the existing access points for farming activities for the duration of the mining activity, to ensure that any ongoing farming traffic is kept separate from the mine traffic.

Vehicle movements

10.8 There are 57 full time staff proposed to be employed across the WCP and wider mine site at the SB. This includes 18 staff to be employed specifically for the mining activity.

10.9 Vehicle movements associated with mining activities are largely generated by the existence of the WCP adjacent to the SB. They will therefore be authorised by the WCP consent.

Lighting

10.10 Due to activities taking place during daylight hours only, only minimal lighting will be required on the mine site and at the mining void.

10.11 There will be limited fixed lighting in the mine area, which may include lighting around the pump to allow for the pump circuit to be checked overnight. Any fixed lighting in the mine area will be shrouded and adhere to the principles outlined below.

10.12 Lighting will not exceed 2.0 lux spill (horizontal and vertical) onto any adjoining property, measured at any point more than 2m inside the boundary of the adjoining property or the closest window on the adjoining property (whichever is the closest).

10.13 All lighting on site will adhere to the Australian Government's National Light Pollution Guidelines for Wildlife January 2023 (or subsequent revision), including but not limited to:

(a) Utilising the Seabird Light Mitigation Toolbox in Appendix G – Seabirds (Schedule 4);
(b) All fixed lighting shall be pointed downward and shielded to avoid light spill, with a lighting temperature of no more than 2000K, and be filtered to reduce blue and violet wavelengths;
(c) Lights shall only illuminate the object or area intended;
(d) Fixed lights shall be mounted as close to the ground as practicable;
(e) External lighting shall use the lowest intensity lighting as possible, while ensuring compliance with workplace health and safety requirements;
(f) External lighting shall be equipped with light minimising technology, including motion sensors or timers;
(g) Mobile lighting within the mine site will adhere to the above principles, including the dipping of headlights of vehicles operating on site.

10.14 Adherence to the above standards will minimise light spill, thereby preserving the natural character and dark night sky of the coastal environment. The measures proposed will also assist in avoiding the risk of adverse effects on the Westland Petrel Colony located approximately 5.5km north of the WCP location. These standards are consistent with the conditions of consent granted for the CB.

Noise

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10.15 Noise will be generated from the activities at the mining void including excavators and front end loaders to strip top soil and overburden, trucks to move material to the rear of the site, the dredge and field screening unit and the spreading of tails from the cyclone.

10.16 Noise generation has been taken into account in the design of the project. Hours of operation control the activity each day. Earthworks near dwellings will be minimised, and noise mitigation bunds will be constructed at four locations as outlined in Section 7.23.

10.17 The site will operate in accordance with a Noise Management Plan, which sets out the management techniques to be applied to ensure that the site operates in accordance with best practice and unnecessary noise generation is minimised by:

(a) Exhaust silencers fitted to all mobile plant;
(b) Power from the grid used in preference to diesel generators where possible;
(c) Vehicles and equipment maintained to avoid unnecessary noise and vibration;
(d) Trucking contractor behaviour expectations including following speed limit; restrictions, no unnecessary sounding of horns or revving of engines, avoidance of engine braking, vehicles to be properly maintained;
(e) Metal to metal contact avoided during the loading of trucks;
(f) No tonal reversing alarms;
(g) Site vehicles to follow speed limits and drive in consistent manner, no amplified music permitted inside vehicle cabs, horns to be used in emergency only;
(h) Access road and working surface maintained free from potholes and corrugations.

10.18 The following noise limits are proposed to apply at or within the notional boundary of any dwelling existing at the date consent is granted on any other site, except in relation to the four dwellings on Warren Road, three dwellings on Cargill Road and at Lot 2 DP2178:

(a) Daytime (0700-2200): 55 dB LAeq (15 min)
(b) Night-time (2200-0700): 45 dB LAeq (15 min) and 75 dB LAFmax
(c) when measured and assessed in accordance with the latest New Zealand noise standards: NZS 6801:2008 “Acoustics – Measurement of environmental sound” and NZS 6802:2008 “Acoustics -Environmental Noise”.

10.19 At some locations, extraction of ore can proceed between 0600 and 0700hrs (classified as night-time under the District Plan) while still complying with the 45 dB L_{Aeq} noise limit.

Dust Management

10.20 Some activities proposed to be undertaken have the potential to generate dust emissions. While the application site is within a high rainfall area, there are periods of dry weather.

10.21 As the mining activity is a wet process dust generating activities will be limited to times of overburden removal and rehabilitation and vehicle movements on site. These activities are intermittent (not always continuous) and can be managed with techniques outlined in the Dust Management Plan. Dust will be managed via visual inspections, use of water carts and other dust suppression techniques as required.

10.22 The Applicant has installed dust monitors on the perimeter of the mine site. These monitoring stations will remain in place for the duration of mining activities on site.

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Hazardous substances use, storage and management

10.23 The refuelling of machinery will be undertaken on site using a mobile fuel tanker with a centralised fuel store located at the WCP (40,000 litres). The proposed above ground tank will be authorised by the WCP consent.

10.24 Re-fuelling will be completed under direct supervision of the machine operator to minimise the risk of spills occurring. Refuelling will occur at least 20m away from waterbodies.

10.25 Mechanical repairs and servicing will occur at the WCP area. In the event of major mechanical break-down, machines may be taken to an off-site workshop. Spill kits and procedures will be available on site in the event of a fuel or oil spill occurring.

10.26 All waste oil and fuel containers will be removed from the site promptly.

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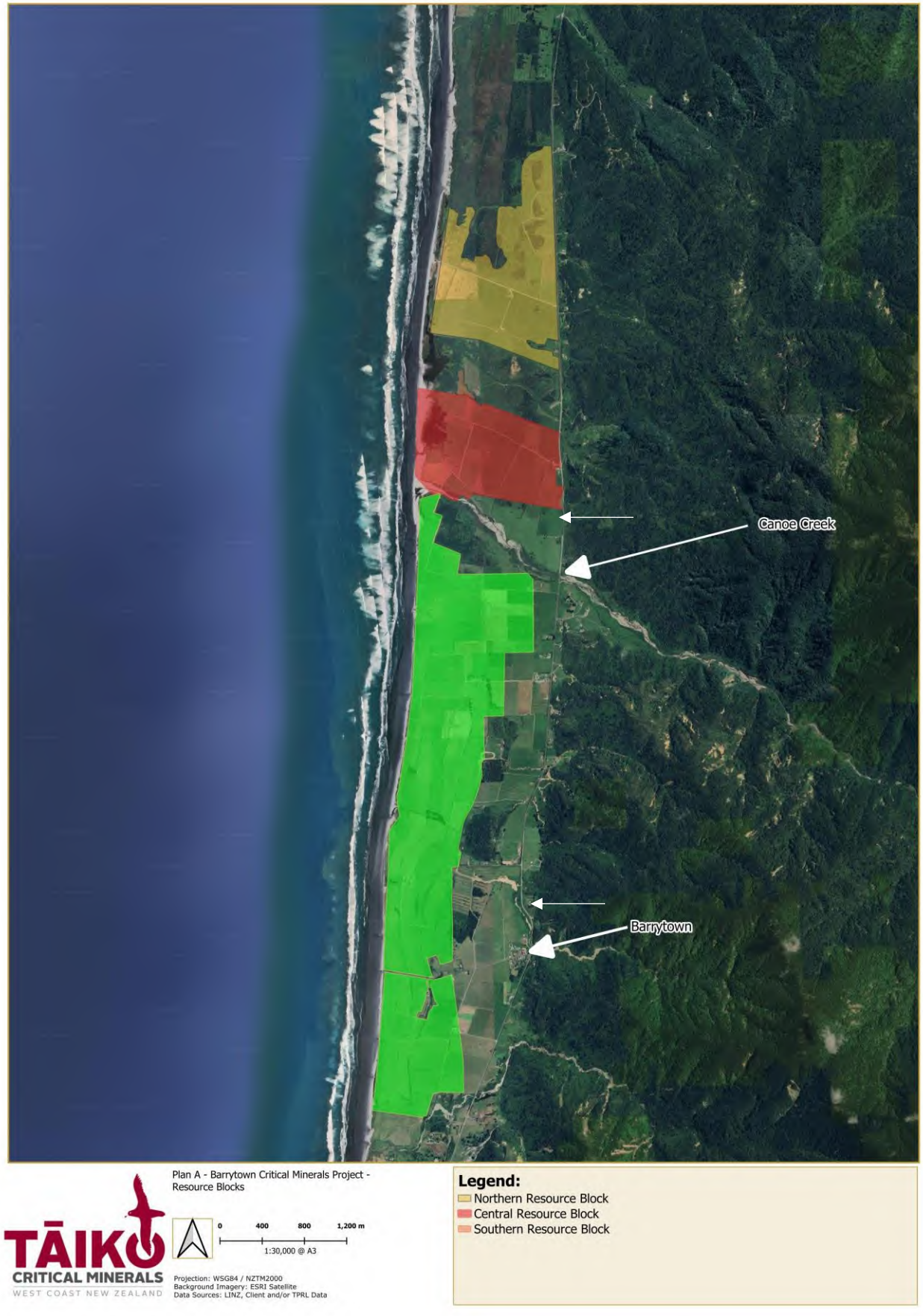
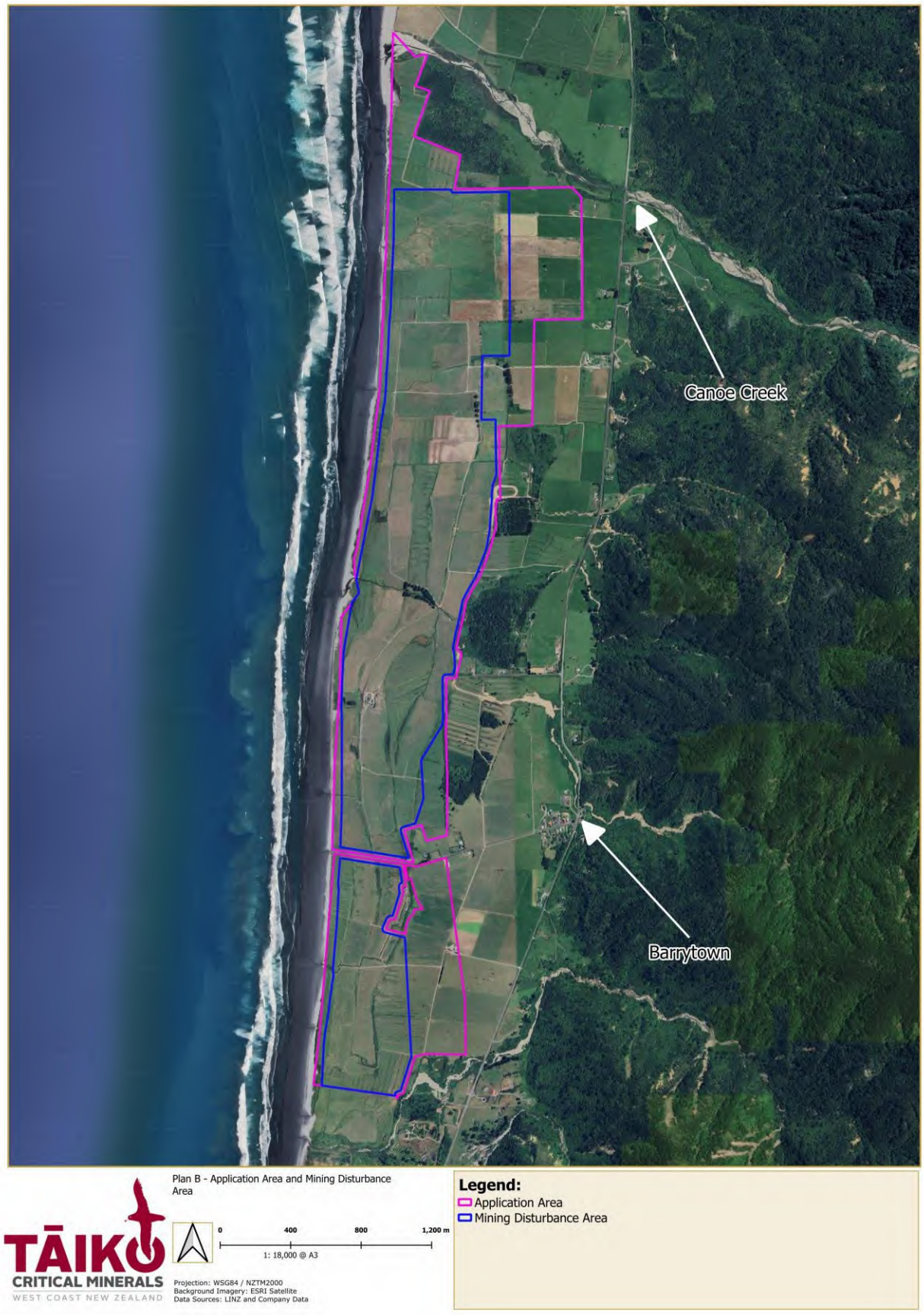
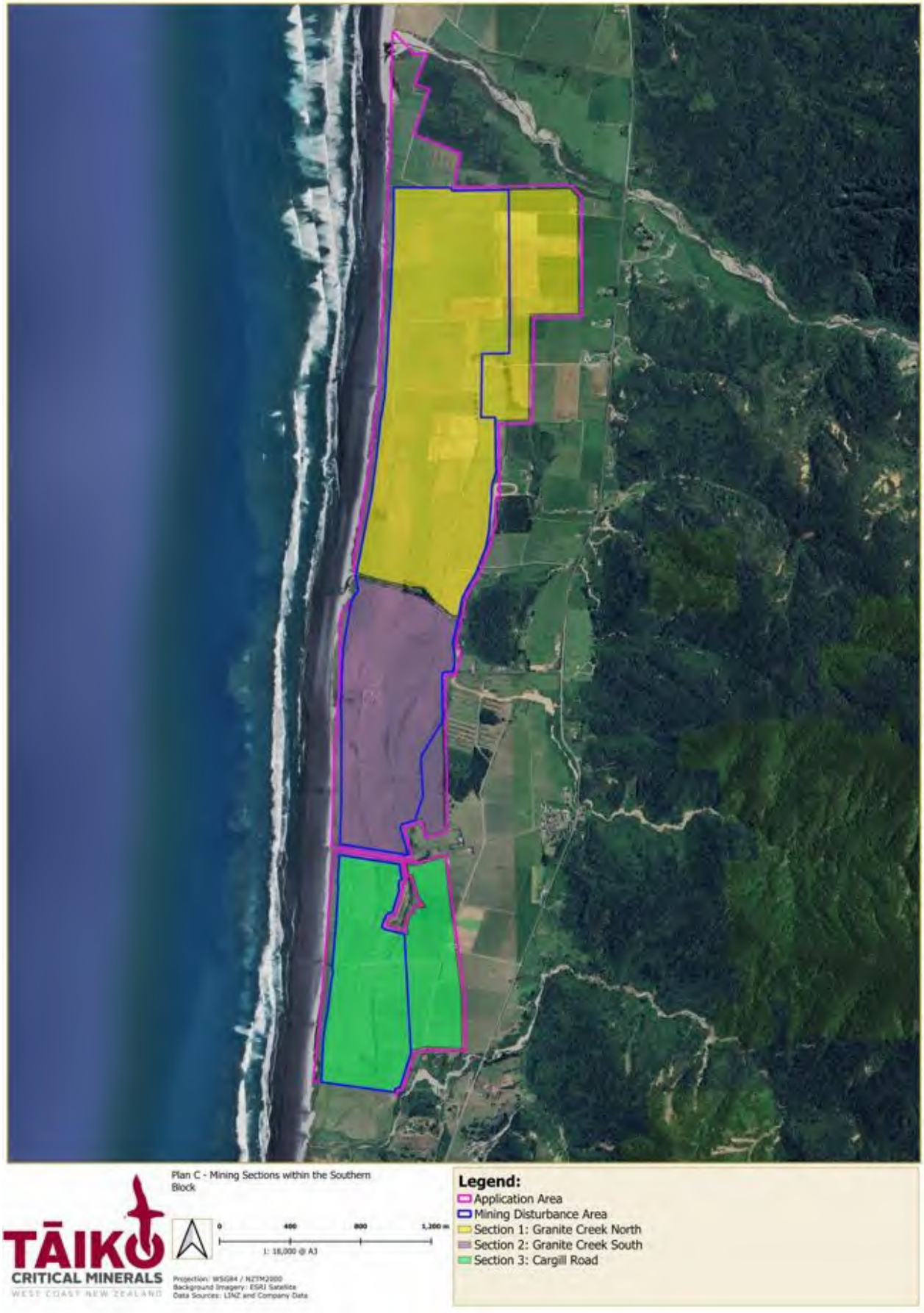
Plan A: Barrytown Critical Minerals Project – Resource Blocks



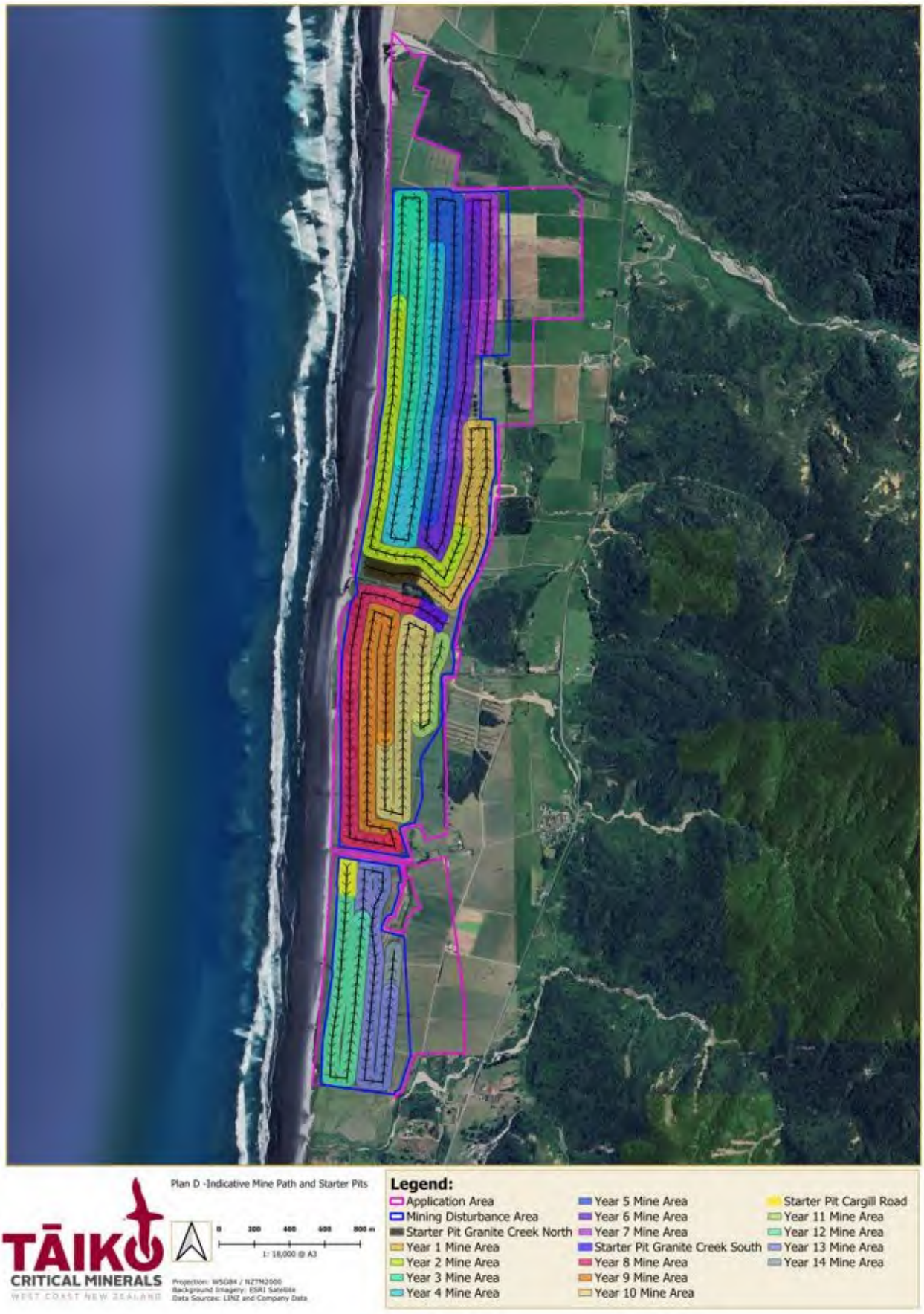
Plan B: Southern Block Application Area and Proposed Mining Disturbance Area



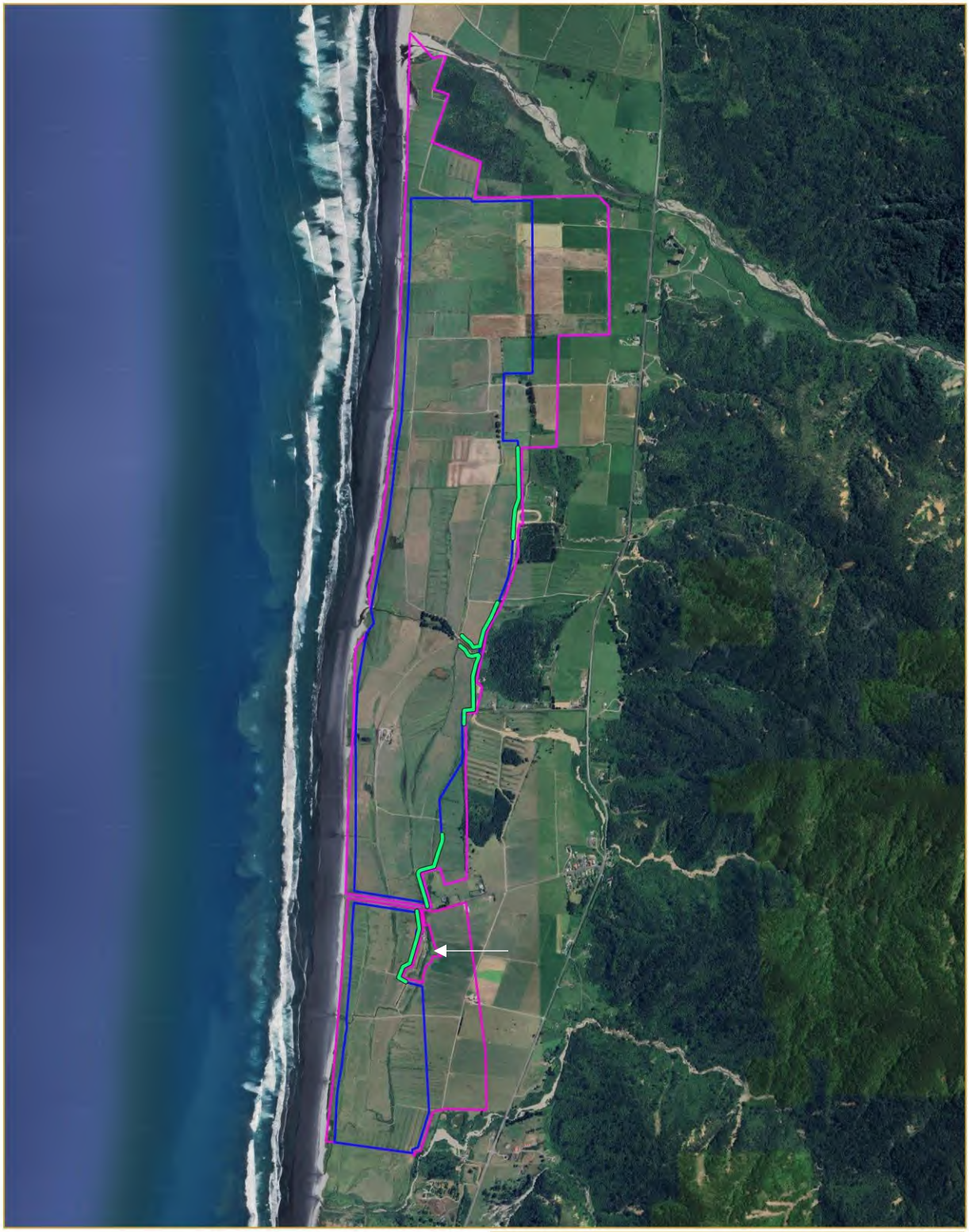
Plan C: Mining Sections within the Southern Block



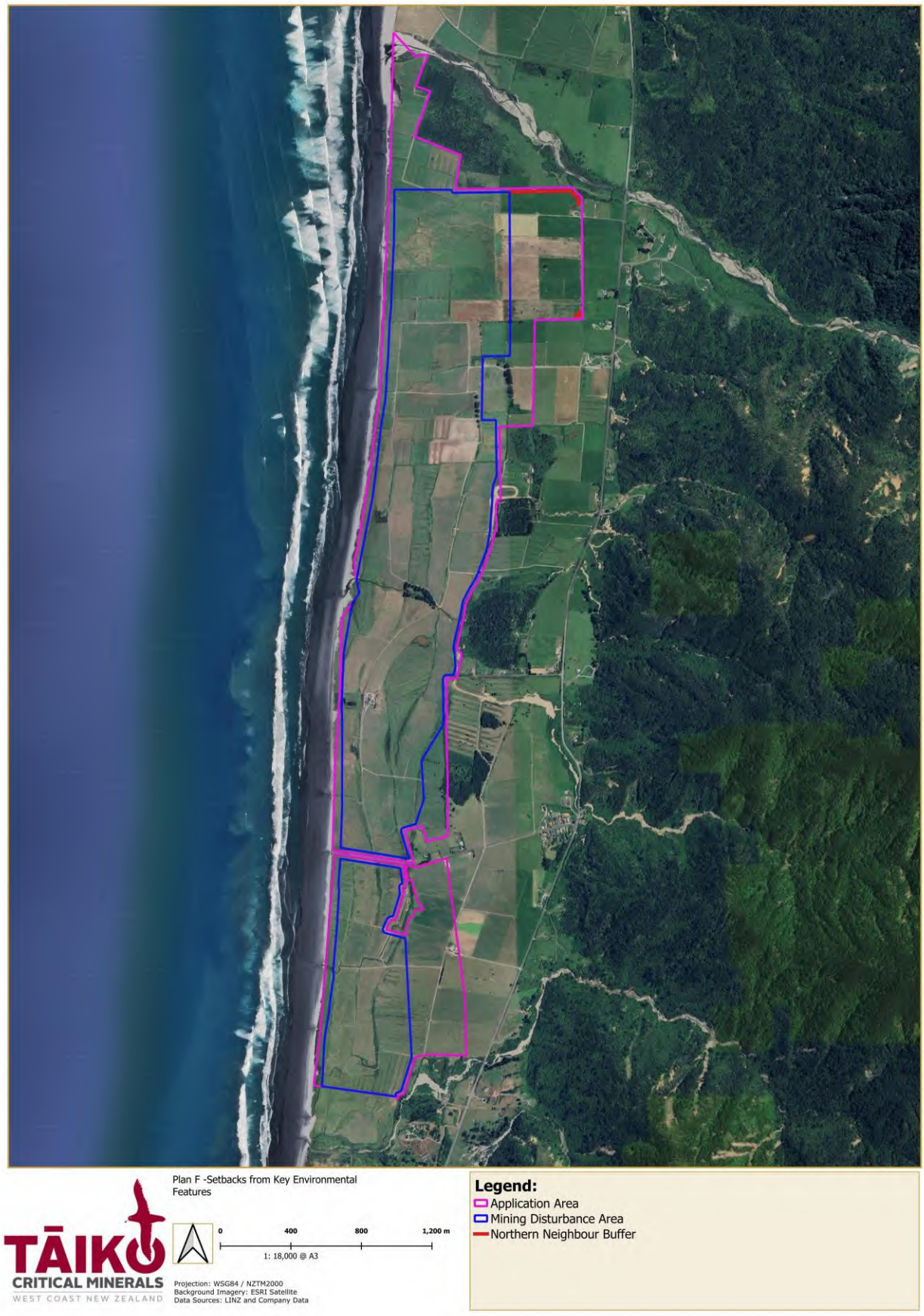
Plan D: Indicative Mine Path Including Mine Starter Pits



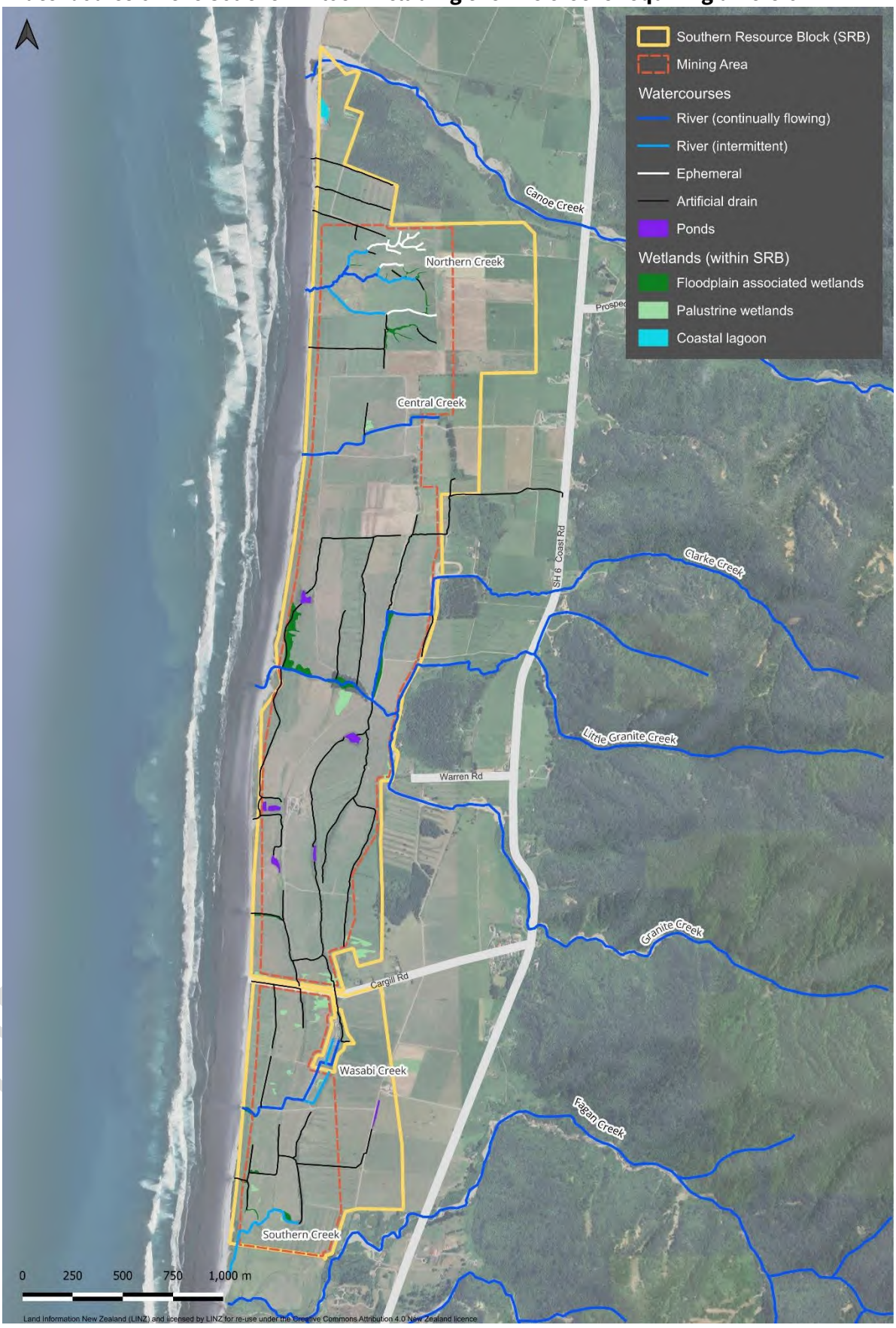
Plan E: Noise Bunds



Plan F: Setbacks From Key Environmental Features

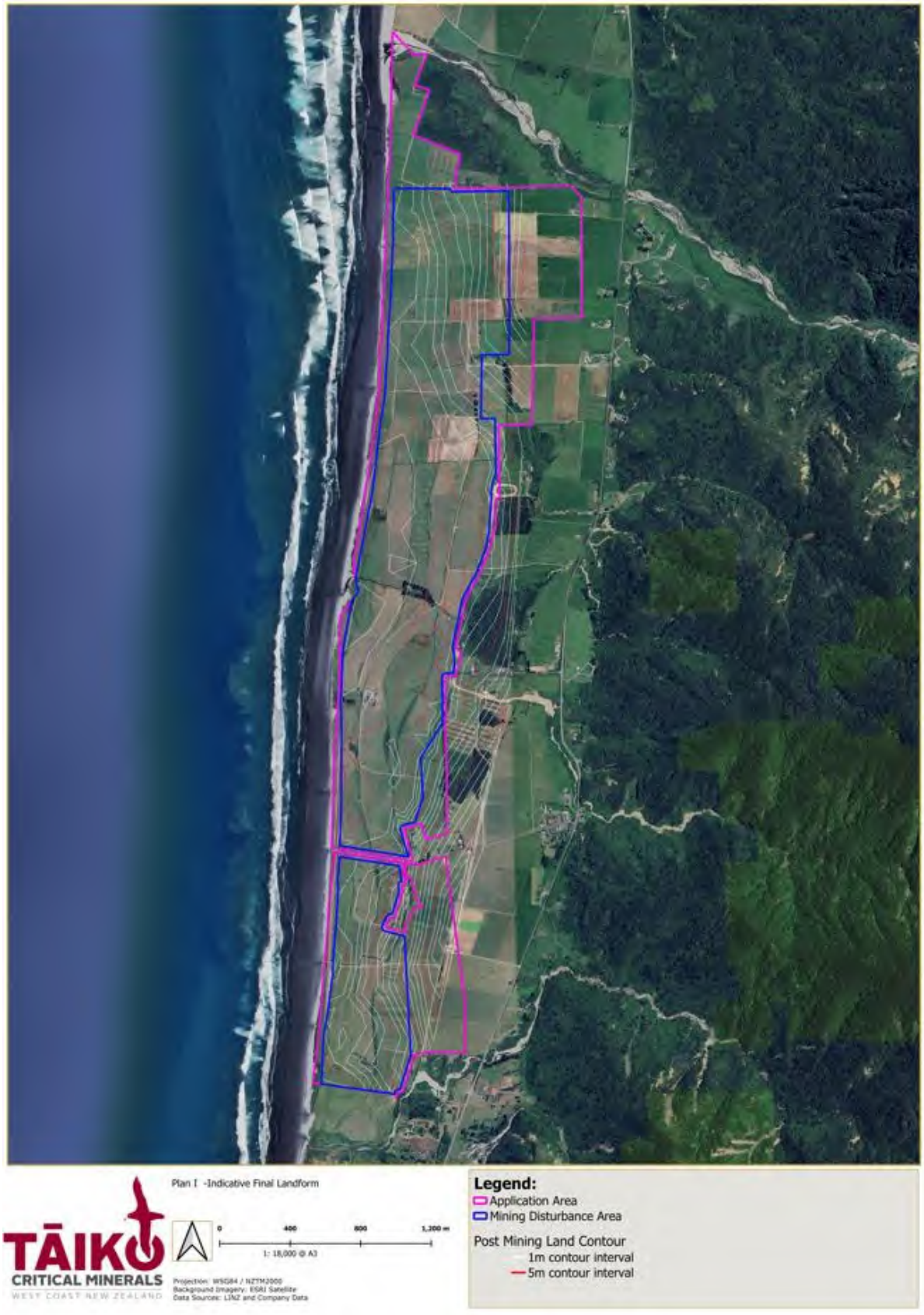


Plan G: Waterbodies on the Southern Block including the five creeks requiring diversion

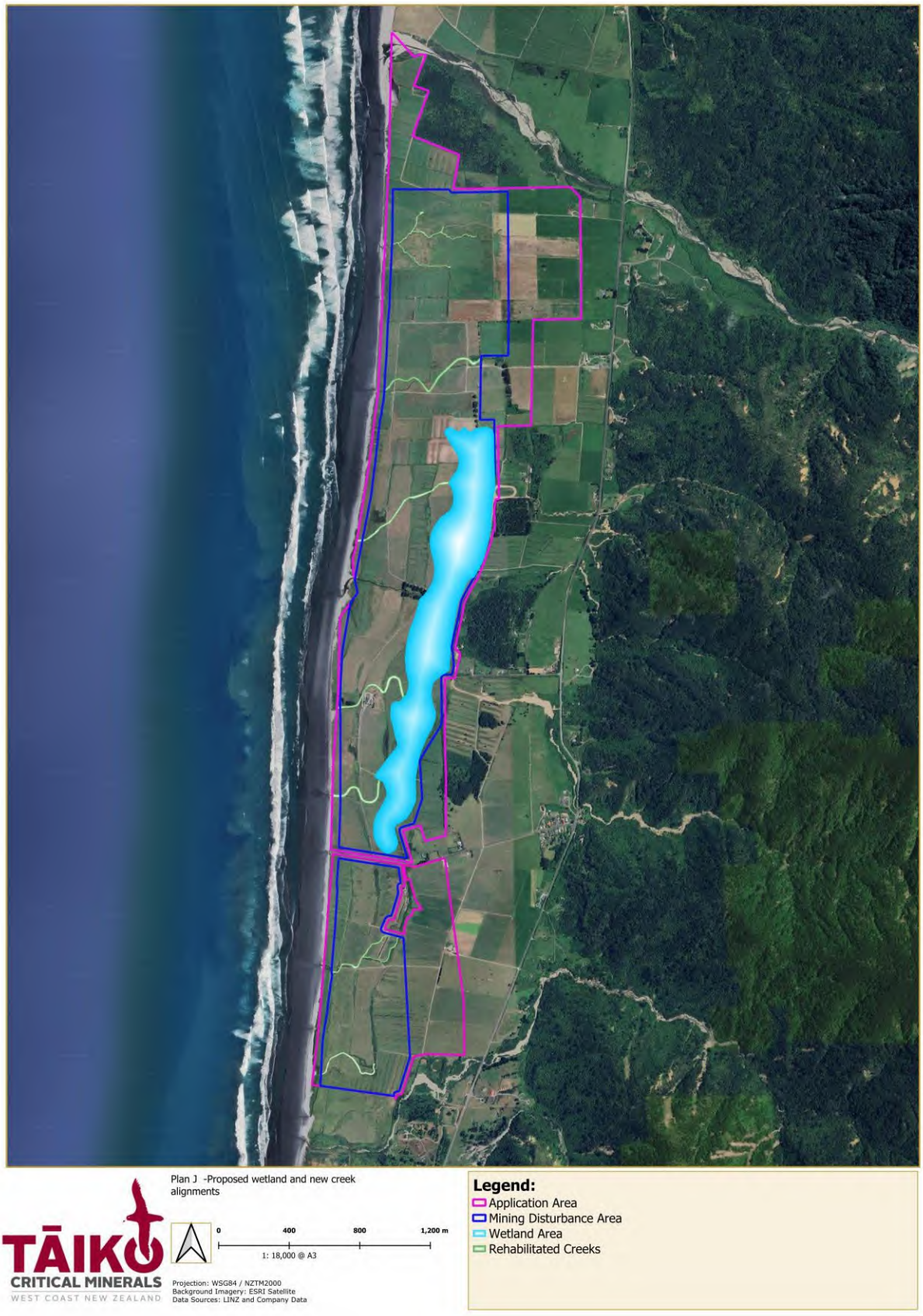


Plan H: Location of Water Take

Plan I: Indicative Final Land Contour



Plan J: Proposed Post-Mining Wetland and Watercourse Rehabilitation Layout



Appendix B

Proposed conditions

Barrytown Critical Minerals Project
Southern Block

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General Conditions for Grey District Council and West Coast Regional Council	
1.0 General	
1.1	The Consent Holder must carry out the mineral sand mining activities in general accordance with the application made through the Fast-track Approvals process, the Site Plan enclosed as Schedule 1 prepared by Tai Poutini Resources Ltd and the following management plans [to be inserted].
1.2	The Consent Holder must ensure all staff and contractors are made aware of, and have access to, the resource consent conditions prior to the commencement of mining. A copy of the resource consent conditions must also be readily available on-site.
1.3	All actual and reasonable costs incurred by the Consent Authorities in monitoring, enforcement and administration of this resource consent must be met by the Consent Holder.
1.4	a. Within 2 months of the commencement of these consents, the Consent Holder must appoint an Accountable Person to be responsible for ensuring compliance with all conditions of these consents. The Accountable Person must be based on-site for a minimum of 4 hours per day, for three days per week. The Accountable Person must: i. Review, submit and ensure compliance with all management plans listed in the conditions of these consents; ii. Ensure there is another person who can provide cover in the event they are sick or unavailable, and to provide for succession ('Nominated Cover Person'); iii. Be the point of contact between the Consent Holder, the Consent Authorities, the Community Liaison Group and the community generally, and pro-actively engage with these parties as required under these consents; iv. Deliver on reporting requirements required by the conditions of these consents. b. The Consent Authorities must be advised of the name and contact details of the Accountable Person and the Nominated Cover Person when they are appointed. In the event that the Accountable Person or Nominated Cover Person change, the Consent Authorities must be notified. A sign must be erected at the property boundary adjacent to the site access road, which provides the name and contact details of the Accountable Person and Nominated Cover Person required to be appointed under sub-clause a
2.0 Notification	
2.1	For monitoring purposes, the Consent Holder must notify the Consent Authorities of the following: a. The intended commencement date of works on-site at least 15 working days prior to commencement of works on-site; and b. The intended completion of final mine closure rehabilitation activities at least 15 working days prior to works ceasing on-site.
3.0 Review of Conditions	
3.1	Pursuant to Section 128(1) of the Resource Management Act 1991, the Consent Authorities may review any of the conditions of these consents by serving notice on the Consent Holder

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	within a period of 60 working days, commencing on each anniversary of the date of commencement of these consents for any of the following purposes: a. To deal with any unanticipated adverse effect on the environment which may arise from the exercise of the consents which is appropriate to deal with at a later stage. b. To assess the appropriateness of imposed monitoring parameters, monitoring regimes and monitoring frequencies and to alter these accordingly. c. To ensure that any management plan required by conditions gives effect to conditions of these consents. d. If the information made available to the Consent Authorities by the applicant for the purposes of applying for consent contained material inaccuracies and the effects of the exercise of the consent are such that it is necessary to apply more appropriate conditions.
4.0 Bond Conditions	
4.1	The Consent Holder must provide and maintain in favour of the Consent Authorities (the West Coast Regional Council and the Grey District Council [jointly for their respective interests]) a bond or bonds related to mine closure activities required by these consents.
4.2	The payment of the bond quantum by the Consent Holder, as required by Condition 4.5 must either be: a. A bond in favour of the Consent Authorities for the guarantee sum in a form and executed by a surety acceptable to the Consent Authorities; or b. A cash bond deposited with and held in a bank account by the Consent Authorities.
4.3	Where a bond is guaranteed in accordance with Condition 4.2 a., the guarantor must bind itself to pay up to the bond quantum for the carrying out and completion of all obligations of the Consent Holder under the bond.
4.4	The bond (as set at any time under Condition 4.1) must be held or remain in full force and effect throughout the term of these consents until all conditions under these consents have been performed unless otherwise agreed by the Consent Authorities.
4.5	a. The bond quantum must be $300,000. b. The method for arriving at the bond quantum does not limit the scope of the bond, which is set by Condition 4.1.
4.6	The provisions of Section 109 of the Resource Management Act 1991 must apply to any bond, or bonds, required pursuant to the above and must not be limited by the details of the bond instrument.
4.7	The amount of the bond may be inflation adjusted annually, if requested by the Consent Authorities, by the movement of the CPI relative to the CPI at the date when the bond is first provided.
4.8	The Consent Holder must not exercise these consents:

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	a. Until the bond required by Condition 4.1 has been fully executed by the Consent Holder and guarantor, or has been deposited with the Consent Authorities, or b. In respect of any inflation adjusted bond referred to in Condition 4.7, after 30 working days have expired from the date the Consent Holder was notified of the terms of the inflation adjusted bond by the Consent Authorities unless the inflation adjusted bond has been executed with the Consent Authorities by the Consent Holder and guarantor, or has been deposited with the Consent Authority; or c. In respect of any bond sum changed or reviewed pursuant to Sections 127 or 128 of the Act, after thirty 30 working days have expired from the date the Consent Holder was notified of the decision of the changed or reviewed bond by the Consent Authorities unless the changed or reviewed bond has been executed with the Consent Authorities by the Consent Holder and guarantor, or has been deposited with the Consent Authorities, or d. If, during the term of these consents, the whole or any part of the bond is required to be used for the carrying out and completion of all obligations of the Consent Holder under the bond, unless the full bond has been executed with the Consent Authorities by the Consent Holder and guarantor, or has been deposited with the Consent Authorities.
4.9	The Consent Holder must complete such work requested in respect of which any bond or deposit is held, within the time period nominated by the Consent Authorities' written request.
4.10	If the consents are transferred in part or whole to another party or person, the bond must continue until any outstanding work at the date of transfer is completed to ensure compliance with the conditions of these consents, unless the Consent Authorities are satisfied adequate provisions have been made to transfer the liability to the new Consent Holder.
4.11	In the event of any such transfer of the consents, the Consent Holder must ensure that the transfer provides a replacement bond to the Consent Authorities on the terms required by the Bond Conditions.
4.12	The Consent Holder must meet the costs of providing any bond, or bonds, including the costs of the bond and any substitute bond. ***Advice Note:*** • *The Consent Authority will release the bond upon the closure of the mine if all conditions of consent have been complied with to the satisfaction of the Consent Authorities.*
5.0 Annual Work Programme	
5.1	At least 20 working days prior to mining activities commencing and thereafter on or before the anniversary date of the mining activities commencing, the Consent Holder must submit a programme of work ("Annual Work Programme") for certification by the Consent Authorities detailing: a. The proposed works to be carried out over the next 12 months including: i. Equipment to be used; ii. Areas of topsoil and overburden stripping and stockpile locations; iii. New areas of land disturbance that will be mined; iv. Access tracks;

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	v. Drilling or prospecting sites and other tracks to be constructed; vi. Native freshwater fish capture and relocation plan and any other wildlife management required (lizards and birds); vii. Proposed location, and relocation, of the penguin fence; and viii. Any other site works within the consent area. b. The approximate open volume of the mining void at the start of the year including the depth of excavations and the area of the mining void. c. Extent of creek diversions and reclamations. d. The progressive rehabilitation works to be carried out over the next 12 months including: i. Areas of unrestored land (i.e. any land not finally topsoiled and revegetated) at the beginning of the 12-month period; ii. The area that will be fully rehabilitated during the forthcoming 12-months; iii. Maximum slope angles, bench heights and widths of recontoured ground, if applicable; iv. Rehabilitation methods and techniques including replacement of topsoil and vegetation cover with seed collection and plant procurement details; d. Description of measures to prevent adverse effects on natural waterbodies, including drainage works within the consent area, and the collection and treatment of site run-off; e. Measures to ensure soil conservation; f. A description and analysis of any unexpected adverse effects that have arisen as a result of activities within the last 12 months, the steps taken to address those adverse effects and measures implemented to avoid a repeat occurrence of them.
5.2	The following plans, reports and results of monitoring must also be submitted as part of the Annual Work Programme: a. A detailed plan or aerial photograph showing: i. The open working area at the start of the year; ii. Proposed mine path for the forthcoming year including haul and access roads; iii. Rehabilitated ground behind the mining void area; iv. Location of existing and intended topsoil or overburden dumps and their dimensions; v. Location of natural surface water bodies; vi. Proposed diversions of water bodies, location of fish diversions and reclamations of creeks; vii. Location of present and intended drainage works and settling ponds; and viii. Any other site works within the consent area. b. A Site Specific Erosion and Sediment Control Plan in accordance with Condition 18.2. c. Results of surface water quality, surface water flows, and groundwater level monitoring from the previous 12 months in the form of an Annual Hydrological and Water Quality Report required by Condition 24.5. d. Any proposed updates to management plans submitted in accordance with the respective conditions of consent.

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	e. Results of any previous dust monitoring required by Condition 26.3.
5.3	The Consent Holder must provide the Consent Authorities with any further information, which the Consent Authorities may reasonably request after considering any Annual Work Programme. This information must be provided within 5 working days of any request from the Consent Authorities.
6.0 Management Plans	
6.1	At least 20 working days prior to undertaking any activities authorised by these consents, the Consent Holder must submit the following management plans to the Consent Authorities for certification: a. Noise Management Plan b. Avian Management Plan c. Lizard Management Plan d. Native Freshwater Fish Capture and Relocation Plan e. Dust Management Plan f. Rehabilitation Management Plan g. Water Management Plan h. Erosion and Sediment Control Plan i. Landscape Planting Plan j. Lighting Management Plan Advice Notes: • These are collectively referred to as 'Management Plans'. • Where a plan requires the input of an appropriately qualified professional, the Consent Authorities may engage an appropriately qualified person to peer review the plan as part of the certification process.
6.2	a. The purpose of the Management Plans is to implement the relevant conditions of these consents. All Management Plans must include (where relevant): i. The purpose/objective of the plan; ii. Reference to the conditions of these consents that the management plan implements; iii. How each of the relevant conditions have been given effect to; iv. Procedures for implementing the relevant plan; v. Plan auditing check lists; vi. Monitoring programmes and/or monitoring protocols; vii. Feedback mechanisms for adaptive management, including circumstances in which a material change to the management plan would be required; viii. An organisational chart showing staff and contractor positions and responsibilities for plan implementation; ix. Relevant training and induction procedures and training schedules; and x. Reporting procedures and format for providing the results of any monitoring or surveys required by the plan. b. Where plans require the input of an appropriately qualified professional, the Consent Holder must engage an appropriately qualified person to prepare the Plan.
6.3	Site activities must not commence until the Management Plans listed in Condition 6.1 have been certified by the Consent Authorities.

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6.4	a. If the Consent Holder has not received a response from the Consent Authorities within 20 working days of the date of submission of a management plan under Condition 6.1, the management plan must be deemed certified. b. If the response from the Consent Authorities is that they are not able to certify the management plans, the Consent Holder must consider any reasons and recommendations provided by the Consent Authorities, amend the management plan accordingly, and resubmit the management plan to the Consent Authorities.
6.5	The Consent Holder may amend a management plan at any time to take into account: a. Any positive measure/s to ensure the stated objectives of the management plan are achieved; b. Any changes required to further reduce the potential for adverse effects as a result of actions identified in the Annual Work Programme; and c. Any required actions identified as a result of monitoring to address a. or b. Where the preparation of a management plan required the input of an appropriately qualified person, any amendment to that management plan must also be undertaken by an appropriately qualified person. Advice Note: • *Some management plans have ongoing annual review requirements which are required in order to manage effects. These specific review requirements are stipulated in the relevant conditions of this consent.*
6.6	Any amended management plan must be provided to the Consent Authorities within 20 working days of its review, for recertification in accordance with Condition 6.1. Advice Note: • *The Consent Authorities may engage an appropriately qualified person to peer review the amendments.*
6.7	A management plan may only be amended in a way that is consistent with, and does not contravene, the conditions of these resource consents.
6.8	A copy of the latest version of the certified Management Plans must be kept on site at all times and all personnel must be made aware of each Plan and their responsibilities under each Plan.
6.9	Subject to any other conditions of these consents, all activities must be undertaken in accordance with the latest version of the certified Management Plans.
7.0 Method of Operations	
7.1	a. The mine boundaries must be clearly marked on the ground as per Schedule 1 before any earthworks take place, with the following setbacks applied: i. 20m from the consent boundary; ii. 20m from Granite Creek iii. 20m from Fagan Creek;

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	iv. 50m from the mean high water spring v. 20m from the proposed SNA PUN-049; vi. 20 from all private property boundaries not within the consent area as shown on Schedule 1; vii. 200m from dwellings other than where noise bunds are proposed.
7.2	The maximum area of site disturbance must not exceed 16.0 hectares at any one time. Advice Note: • *The disturbed area includes the stripped area ahead of mining, mining void and active rehabilitation areas.*
7.3	a. The Consent Holder must strip soil material ahead of mining operations and stockpile it for progressive and final mine closure rehabilitation purposes. b. Stockpiled soil must be protected from erosion caused by water and wind as far as practicable.
7.4	The Consent Holder must not bury any topsoil or soil material suitable as a growing medium or remove it from the site.
8.0 Hazardous Substances	
8.1	a. Refuelling, lubrication and mechanical repairs of equipment and storage of hazardous substances and dangerous goods must be undertaken in such a manner that ensures spillages of hazardous substances or dangerous goods onto the land surface or into a waterbody do not occur, including that refuelling must not occur outside the mining area or within 20 metres of a water body. b. Any accidental discharge of greater than 20 litres of fuel, oil or hazardous substances must be reported immediately to the Consent Authorities along with details of the steps taken to remedy and/or mitigate the adverse effects of the discharge.
8.2	All contractors and/or operators transporting or storing more than 20 litres of fuel, oil or hazardous substances must carry spill kits to contain any fuel, oil or hazardous substances discharges on-site.
8.3	A list of all hazardous substances and dangerous goods stored or used on site must be maintained on site at all times showing the location of the storage and use.
8.4	The Consent Holder must undertake quarterly systematic testing of the heavy minerals concentrate from within the active mining area to confirm that the concentrate remains below the acceptable level of radioactivity concentration limits as specified in Schedule 2 of the Radiation Safety Act 2016. Copies of the independent test results must be submitted to the Consent Authority within 10 working days of receipt of the results. Advice Note: • *If material meets the criteria in Schedule 2 of the Radiation Safety Act 2016, the extraction, processing and transport of heavy minerals concentrate will require a Source Licence under this Act, and may possibly require a radiation safety plan as per section 18 of the Act.*

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8.5	In the absence of any extant and current New Zealand Code of Practice for handling naturally occurring radioactive materials, the Consent Holder must carry out all activities on site in accordance with the Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing Code of Practice and Safety Guide published by the Australian Radiation Protection and Nuclear Safety Agency. Advice Note: • *The Code of Practice within this consent condition requires that if radiation levels exceed 1Bq/g, the relevant authority must be notified, which differs from state to state. In the New Zealand context, the relevant body to notify is the Office of Radiation Safety.*
8.6	a. The Consent Holder must maintain radiation monitoring devices in the locations specified in the Dust Management Plan. Data from the radiation monitoring devices must be collected and analysed once every three months. Copies of the test results must be submitted to the Consent Authorities with 10 working days of receipt of the results. b. If the radiation monitoring devices record radiation levels exceeding the equivalent of 1 mSv (millisievert) above background levels over 12 months (i.e., the sum of results from the past four device readings at each location minus background levels established prior to the activity commencing), then the Radiation Safety Act 2016 applies, and the Consent Holder must: i. inform and consult the Office of Radiation Safety, New Zealand Ministry of Health; and ii. carry out all activities on site in accordance with the Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing Code of Practice and Safety Guide published by the Australian Radiation Protection and Nuclear Safety Agency (or any subsequent revision).
9.0 Rehabilitation and Rehabilitation Management Plan	
9.1	The Consent Holder must carry out progressive rehabilitation, to achieve the following requirements: a. Reinstatement of productive pasture; b. Reinstatement of existing creek and drainage patterns to reflect pre-mining catchment areas ensuring no loss of extent, with appropriate riparian planting, in accordance with the Rehabilitation Management Plan; c. Construction of wetland and riparian areas in accordance with the Rehabilitation Management Plan;
9.2	At the completion of mining (final mine closure), the mine area must be fully rehabilitated, by reinstating the productive pasture in general accordance with the Rehabilitation Management Plan. The objectives of the Rehabilitation Management Plan are: a. To create a final landform with a similar contour and profile at final mine closure as that which existed prior to mining but with improved drainage across the site; b. To establish vegetation cover on all areas disturbed by mining activity; c. To protect freshwater values associated with natural waterways in accordance with the Rehabilitation Plan; and

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	d. To construct and establish a permanent wetland area that contributes to ecological enhancement, hydrological function and landscape integration at final mine closure. Advice Notes: • *Final mine closure is the completion of all mining and progressive rehabilitation works.* • *All Management Plans are required to adhere to the requirements of Condition 6.0.*
9.3	The Rehabilitation Management Plan must include the following: a. A programme of progressive rehabilitation of the pre-mining landform, adhering to maximum disturbed area limits. b. The original and final mine closure land contours. c. Contouring of all post-mining landforms. d. Establishment of pasture cover over all disturbed land. e. Restoration of diversion discharge channels. f. Construction and planting details for the constructed wetland area. g. Erosion and sediment runoff control measures. h. Removal of equipment; and i. Post-mining weed and pest control requirements.
9.4	If for any reason active mining ceases for more than 6 months, operational stockpiles must be removed and the stockpiled material returned to the mining area, and all disturbed areas must be rehabilitated as required by the conditions of these consents within 12 months from the date of the last mining activity.
10.0 Complaints and Non-Compliance	
10.1	The Consent Holder must maintain a complaints register for all aspects of operations in relation to these consents. The register must be available to the Consent Authorities at all times and must detail: a. the date, time and type of any complaint; b. the cause of the complaint; and c. any action taken in response to the complaint.
10.2	Upon receipt of any complaint, the Consent Holder must promptly investigate the complaint, take action to remedy or mitigate the cause of the complaint and within 24 hours inform the Consent Authorities of the details of the complaint and any action taken.
10.3	Complaints which may infer non-compliance with the conditions of these consents, must be referred to the Consent Authorities within 48 hours of their receipt.

10.4	a. The Consent Holder must immediately notify the Consent Authorities upon becoming aware of any non-compliance with the conditions of these consents b. Within 5 working days thereafter the Consent Holder must provide written notification to the Consent Authorities which explains the cause of the non-compliance, and if the cause was within the control of the Consent Holder, steps which were taken to remedy the non-compliance and steps which will be taken to prevent any further occurrence of non-compliance with the conditions of these consents. Advice Note: • *This consent condition does not replace the compliance and enforcement responsibilities of the Consent Authorities.*
Grey District Council Conditions	
11.0 Hours of Operation	
11.1	a. Mining, overburden and topsoil stripping, bund development and any related activities must not operate during the hours of darkness. For the purpose of this condition, hours of darkness are between 30 minutes after sunset to 30 minutes before sunrise. b. Mining shall not occur between the hours of 0600 and 0700 within 500m of the dwellings located at Lot 2 DP2178, 23, 37, 41, 43 and 50 Warren Road, and 64, 67, 86 and 101 Cargill Road. c. Mining shall not be undertaken on Sunday. Advice Notes: • *Sunrise and sunset times can be found at https://www.sunrise-and-sunset.com/en/sun/new-zealand/greymouth* • *In addition to Condition 12.1, further restrictions on noise are contained in Conditions 13.1 – 13.4 Noise.*
11.2	Mining shifts must operate only during the hours of daylight.
12.0 Noise	
12.1	The consent holder shall ensure that all operational mining activities on site do not exceed the following noise limits at or within the notional boundary of any dwelling: a. Daytime 0700 to 2200 55 dB L_{Aeq}(15 min) b. Night-time 2200 to 0700 45 dB L_{Aeq}(15 min) and 75 dB L_{AFmax} when measured and assessed in accordance with the latest New Zealand noise standards: NZS 6801:2008 "Acoustics – Measurement of environmental sound" and NZS 6802:2008 "Acoustics -Environmental Noise". Advice Note: • *'Notional boundary' is defined as a line 20 metres from any side of a dwelling or the legal boundary where this is closer to the dwelling.*

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12.2	Construction activities must be conducted in accordance with NZS 6803: 1999 "Acoustics - Construction Noise" and must comply with the "typical duration" noise limits contained within Table 2 of that Standard. Advice Note: • *Construction activities include the formation of access roads, bunds, land contouring and planting. For the avoidance of doubt, overburden stripping and topsoil removal associated with mining operations must not be considered construction activities.*
12.3	The Consent Holder must prepare a Noise Management Plan (NMP) to control day-to-day noise emissions from the site. This NMP must be submitted to the Consent Authority for certification 10 working days prior to commencement of the commencement of on-site works. As a minimum, the NMP must include: a. The person responsible for implementing the NMP b. Applicable noise conditions relating to noise c. Training of staff relating to how to minimise noise and vibration d. Mining risk analysis for noise generation e. Method for handling noise complaints f. Noise monitoring methodology, including frequency, duration, and location. Advice Note: • *All Management Plans are required to adhere to the requirements of Condition 6.0.*
12.4	a. The Consent Holder must engage a suitability qualified and experienced acoustic consultant to undertake compliance noise monitoring within 30 days of mining or processing operations occurring and thereafter at 3 monthly intervals for the first 12 months of the mining operation. Thereafter, compliance noise monitoring must be undertaken on an annual basis. b. All noise monitoring must be submitted to the Consent Authority within two weeks of completion of each monitoring event. c. If compliance with Condition 13.1 is not achieved, the Consent Holder must: i. investigate the reasons for non-compliance and within 20 working days implement additional mitigation measures to achieve compliance with those noise limits. ii. submit a report to the Consent Authority within 30 working days of the relevant monitoring event detailing the additional mitigation measures that were implemented. d. If additional mitigation measures are implemented, the Consent Holder must engage a suitability qualified and experienced acoustic consultant to undertake further compliance noise monitoring within 10 working days of any mitigation measure being implemented to determine the effectiveness of that mitigation.

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	e. If compliance with Condition 13.1 is still not achieved the Consent Holder must repeat the requirements of c. and d. until compliance is achieved.
12.5	Mining operations must utilise the best practicable option to minimise noise at all times. This includes: a. Replacement of worn machinery parts, maintenance of mufflers, lubrication of moving machinery to avoid squeaks and squeals, and appropriate operation of all equipment. b. Vehicles or equipment must not be fitted with tonal reversing alarms. c. Where reversing alarms are required, broadband reversing alarms must be used.
13.0 Avian Management	
13.1	a. Prior to and during each breeding season, the Consent Holder shall undertake regular surveys of all areas scheduled for mining to identify any bird breeding or nesting activity. Where surveys indicate that nesting is likely to occur, the Consent Holder shall implement appropriate deterrence measures, including walkovers, visual cues, audio bird scarers, and strategic placement of machinery, to discourage birds from establishing nests. Advice Note: • *Conditions relating to the Avian Management Plan are Conditions 13.7 – 13.9.*
13.2	Staff, contractors and visitors associated with the mining activity must not be permitted to bring dogs to the site at any time, except for conservation purposes.
13.3	a. The Consent Holder must deploy wildlife cameras at low spots and creek mouths along the coastal edge of the mine disturbance area as required to monitor for Kororā at locations likely to experience activity as determined by a suitably qualified ecologist and set to record for at least 10 nights every month. b. The cameras must be equipped with motion sensors and be installed by a suitably qualified ecologist. c. Imagery must be reviewed for wildlife interactions at least weekly by a suitably qualified ecologist, retained for a minimum of 6 months, and be made available to the Consent Authority or the Department of Conservation on request.
13.4	a. Any interactions with wildlife recorded as a result of the monitoring requirements in the Avian Management Plan including the wildlife cameras required by Condition 13.3, must be reported to the Consent Authority and the Department of Conservation on a weekly basis from 1 November to 31 January each year, and on a monthly basis from 1 February to 31 October. b. Footage must be made available to the Department of Conservation and the consenting authority as set out in Condition 13.3.
13.5	a. The Consent Holder must engage a suitably qualified expert to carry out annual penguin surveys of Pakiroa beach and the mine area using a certified conservation dog within 500m of the mining disturbance area to detect the presence of Kororā.

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	b. The first survey must be conducted within the first 12 months of the commencement date of the resource consent, and at least two annual surveys must be completed before mining commences. c. If penguins or burrows are detected the location must be mapped and the Consent Holder must undertake the following management actions: i. If penguins are detected using the mining area to access other habitats, any existing access ways must be maintained and/or works affecting that accessway must be completed in the period April – June (outside the breeding and moult period). ii. Any potential penguin burrows identified must be investigated, including use of a burrowscope, to determine whether Kororā are using them. iii. Where any penguin burrows are compromised by mining (i.e. there are direct effects), replacement artificial burrows or nest boxes must be installed at a rate of 2:1. Any additional nest boxes provided must be located within the vegetated coastal foreshore habitat associated with any identified accessways. iv. If penguins are found within the application site, a specific Penguin Management Plan must be developed by a suitably qualified and experienced ecologist on behalf of the applicant in consultation with the West Coast Penguin Trust. The West Coast Penguin Trust must be reimbursed for reasonable time and expenses associated with consultation on the Penguin Management Plan. v. Any deceased penguins found on or near the mine site must be provided to the Department of Conservation for necropsy. ***Advice Note:*** • *If a certified conservation dog is unavailable or unable to complete the survey, human surveys and increased camera monitoring will be undertaken in accordance with the advice of a suitably qualified ecologist.*
13.6	a. The Consent Holder must erect and maintain a moveable penguin fence around the perimeter of the mining areas identified in the current Annual Work Plan to deter Kororā from entering hazardous areas. b. The penguin fence must be comprised of geosynthetic mesh to a height of at least 900mm above ground and buried at least 300mm below the ground and with posts no greater than 4m apart. c. The fence installation must be certified by a suitably qualified ecologist as preventing the ingress of Korora to the active mine disturbance area. d. The certification must be supplied to the Consent Authority prior to mining commencing. e. Upon completion of all mining activities and associated site rehabilitation, all penguin fencing must be removed. Advice Note: • *The requirement to erect a penguin fence only applies if Kororā are detected within 500m proximity of the active mining disturbance area. If no Kororā are detected within 500m of the active mine disturbance area a penguin fence is deemed unnecessary.*

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13.7	The Consent Holder must conduct activities on site in general accordance with an Avian Management Plan (AMP) prepared by a suitably qualified ecologist or ornithologist. The objectives of the AMP are: a. To ensure adverse effects on the threatened and at risk birds present in the vicinity of the site and any other threatened and at risk species detected by subsequent monitoring are avoided. b. To ensure significant adverse effects on important bird habitats adjoining the mining site and the coastal margin are avoided. c. To ensure safe ongoing use of the site and its environs by the birds which currently occur in the area. Advice Note: • *All Management Plans are required to adhere to the requirements of Condition 6.0.* • *Threatened or at-risk bird species refers to the Conservation Status according to the Department of Conservation's Threatened Classification System.*
13.8	The AMP must detail: a. A description of the site and surrounding avian habitats b. A description of the threatened and at risk indigenous birds likely to be present in these habitats and which species require specific mitigation measures c. A description of the mitigation measures that are required to be implemented to avoid effects on threatened and at risk indigenous birds . d. A procedure for managing and responding to Westland Petrel or other wildlife being found on the mine site; e. Details of the penguin fence described in condition 13.6. f. A description of the monitoring requirements to assess the effectiveness of the AMP.
13.9	The AMP must be reviewed annually by the Consent Holder. Any proposed amendments to the AMP must be submitted to Council for certification and must: a. Achieve the AMP's objectives including avoiding effects on any threatened or at-risk indigenous bird species; b. Comply with the conditions of this resource consent; c. Have been reviewed by an appropriately qualified and experienced ecologist or ornithologist; d. Have been provided in advance to Te Rūnanga o Ngāti Waewae and the Buller/Kawatiri (for Tāiko) and the Greymouth (for other wildlife) office of the Department of Conservation for comment (and feedback received collated and submitted with the amendments to be provided to Council); and

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	e. Follow the certification process set out in Condition 6.1. Advice Note: • *Any disturbance or relocation of avifauna may require a permit from the Department of Conservation under the Wildlife Act (1953).*
13.10	a. The Consent Holder must engage a suitably qualified expert(s) to undertake all monitoring of avian species from the commencement of consent until at least one year following the cessation of mining activities on this site. b. The monitoring must be carried out in accordance with the monitoring requirements in the AMP.
13.11	An annual bird management report must be provided to the Consent Authority, Te Rūnanga o Ngāti Waewae, the Buller/Kawatiri and Greymouth offices of the Department of Conservation in Westport, the West Coast Penguin Trust, Paparoa Wildlife Trust, the Community Liaison Group and Waka Kotahi NZ Transport Agency Environment and Sustainability Team (via: environment@nzta.govt.nz), no later than 30 June each year. The report must include the following matters: a. The timing and duration of any mining within 100m of the proposed SNA Site PUN-049; b. Results of seasonal bird surveys at the site; c. Timing of nest detection surveys and observations relating to nesting or other behaviours observed within the area to be mined; d. Efforts to deter any attempts at nesting within the area to be mined and the outcome of those efforts; e. Species attempting to nest within the area to be mined (including threatened and at risk species); f. Date of first nesting attempts (if any) for threatened and at risk species within the area to be mined; g. Number and location of nesting attempts by threatened and at risk species within the area to be mined; h. Outcome of individual nesting attempts by threatened and at risk species within the area to be mined; i. Results of annual kororā surveys on Pakiroa Beach, the implications for mine operations and any management actions undertaken; j. Number, dates and location of any mining operation vehicle strikes or near misses involving the Westland Petrel or Korora; k. Autopsy outcomes for any dead Westland Petrel or Kororā collected; l. The findings of any lighting audits undertaken during the year and steps taken to resolve any issues identified;

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	m. A summary of any revisions made to the AMP and the reasons for the changes; n. The date and duration of any operational shut-downs; and o. The results of the quarterly walk-through surveys of birds using the lagoon area.
14.0 Lizard Management	
14.1	The Consent Holder must conduct activities on site in general accordance with a Lizard Management Plan (LMP) prepared by a suitably qualified ecologist. The objective of the LMP is to avoid, remedy or mitigate adverse effects on indigenous lizards present within the project area.
14.2	The LMP must include (but is not limited to): a. Survey of lizard species and habitats within the site; b. Methods for lizard capture, salvage, and relocation; c. Identification of release sites and habitat enhancement measures; d. Timing of works to minimise impacts on lizards; e. Monitoring and reporting requirements; f. Contingency procedures if lizards are discovered during works.
14.3	Site works must not commence until the Consent Authority has certified the LMP.
15.0 Native Freshwater Fish Management	
15.1	The Consent Holder must conduct activities on site in general accordance with a Native Freshwater Fish Capture and Relocation Plan (NFFCRP) prepared by a suitably qualified freshwater ecologist. The objective of the NFFCRP is to avoid, remedy or mitigate adverse effects on native fish present within the project area.
15.2	This NFFCRP must detail how native fish will be salvaged and relocated prior to streamworks commencing and must include but not be limited to: a. Methodologies to capture fish within the impact streams and wetland habitats, or justification there is no habitat for native fish present at the time of earthworks; b. Fishing effort; c. Details of the relocation site; d. Storage and transport measures including prevention of predation and death during capture; e. Euthanasia methods for diseased or pest species,
15.3	Streamworks must not commence until the Consent Authority has certified the NFFCRP.

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16.0 Landscape Mitigation and Rehabilitation	
16.1	a. As soon as practicable following the commencement date of this consent, and prior to the commencement of mining, the Consent Holder must construct bunds and complete planting and fencing in accordance with the "Landscape Mitigation Package" prepared by Glasson Huxtable Landscape Architects dated February 2026, REV C (Schedule 2).
16.2	New bunds are to be constructed 3.0 metres high and 24 metres wide with an inward facing grassed slope and dense planting on the crest and outward facing slopes. While primarily required for noise mitigation, the bunds will also provide visual screening. Bunds are to be located: a. On the western boundary of Lot 2 DP2178. b. Near the bottom of Warren Road (with a separation at Granite Creek). c. On the northern side of Cargill Road at the eastern boundary. d. On the southern side of Cargill Road, alongside the western boundary of 114 Cargill Road. The above areas are illustrated within the "Landscape Mitigation Package" prepared by Glasson Huxtable Landscape Architects dated February 2026, REV C (Schedule 2).
16.4	Vegetation to be retained includes: a. The stand of Old Man Pines and the large cluster of vegetation near the consented WCP. b. Clusters of vegetation along the eastern application area boundary north of Cargill Road. c. The patch of vegetation adjacent to 101 Cargill Road. d. The stand of Old Man Pine and other riparian vegetation adjacent to Granite Creek. The above areas are illustrated within the "Landscape Mitigation Package" prepared by Glasson Huxtable Landscape Architects dated February 2026, REV C (Schedule 5).
16.5	Plant species selection, grades, spacing, densities and quantities, along with the planting methodology must adhere to the guidance provided in the Landscape Planting Plan to be prepared under condition 6.0.
16.6	The Consent Holder must source plants required for mitigation and rehabilitation planting from within the Punakaiki Ecological District or North Westland Ecological Region in order of preference. Where this is unable to be achieved, the Consent Holder must notify the Consent Authority and work with the Consent Authority and a suitably qualified Landscape Architect or Ecologist to determine an appropriate alternative plant source.
16.7	The wetland construction, Granite Creek riparian planting, and creek and drainage riparian planting must be undertaken and managed in accordance with the Landscape Mitigation Package" prepared by Glasson Huxtable Landscape Architects dated February 2026, REV C (Schedule 2) and the further details to be provided in the Landscape Management Plan and Rehabilitation Plan to be prepared under condition 6.0.
16.8	The Rehabilitation Management Plan must include:

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	a. A description of the site; b. A description of the riparian planting required by Conditions 16.5; c. A final wetland design that, when the planting required in Condition 16.6 achieves an area of at least 50ha with the following habitats: i. At least 5.2ha of shallow marsh with an average depth of 0.4m ii. At least 2.8ha of mid-depth water with an average depth of 1m iii. At least 5.3ha of deep open water with an average depth of 2m iv. At least 15.3ha of flaxland and dry edge vegetation v. At least 5.3ha of Carex Rushlands vi. At least 15.6ha of Raupo vii. At least 4.1ha of raised islands d. Wetland construction methodology, including details of the pre-mining and post-mining areas of the constructed wetland; e. Site preparation requirements for the wetland and riparian planting; f. Planting methodology for planting and establishment of the wetland and riparian areas; g. Monitoring and maintenance requirements to ensure the survival and ecological functioning of the constructed wetland, including pest and weed control; h. A timeline for the planting which aligns with conditions 16.1 to 16.7.
16.9	The Landscape Management Plan must include: a. Detailed planting areas (m2 amounts) for areas such as bunds and screening planting not covered by the Rehabilitation Plan. b. Plant species (common name and botanical name), grades, spacing/densities and quantities. c. Planting specifications (with a particular focus on planting methodology and maintenance). d. Staging of planting (pre-mining, during mining and post mining). e. Typical planting and fencing details.
16.10	Each plant shall be of nursey stock and be of good form that is true to species. Plants shall be healthy, vigorous and free of disease, injury, parasites or insects and not root bound.
16.11	All new planting areas required by this consent including wetlands and riparian areas shall be fenced off with stock proof post and wire fencing immediately following planting.
16.12	All planting must be maintained for the duration of the consent. Maintenance includes weeding, spraying, staking, watering, fertilising, trimming, pest removal and plant replacement. The aim is to have plants which are vigorous and thriving, thereby providing effective screening and rehabilitation.
16.13	Any plants that are dead, diseased, fail to thrive or are damaged must be replaced with the same or similar plant species within the following planting season.

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16.14	The existing mature flax and raupo located within the site will be utilised where possible for direct vegetation transfer associated with the constructed wetland.
17.0 Lighting	
17.1	Fixed lighting must not exceed 2.0 lux spill (horizontal and vertical) of light onto any adjoining property, measured at any point more than 2m inside the boundary of the adjoining property or the closest window on the adjoining property whichever is the closest.
17.2	Lighting must be designed in a manner which adheres to the Australian Government's National Light Pollution Guidelines for Wildlife January 2023 (or subsequent revision); including but not limited to: a. All fixed lighting must be directed downward, shielded to avoid light spill outside of permitted limits, operate primarily in the yellow orange spectrum, and be filtered to reduce blue and violet wavelengths; b. Lights must only illuminate the object or area intended; c. Fixed lights must be mounted as close to the ground as practicable while still achieving site lighting requirements; d. External lighting must be minimised on the seaward side of buildings to minimise light spill toward the coast; and e. External lighting must use the lowest intensity lighting possible, while ensuring compliance with workplace health and safety requirements.
18.0 Accidental Discovery Protocol	
18.1	Immediately following the discovery of material suspected to be a taonga, kōiwi or archaeological site the following steps shall be taken: a. All works on the site will cease immediately at that place and within 20m around the site. b. Immediate steps will be taken to secure the site to ensure the archaeological material is not further disturbed. c. The contractor/works supervisor/owner will notify the Rūnanga, Council and the Area Archaeologist of Heritage New Zealand. In the case of kōiwi (human remains), the New Zealand Police must be notified. d. The Rūnanga and Heritage New Zealand will jointly appoint/advise a qualified archaeologist who will confirm the nature of the accidentally discovered material. e. The contractor/works supervisor/owner will also consult the Rūnanga on any matters of tikanga (protocol) that are required in relation to the discovery and prior to the commencement of any investigation. f. If kōiwi (human remains) are uncovered, in addition to the steps above, the area must be treated with utmost discretion and respect, and the kōiwi dealt with according to both law and tikanga, as guided by the Rūnanga. Remains are not to be moved until such time as Rūnanga, NZ Police and Heritage New Zealand have responded.

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	g. Works in the site shall not recommence until authorised by the Rūnanga, Heritage New Zealand (and the NZ Police in the case of kōiwi). h. All parties will work towards work recommencing in the shortest possible timeframe while ensuring that any archaeological sites discovered are protected until as much information as practicable is gained and a decision regarding their appropriate management is made, including obtaining an archaeological authority under the Heritage New Zealand Pouhere Taonga Act 2014 if necessary. Appropriate management may include recording or removal of archaeological material. i. Although bound to uphold the requirements of the Protected Objects Act 1975, the contractor/works supervisor/owner recognises the relationship between Ngāi Tahu whānui, including its Rūnanga, and any taonga (Māori artefacts) that may be discovered. Where Rūnanga so request, any information recorded as a result of the find such as a description of location and content, is to be provided for their records.
General Conditions to Apply to all West Coast Regional Council Consents	
20.0 Method of Mining	
20.1	The consent holder must only carry out mining activities within the mining area shown on the attached map titled "Tāiko Fast-track Application" prepared by Tai Poutini Professional Services Ltd dated [*insert date here*] attached as Schedule 1.
20.2	The maximum combined surface area of un-rehabilitated disturbed land in the application area must not exceed 16.0 hectares at any one time.
20.3	The mining and associated activities under this consent must not cause or induce erosion or slope instability outside the mining area (during operations), or the application area as part of final rehabilitation.
21.0 Erosion and Sediment Control Plan	
21.1	The Consent Holder must operate in general accordance with the Erosion and Sediment Control Plan labelled 'Barrytown Mineral Sand Operation Erosion and Sediment Control Plan and Water Management' (ESCP) prepared by Ridley Dunphy Environmental Ltd, dated [*insert date here*]. The objectives of the ESCP are: a. To use established guidelines and practices to minimise sedimentation of waterbodies adjacent to the mining area; b. To assist with compliance with the water quality parameters in Condition 24.
21.2	A Site Specific Erosion and Sediment Control Plan (SSESCP) must be prepared and reviewed annually and submitted to the Consent Authority with the Annual Work Programme, reflecting the water management measures proposed for construction and mining for the following 12 months, and adhering to principles of the Erosion and Sediment Control Plan in Condition 21.1 above. The SSESCP must include: a. Location of the work; b. Contour information; c. Erosion and Sediment Controls (ESCs);

	d. Chemical treatment requirements, design and details; e. Internal catchment boundaries; f. Details of earthworks and ESC construction methods; g. Contingency measures; h. ESC design details; i. A programme for managing non-stabilised areas; j. The identification staff who will manage ESCs; k. The identification of staff who monitor compliance with consent conditions; l. A chain of responsibility for managing erosion and sediment control issues; and m. Methods and procedures for decommissioning ESCs (if applicable).
22.0 Water Management Plan	
22.1	The Consent Holder must operate the mine in general accordance with a Water Management Plan (WMP) prepared by a suitably qualified hydrologist. The objectives of the Water Management Plan are: a. The rate of take of water from Canoe Creek gallery is not greater than 10% of Canoe Creek's MALF. b. The groundwater level in the mining void will not be manipulated to materially lower or raise pond water levels beyond 20% of baseline dredge pond water depth. c. Pumping of groundwater will be minimised by avoiding dewatering and associated water table lowering while excavating saturated material within the void down to the economic mineral grade limit or maximum reach depth of the dredge. d. Water pumped from the void will be conveyed to the WCP. Water will be ordinarily pumped back to the dredge pond tailings zone to achieve the hydrological effect management goals and the objective in ii above. e. The quality of any groundwater that could enter surface water or coastal water or Wasabi Springs will be monitored to confirm that it meets standards which are consistent with Hydrological effects goal III in 6.1 of the Water Management Plan. f. Detailed design information for the water management system shall be issued to WCRC for review and comment at least 16 weeks prior to the start of mining operations. Design information will include design drawings of the infiltration trenches and basin. g. The rate of take of water will be monitored in accordance with the Resource Management (Measurement and Reporting of Water Takes) Regulations and the pumping rate will be restricted to 63 L/s instantaneous rate, and 5,400 m^3/d or 62.5 L/s on a daily basis. The maximum rate of take is anticipated to be required for infrequent periods of up to 7 days. It is also anticipated that the long-term abstraction rate would be less at 9.5 L/s.

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	h. The rehabilitated mine area will provide for the establishment of a large wetland complex in the east of the former mining area. Advice Note: • *All Management Plans are required to adhere to the requirements of Condition 6.0.*
22.2	The WMP must include a description of the water management methods for the site, including: a. A description of the baseline monitoring and the receiving environment; b. The proposed mine disturbance area; c. A description of all site activities with the potential to cause hydrological impacts; d. The water management actions that will be implemented to avoid hydrological effects, including: i. The water treatment train, including settling infrastructure; ii. The return of limed water to the mining void; e. Operational water level and water quality monitoring requirements for the duration of the activity; f. Groundwater level thresholds and actions to be taken should these thresholds be exceeded; g. Surface water body flow threshold for Canoe Creek and actions to be taken should that threshold be exceeded; h. Actions to be taken if water quality thresholds are exceeded; i. Final Rehabilitation requirements to avoid adverse hydrological impacts on waterbodies post-mining; j. Audit checklists; k. An organisational chart showing staff and contractor positions and responsibilities for plan implementation; and l. Relevant training and induction procedures and schedules.
22.3	The WMP must be updated on an annual basis and must be submitted to the Consent Authority for certification in accordance with condition 6.0. The annual update is required to: a. reflect the proposed mining operations for the following 12 months; and b. provide any additional or amended monitoring and mitigation requirements in order to reduce the potential for adverse hydrological and/or water quality effects.
Conditions to Apply to WCRC Discharge Permit	

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23.0 Method of Discharge during mining activity

23.1 During mining, treated mine water is only permitted to be discharged directly to the mining void, and from the Mine Water Facility, if:

a. metal and metalloid water quality parameters in Table A below are complied with at the sites shown in Schedule 3; and
b. the non-metal water quality parameters in Table B below are complied with at the sites shown in Schedule 3 (as required by Condition 23.2) and the locations defined in Table B.

Table A - metals and metalloids

Parameter	Threshold mg/L	Dependency
Aluminium	0.62[B]	Hardness, pH, Dissolved Organic Carbon
Arsenic	0.013	As arsenic (V)
Boron	0.94	NA
Cadmium	0.0002[D]	Hardness
Chromium	0.0033[D]	Hardness, as chromium (III)
Copper	0.0039[E]	Hardness, pH, Dissolved Organic Carbon
Iron	1.0	As total fraction
Lead	0.0034[D]	Hardness
Manganese	1.9	NA
Nickel	0.011[D]	Hardness
Zinc	0.008[D]	Hardness

[A] dissolved fraction, unless stated

[B] at hardness = 25 g/m^3, pH = 7.0, Dissolved Organic Carbon = 1.0 g/m^3

[C] 95%-ile trigger value

[D] at hardness = 30 g/m^3

[E] at hardness = 25 g/m^3, pH = 7.0, Dissolved Organic Carbon = 2.0 g/m^3

Table B – Non-metals

Parameter	Threshold	Notes/Monitoring Location
Turbidity	20 NTU	Applies to discharges to Northern Creek, Central Creek, Granite Creek downstream, Unnamed Creek north of

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			Cargill Road, Wasabi Creek and Southern Creek, shown in Schedule 3.
	Visual clarity	Conspicuous visual change	In the receiving water bodies of Northern Creek, Central Creek, Granite Creek downstream, Unnamed Creek north of Cargill Road, Wasabi Creek and Southern Creek as shown in in Schedule 3.
		Relevant NPS-FM (2020) attribute state for visual clarity	No change in the attribute states of the receiving surface water bodies, as an annual median and a 95%-ile, versus the baseline states. See advice note b below. Monitoring locations are Northern Creek, Central Creek, Granite Creek downstream, Unnamed Creek north of Cargill Road, Wasabi Creek and Southern Creek shown in Schedule 3.
	Dissolved Reactive Phosphorus (DRP)	Relevant NPS-FM (2020) attribute state	No change in the attribute states of the receiving surface water bodies, as an annual median and a 95%-ile, versus the baseline states. See advice note b below. Monitoring locations are Northern Creek, Central Creek, Granite Creek downstream, Unnamed Creek north of Cargill Road, Wasabi Creek and Southern Creek shown in Schedule 3.

Advice Notes:

- *Water quality monitoring conditions to establish the ability to discharge under this condition are contained in Condition 24.0 below.*
- *The attribute state for visual clarity and DRP must be either*
  - *a) defined via at least 12 months of baseline monitoring in Northern Creek, Central Creek, Granite Creek downstream, Unnamed Creek north of Cargill Road, Wasabi Creek and Southern Creek; or*
  - *b) assumed to be of pristine water quality (A Band).*
- *In the case of a), the monitoring data and attribute state assessment must be submitted to WCRC for approval at least 4 weeks prior to the start of mining operations.*

23.2	The Consent Holder must ensure that discharges to surface and groundwater do not contain any contaminants other than suspended sediments, naturally occurring elements and metals, and water treatment chemicals in accordance with Conditions below: a. The use of any water treatment chemical(s) is/are permitted provided they are used in accordance with its Material Safety Data Sheet(s) (MSDS). b. The Consent Holder must notify the Consent Authority in writing and provide the respective MSDS of any water treatment chemical(s) used in accordance with the above condition before it is used.
23.3	The Consent Holder must take all practicable measures to prevent uncontaminated stormwater entering the mine workings and disturbed areas to reduce the volume of water

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	passing through the mining pond/settling pond system, and to improve the efficiency of the water reticulating system.
24.0 Water Monitoring	
24.1	The Consent Holder must carry out water monitoring at the locations shown in the ESCP and Water Management Plan, and as listed in the table below:

Location	**Parameter(s)**	**Frequency**
Canoe Creek @ State Highway 6	Flow	Hourly
Canoe Creek Gallery	Flow Level	Hourly 6 Hourly
Discharges to mining void @ Mine Water Facility near Wet Concentrator Plant	Flow	Continuous, Automated
Northern Creek	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others)
Central Creek (WCP)	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others)
Clarke Creek upstream	Monitoring Suite A* Visual clarity Flow	Quarterly (metals) Monthly (Others) Hourly
Little Granite Creek upstream	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others)
Granite Creek upstream	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others)
Granite Creek downstream of mining	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others) Hourly
Unnamed creek north of Cargill Road	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others)
Wasabi Creek	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others)
Wasabi Springs	Monitoring Suite A* Visual clarity Flow	Quarterly (metals) Monthly (Others) Hourly
Southern Creek	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others)

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	PZ 1	Water level and Monitoring Suite A*	6 hourly Quarterly (metals)
	PZ 2	Water level and Monitoring Suite A*	6 hourly Quarterly (metals)
	PZ 3	Water level and Monitoring Suite A*	6 Hourly Quarterly (metals)
	PZ 4	Water level and Monitoring Suite A*	6 Hourly Quarterly Metals

*Monitoring Suite A includes the following water quality indicators:

Dissolved metals	***Others***
Aluminium (Q)	EC (M)
Arsenic (Q)	pH (M)
Boron (Q)	Turbidity (M)
Cadmium (Q)	TSS (M)
Chromium (Q)	Hardness (Q)
Copper (Q)	Sulphate (Q)
Iron (Q)	Amm-N (M)
Nickel (Q)	NO_3-N (M)
Lead (Q)	Dissolved Reactive Phosphorus (M)
Manganese (Q)	
Zinc (Q)	

The Clarke Creek, Little Granite Creek and Granite Creek upstream observation locations must be upstream of the mining disturbance area.

Downstream monitoring sites will be located within the 50m buffer between MHWS and the mining disturbance area.

24.2	Notwithstanding Condition 24.1, all discharges associated with the mining operations authorised under these consents must not cause any of the following effects within any receiving waterbody measured at the downstream water quality monitoring sites in Condition 24.1: a. Any conspicuous oil or grease films, scums or foams, or floatable or suspended materials,

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	b. Any conspicuous change in the colour or visual clarity, c. Any emission of an objectionable odour, d. Any significant adverse effects on aquatic life, or e. The rendering of fresh water unsuitable for consumption by farm animals.
24.3	Sampling required under the conditions of this consent must be undertaken and analysed by suitably qualified personnel and the results supplied to the Consent Authority annually as part of the annual works programme.
24.4	An Annual Hydrological and Water Quality Report must be submitted to the Consent Authority with the Annual Work Programme in accordance with Condition 5.2 for review and evaluation of compliance. The report must be prepared by a suitably qualified and experienced person and include the following information: a. A summary of the monitoring undertaken over the preceding 12 months. The summary must: i. Reference the specific consent conditions under which the monitoring has been undertaken to show how the conditions have been complied with; ii. Provide tables of the water quality data collected in accordance with Condition 24.1. b. Discussion and evaluation of the monitoring data in relation to the relevant conditions including a summary of compliance with conditions; c. A summary of the actions that have been undertaken in response to any exceedance(s) of water quality limits; d. Records of the visual inspections that have been undertaken in accordance with Condition 24.1, 24.2 and condition 24.3.
24.5	a. The Consent Holder must engage a suitably qualified aquatic ecologist to carry out annual macroinvertebrate and fish surveys in Northern Creek, Central Creek, Clarke Creek, Granite Creek, Wasabi Creek and Southern Creek. b. The proposed survey methodology, including the locations where macroinvertebrate (taxa number and composition) and fish sampling will be undertaken, the timing of the sampling, the methods that will be used to undertake the sampling, the name of the authorised person who will undertake the monitoring and reporting methods must be submitted to the Consent Authority 20 working days prior to the survey being undertaken, for the Consent Authority to certify the survey methodology. Advice Note: • *If the Consent Authority refuses to certify the survey methodology, it is expected to give reasons in writing.* • *If the Consent Holder refuses certification the Consent Holder must resubmit the survey methodology for certification addressing any concerns of the Consent Authority.* • *Surveys must not be undertaken until certification is achieved.*

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	• *The results of the survey must be submitted to the Consent Authority within 10 working days of the results being received.* • *The surveys required by this condition are to inform baseline information about aquatic biota present within the waterbodies around the consent area and monitor long term trends in species diversity and prevalence.*
24.6	a. Macroinvertebrate monitoring required by Condition 24.5 must be conducted using Protocol P2 and C1 from the Ministry for the Environment Macroinvertebrate Guidelines and the samples must be analysed by an aquatic ecologist experienced in macroinvertebrate sampling and identification. b. Monitoring must be undertaken on a day on which there has been no major flood event in the preceding week. Whenever practicable, sites that have been sampled in the past must be used.
Conditions to Apply to West Coast Regional Council Air Discharge Permit	
25.0 Dust Management Plan	
25.1	The Consent Holder must operate the site in general accordance with a Dust Management Plan. The objective of the Dust Management Plan is to detail the best practicable option to avoid dust nuisance being caused by mining works and to mitigate any such effects should they occur.
25.2	The Dust Management Plan must include: a. Potential sources of dust that may be created during the mining project. b. Sensitive receptors in the vicinity of identified potential sources of dust for targeted dust management. c. Dust management and mitigation methods. d. Dust monitoring methods. e. Training of staff in relation to dust management; and f. Methods for managing complaints regarding discharges of dust g. Keeping of compliance records.
25.3	Vehicles travelling within the site on unsealed roads must not exceed 15 km/hr on site at all times.
25.4	If wind measured at the meteorological station on the Central Block site exceeds 20km/hr, the Consent Holder must: a. Limit activities that generate dust downwind of sensitive receptors identified in the Dust Management Plan; b. Conduct frequent visual inspections of exposed earthwork areas; and

	c. Assess the need for additional controls such as increased water application rates.
26.0 Air Quality Management and Monitoring	
26.1	There must be no offensive or objectionable discharge of dust into air from the minerals extraction, processing and loading operations that result in an adverse effect beyond the legal boundary of the site. Advice Note: • *For the purpose of Condition 28.1 the Consent Authority will consider an effect that is offensive or objectionable to have occurred if an Enforcement Officer of the Consent Authority deems it so having regard to:* *a. The frequency, intensity, duration, amount, effect and location of the suspended or particulate matter; and/or* *b. Receipt of complaints from neighbours or the public: or* *c. Relevant written advice or a report from an Environmental Health Officer of a territorial authority or health authority.*
26.2	a. The Consent Holder must install, operate and maintain [X] Dust Deposition Gauges in the locations shown in the Dust Management Plan. b. Dust recorded in the gauges must not exceed a value of 4g/m^2/30 days above background levels. c. Dust deposition gauges will operate as follows: i. Commissioned and run to collect 1 year of baseline data prior to mining commencing in respective block ii. Decommissioned 1 year after rehabilitation has been completed. iii. Gauges in the vicinity of Warren Road will be operational throughout the activity. Advice Note: • *Background levels are to be determined by data collected prior to the commencement date of this consent.*
26.3	a. If a breach of Condition 26.3.b is detected, the Consent Holder must notify the Consent Authority within two working days of the breach being detected. b. The Consent Holder must investigate possible reasons for the breach and take all necessary steps to achieve compliance in the following 30-day period.
Conditions to Apply to WCRC Water Take Permit	
27.0 Groundwater abstraction outcomes	
27.1	Mine void and water table exposure and associated mitigation measures must achieve the following outcomes: a. The hydrological responses to mining activity ensure that quality of water discharged to receiving waters will not cause adverse impacts on stream ecology or visual clarity; b. The pre-mining surface drainage patterns are restored such that the catchment areas for Clarke Creek, Granite Creek and other smaller creeks are not changed significantly;

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	c. The contouring and surface drainage installed during mine rehabilitation does not increase the rate of groundwater drainage at the site.
28.0 Diversions	
28.1	The consent holder must not commence any streamworks activity until it has obtained certification from the West Coast Regional Council for the Rehabilitation Management Plan. Advice Note: • *The Rehabilitation Management Plan is to include information on the finalised streamworks for the site. The Native Freshwater Fish Capture & Relocation Plan is to provide information on native fish relocation.*
28.2	The Rehabilitation Management Plan must include, but is not limited to, including the following streamworks information: a. Specific erosion and sediment control works for the streamworks; b. Details of construction methods (such as reclamation, diversion, channel clearance removal and construction of structures); c. Monitoring and maintenance requirements; d. Details relating to the management of exposed areas.
28.3	The Rehabilitation Management Plan must include, but is not limited to, including the following native fish relocation information: a. The timing, duration and methodologies used for fish capture and transportation; b. Specific measures for ensuring fish elsewhere in the catchment do not enter the works area; c. A description and assessment of the quantum and availability of suitable aquatic quality habitat at the relocation site; and d. The names, experience and qualifications (including any necessary permits) of those involved in undertaking the fish relocations.
28.4	The sediment and erosion controls at the site of the works must be inspected on a regular basis and within 24 hours of each rainstorm event that is likely to impair the function or performance of the erosion and sediment controls. A record must be maintained of the date, time and any maintenance undertaken in association with this condition which must be forwarded to the Consent Authority on request.
28.5	Creek and drainage construction and riparian planting must be undertaken onsite and in accordance with the approved Rehabilitation Management Plan to ensure: a. New creek and drainage channels will be constructed to: i. Ensure no loss of extent; ii. Have a meandering pattern; iii. Be formed to include run and pool habitat, and instream features including riffles and woody debris; iv. A mix of rocky and silt bottomed beds;

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	b. Riparian planting will be undertaken to: i. 5m for Granite Creek ii. Minimum of 3m for all other reconstructed creeks as shown in the Rehabilitation Management Plan; iii. Stock proof fencing erected on the outside of all riparian planting areas; iv. The Consent Holder shall ensure the on-going maintenance of any riparian planting for a period of no less than two years. This shall include on-going monitoring and eradication of woody weed species which may establish including blackberry and gorse.
28.6	a. Upon two years following permanent diversion of creek or drain flow to the new channel and completion of riparian planting, fish and macroinvertebrate surveys will be undertaken to confirm recolonisation. b. Where monitoring concludes recolonisation has not occurred, a Further Offset Works Plan shall be prepared and submitted to the Consent Authority within 2 months following the monitoring undertaken. c. The Consent Holder must implement any additional works required by the Further Offset Works Plan within 6 months following the approval by the Consent Authority or during the next planting season (whichever is appropriate to the measure adopted).
29.0 Canoe Creek water take	
29.1	The instantaneous surface water take from Canoe Creek must not exceed 63 litres per second.
29.2	The Consent Holder must undertake monitoring of the surface water take from Canoe Creek at 15 minute intervals and supply this information electronically to the Consent Authority every day, or at the interval instructed in writing by the Consent Authority. **Advice Note:** *The resource Management (Measurement and Reporting of Water Takes) Amendment Regulations 2020 applies to this water take.*
29.3	The Consent Holder must maintain auditable records and provide data in the format of date, time and rate that is suitable for electronic storage.
29.4	a. The Consent Holder must maintain the measurement device(s) in good working order so as to maintain a measurement accuracy of within ± 5% for a fully pressurised pipe or ± 10% for a partially pressurised pipe. b. The Consent Holder must provide the Consent Auhtority within initial written verification of accuracy from a suitably qualified person that the measurement device measures the volume of water to within ± 5% for a fully pressurised pipe or ± 10% for a partially pressurised pipe, and thereafter every five years for the term of the consent.
29.5	The Consent Holder must provide the following information to the Consent Authority no later than the ten working days prior to the water being taken under this consent: a. The type of measurement device(s) used to undertake the continuous monitoring together with the manufacturer's statement for that device; and b. The location of the measurement device(s) in relation to the water take point(s).

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29.6	Upon notice to the Consent Holder the Consent Authority may require the Consent Holder to cease water abstraction for a period not exceeding 48 hours, in order to undertake monitoring of natural water flows.
29.7	A fish screen on any direct surface water take must be maintained to ensure, as far as practicable, that eels, fish and fry are prevented from passing through the intake or being trapped against the screen.
29.8	The 12-year water take consent under WCRC-2023-0046 is to be offered for surrender upon commencement of this consent.

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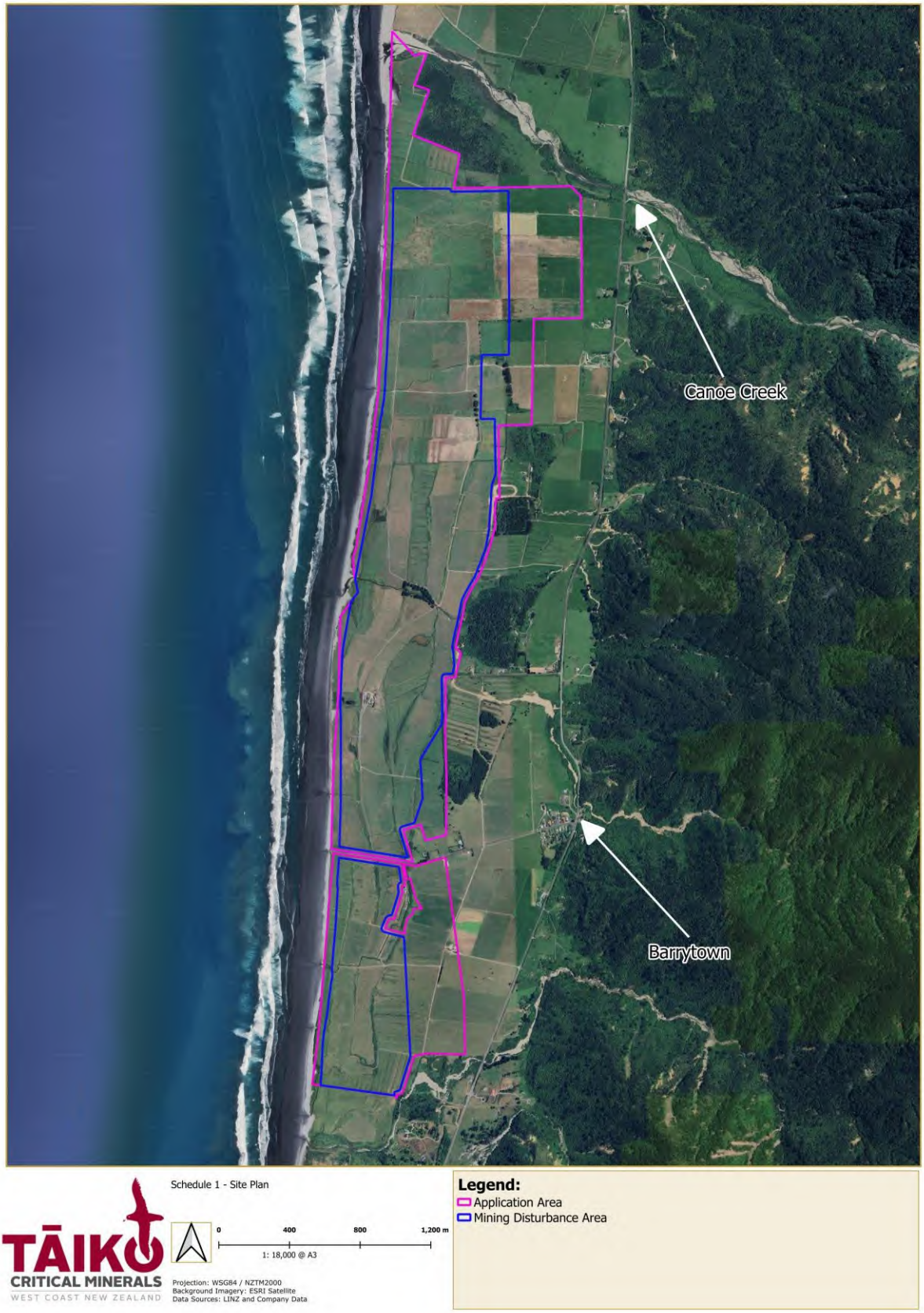
Schedule 1 – Site Plan



Schedule 2 – Landscape Mitigation Package

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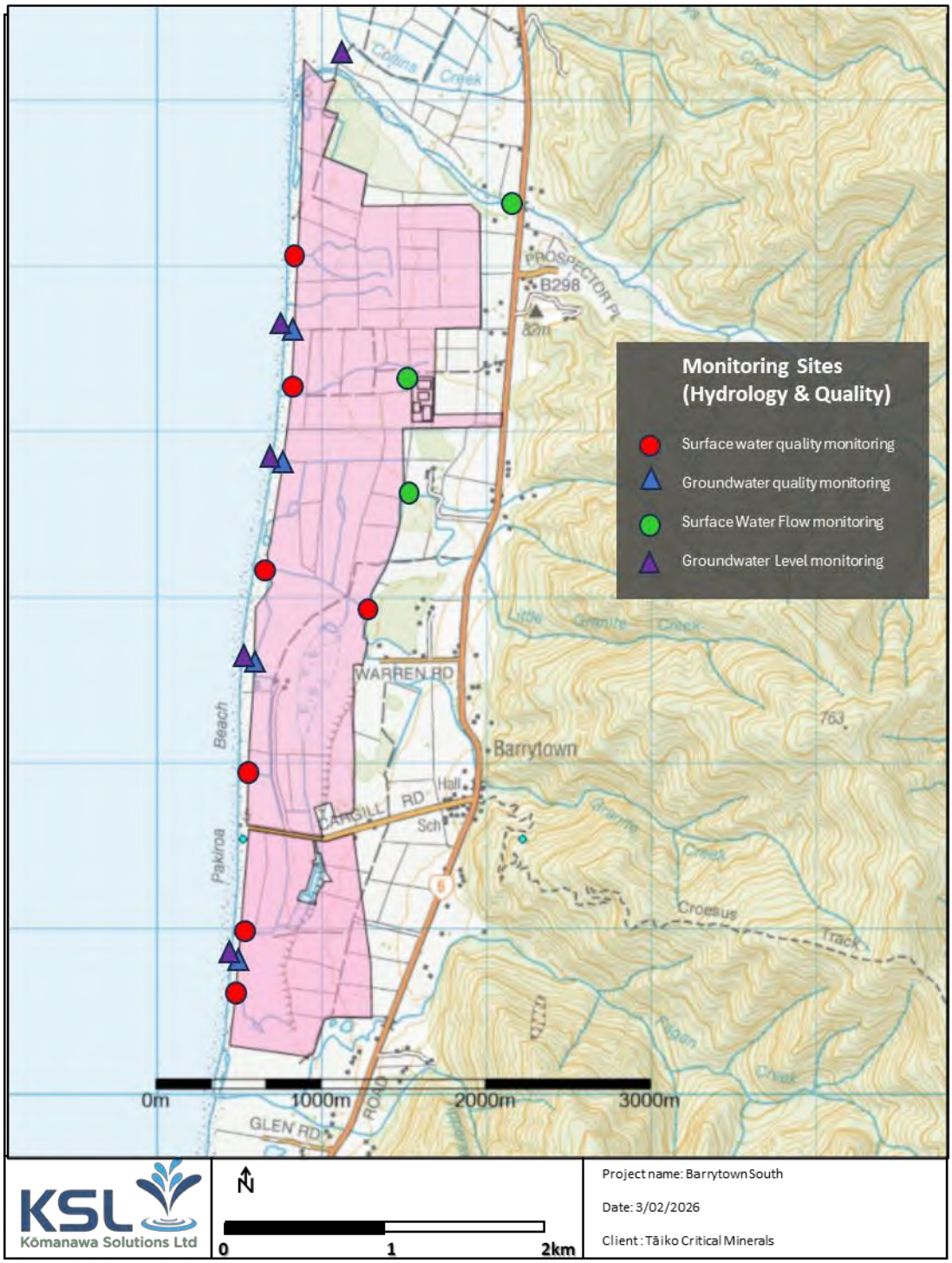
Schedule 3 – Monitoring Sites



Barrytown Critical Minerals Project
Southern Block
Proposed Conditions of Archaeological Authority

1.	The authority holder must ensure that all contractors working on the project are briefed by the s45 approved person , who may appoint a person to carry out the briefing on their behalf, prior to any works commencing on: a. The possibility of encountering archaeological evidence; b. How to identify possible archaeological sites during works; c. The archaeological work required by the conditions of this authority; and d. Contractors' responsibilities with regard to notification of the discovery of archaeological evidence to ensure that the authority conditions are complied with.
2.	Prior to the start of any on-site archaeological work, the authority holder must ensure that Heritage New Zealand Pouhere Taonga is advised of the date when work will begin. This advice must be provided at least 2 working days before work starts. The authority holder must also ensure that Heritage New Zealand Pouhere Taonga is advised of the completion of the on-site archaeological work, within 5 working days of completion.
3.	Any earthworks that may affect any High Archaeological Potential sites (attached as Figure 8-1) must be monitored by the s45-approved person who may appoint a person to carry out the monitoring on their behalf. Topsoil stripping of these sites must be undertaken by a hydraulic excavator and occur over consecutive days at the beginning of each stage of works and prior to any other earthworks in this stage.Any archaeological evidence encountered during the exercise of this authority must be investigated, recorded and analysed in accordance with current archaeological practice.
4.	Immediately following the discovery of material suspected to be a taonga, kōiwi or archaeological site the following steps shall be taken: a. All works on the site will cease immediately at that place and within 20m around the site; b. Immediate steps will be taken to secure the site to ensure the archaeological material is not further disturbed; c. The contractor/works supervisor/owner will notify the Rūnanga, Council and the Area Archaeologist of Heritage New Zealand. In the case of kōiwi (human remains), the New Zealand Police must be notified;

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	d. The Rūnanga and Heritage New Zealand will jointly appoint/advise a qualified archaeologist who will confirm the nature of the accidentally discovered material; e. The contractor/works supervisor/owner will also consult the Rūnanga on any matters of tikanga (protocol) that are required in relation to the discovery and prior to the commencement of any investigation and enable access to Rūnanga in accordance with any site safety requirements; f. If kōiwi (human remains) are uncovered, in addition to the steps above, the area must be treated with utmost discretion and respect, and the kōiwi dealt with according to both law and tikanga, as guided by the Rūnanga. Remains are not to be moved until such time as Rūnanga, NZ Police and Heritage New Zealand have responded; g. Works in the site shall not recommence until authorised by the Rūnanga, Heritage New Zealand (and the NZ Police in the case of kōiwi) and any other authority with statutory responsibility, to ensure that all statutory and cultural requirements have been met; h. All parties will work towards recommencing activities in the shortest possible timeframe while ensuring that any archaeological sites discovered are protected until a decision is made on whether the archaeological material is to be recorded and/or removed.
5.	Any taonga tūturu are prima facie the property of the Crown who will be notified of the find. Taonga tūturu will be registered with the Ministry for Culture and Heritage. Heritage New Zealand, in collaboration with manawhenua, shall notify the Ministry of Culture and Heritage and establish the most appropriate temporary storage, management and care for taonga tūturu, until such time as traditional or actual ownership is determined, with an appropriate institution or kaitiaki.
6.	Although bound to uphold the requirements of the Protected Objects Act 1975, the contractor/works supervisor/owner recognises the relationship between Ngāi Tahu whānui, including its Rūnanga, and any taonga (Māori artefacts) that may be discovered. Where Rūnanga so request, any information recorded as a result of the find such as a description of location and content, is to be provided for their records.
7.	That within 20 working days of the completion of the on-site archaeological work associated with this authority, the authority holder shall ensure that site record forms are updated or submitted to the NZAA Site Recording Scheme.

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8.	That within 12 months of the completion of the on-site archaeological work, the authority holder shall ensure that a final report, completed following the Archaeological Report Guideline (AGS12 2023), is submitted to the Heritage New Zealand Pouhere Taonga Senior Archaeologist for inclusion in the Heritage New Zealand Pouhere Taonga Archaeological Reports Digital Library, to tangata whenua via Ngāti Waewae, the Grey District Museum, and the NZAA Central Filekeeper. a. One hard copy and one digital copy of the final report are to be sent to the Heritage New Zealand Pouhere Taonga Senior Archaeologist. b. Digital copies of the final report must also be sent to to tangata whenua via Ngāti Waewae, the Grey District Museum, and the NZAA Central Filekeeper.
9.	Protection of sites / features: As a first principle, every practical effort must be made to avoid damage to any heritage site, whether known, or discovered during any redevelopment of the site, including: a. Drystone structure under Cargills Road - To avoid damaging the structure the Cargill Road bund should not be built up against this structure. The use of heavy machinery should by limited or monitored in proximity to the structure, to limit the potential damage from vibrations.

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Appendix C

Draft landscape mitigation package

GLASSON HUXTABLE
LANDSCAPE ARCHITECTS

BARRYTOWN MINERAL SANDS PROJECT: SOUTHERN RESOURCES BLOCK

LANDSCAPE MITIGATION PACKAGE

MARCH 2026 - REVISION C

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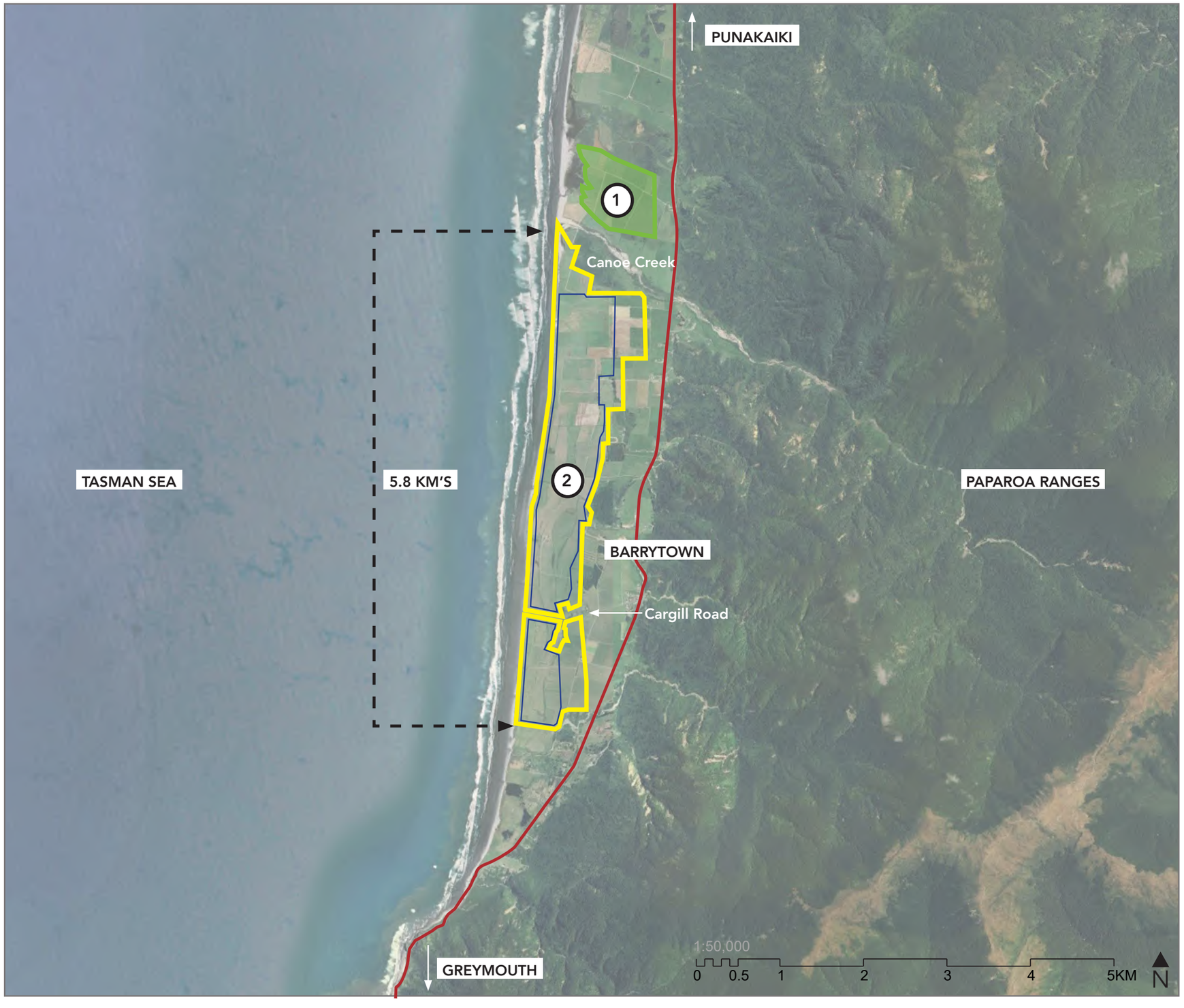
1.0 PROPOSED MINING AREA



KEY

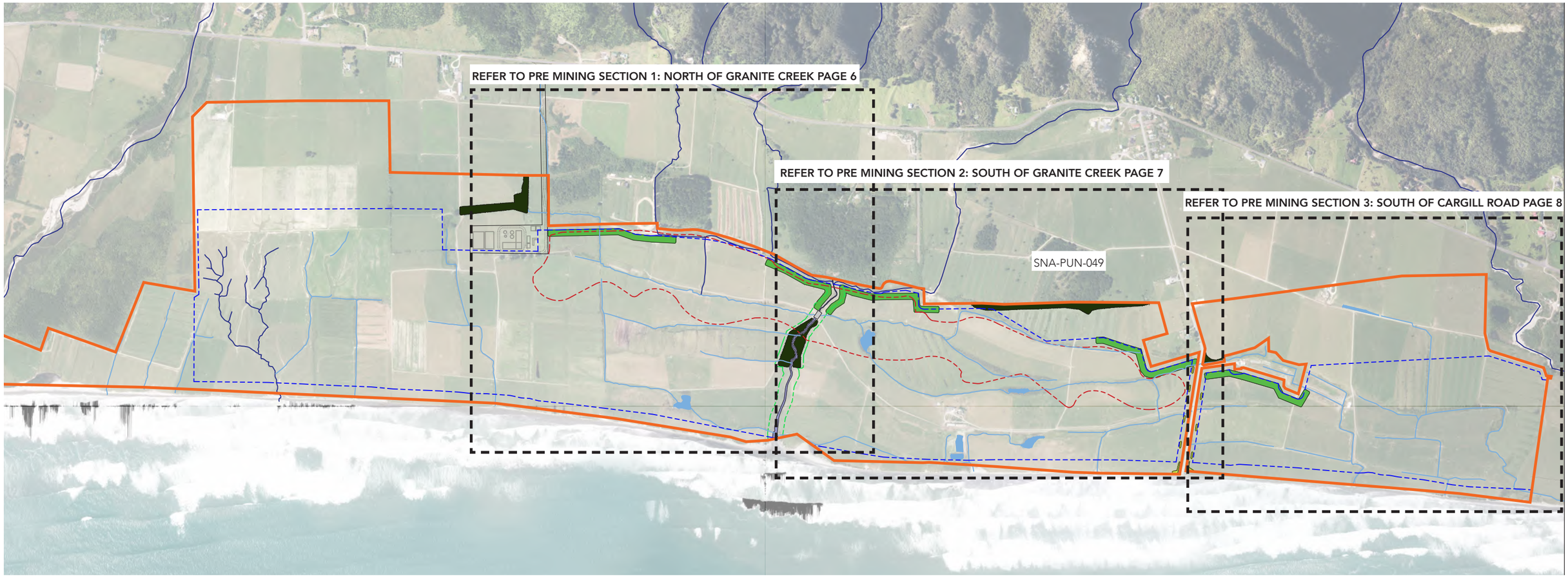
- PREVIOUS APPLICATION AREA (CONSENTED)
- PROPOSED CONSENT AREA
- PROPOSED MINING DISTURBANCE AREA
- COAST ROAD/ STATE HIGHWAY 6

1 **CENTRAL BLOCK (CB)**
A favorable decision for the CB Mineral Sands Project was delivered by commissioners in April 2024 but was subsequently appealed. A successful resolution was reached in October 2024.
This area is not part of this application.

2 **SOUTHERN BLOCK (SB)**
This area is part of this Fast Track application and includes the mining disturbance area.

LANDSCAPE MITIGATION - PRE-MINING

2.0 LANDSCAPE MITIGATION - PRE-MINING KEY PLAN



KEY

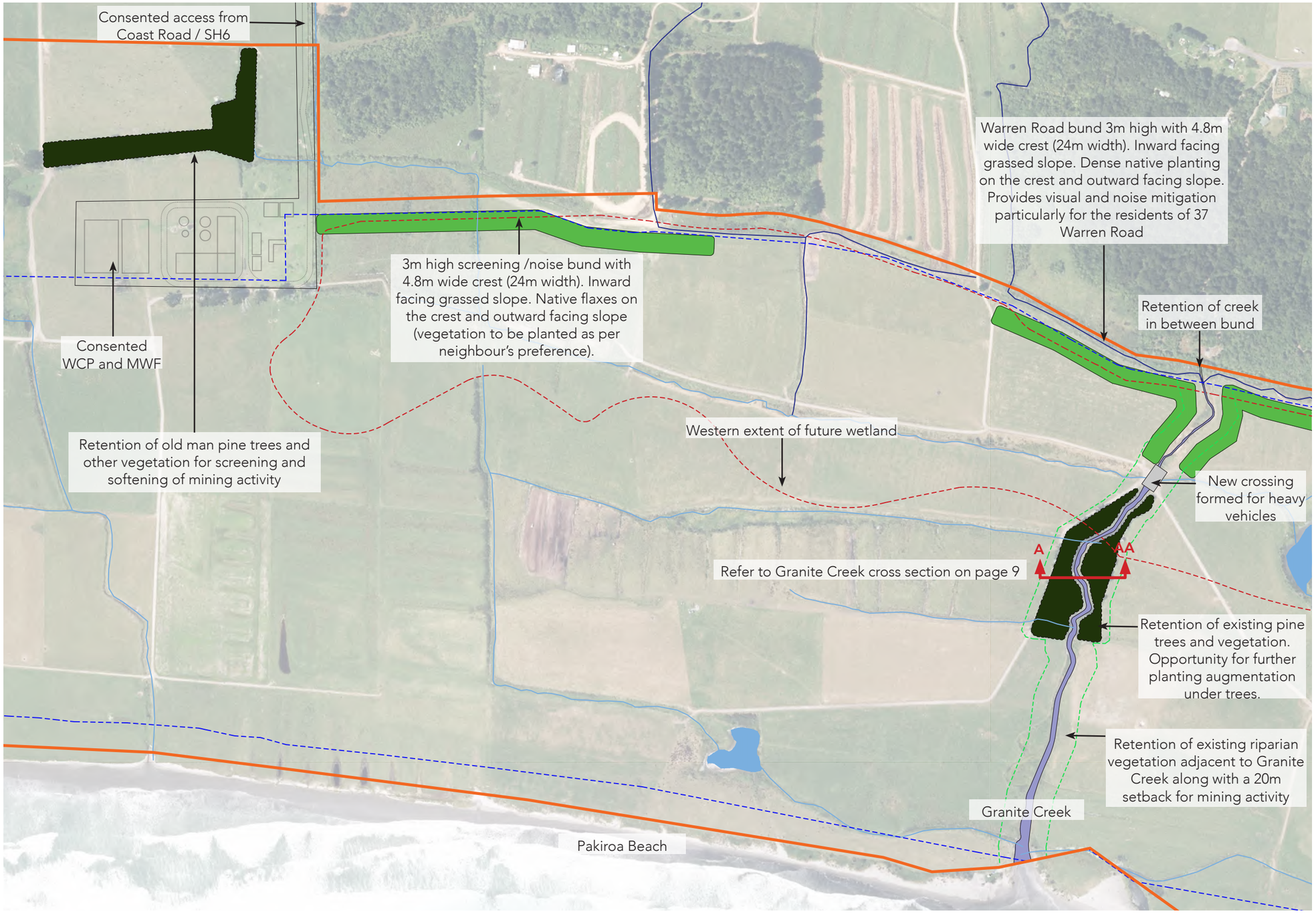
- New Native Vegetation
- Retention of Key Vegetation Areas
- New Planted Bunds (For noise and visual purposes)
- Granite Creek (To be retained)
- Consent Area
- Mining Disturbance Setback (Typically 20m Wide Unless Indicated Otherwise)
  - 20m from SNA-PUN-049
  - 20m from private property boundaries outside SRB
  - 20m from Granite Creek
  - 50m from MHWS
- 20m Setback from Granite Creek
- Existing River
- Existing Drain
- Future Wetland Area

1:15,000

0 100 500 1000 1500M N

Note:
The aim of this Pre-Mining Key Plan is to set out the different landscape areas to undergo landscape mitigation prior to mining commencing. Each of the black boxes refers to an individual sheet (page). These pages correspond with the Mining Sections (stages) outlined in the Project Description accompanying the application.

3.0 LANDSCAPE MITIGATION - PRE-MINING SECTION 1: NORTH OF GRANITE CREEK



KEY

- Retention of Key Vegetation Areas
- Granite Creek (To be retained)
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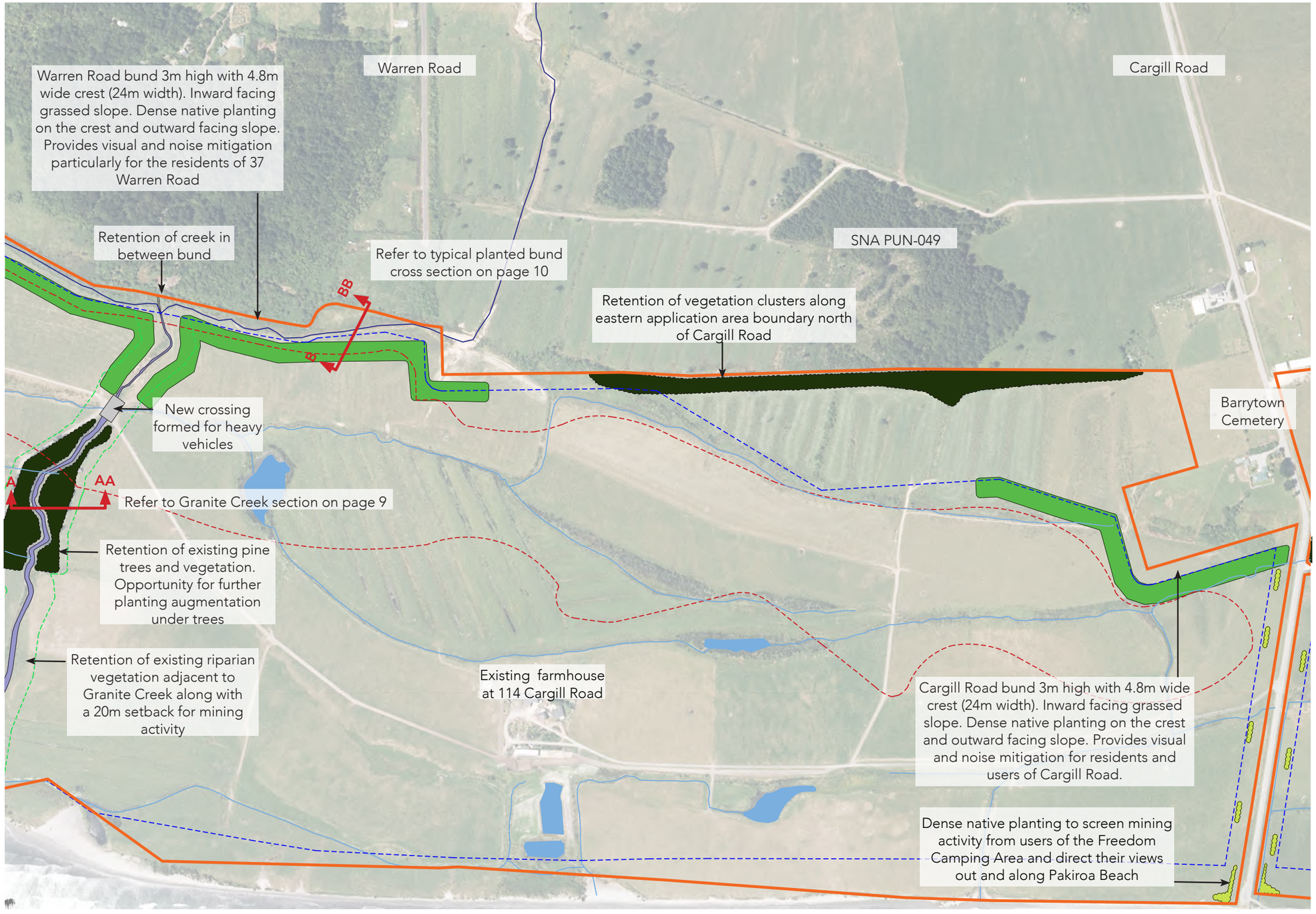
- Existing River
- Existing Drain
- Future Wetland Area

1:5,000

0 50 100 200 300 400 500M N

3.0	LANDSCAPE MITIGATION	PRE-MINING SECTION 1: NORTH OF GRANITE CREEK	PROJECT NUMBER 2410	REVISION C	SCALE 1:5000@A3 1:2500@A1	DESIGN: GHLA DRAWN: EM APPVD: NC	DATE 3/03/2026

4.0 LANDSCAPE MITIGATION - PRE-MINING SECTION 2: SOUTH OF GRANITE CREEK



KEY

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  - 50m from MHWS
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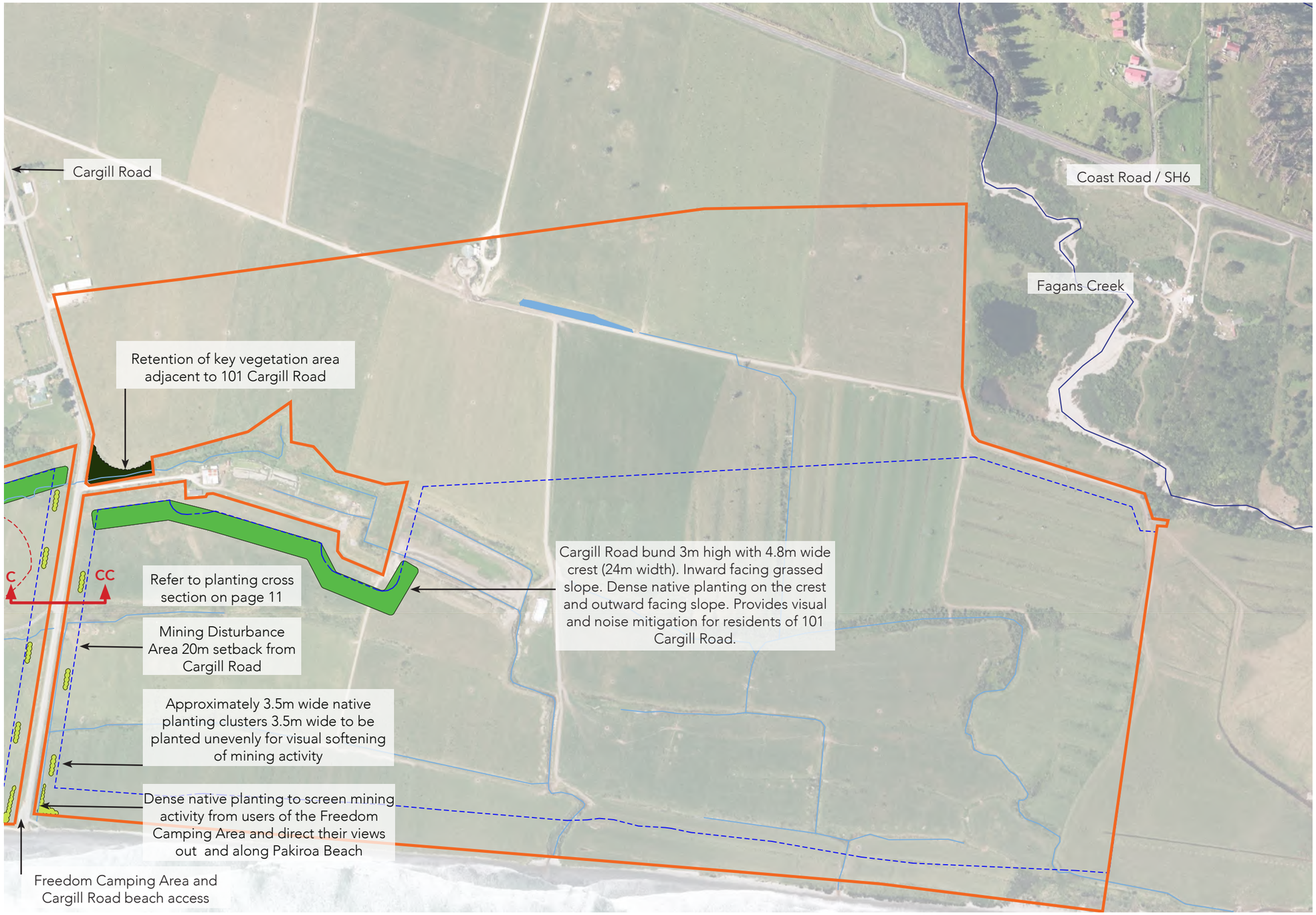
- Existing River
- Existing Drain
- Future Wetland Area

1:5,000

0 50 100 200 300 400 500M N

4.0	LANDSCAPE MITIGATION	PRE-MINING SECTION 2: SOUTH OF GRANITE CREEK	PROJECT NUMBER 2410	REVISION C	SCALE 1:5000@A3 1:2500@A1	DESIGN: GHLA DRAWN: EM APPVD: NC	DATE 3/03/2026

5.0 LANDSCAPE MITIGATION - PRE-MINING SECTION 3: SOUTH OF CARGILL ROAD



KEY

- New Native Vegetation
- Retention of Key Vegetation Areas
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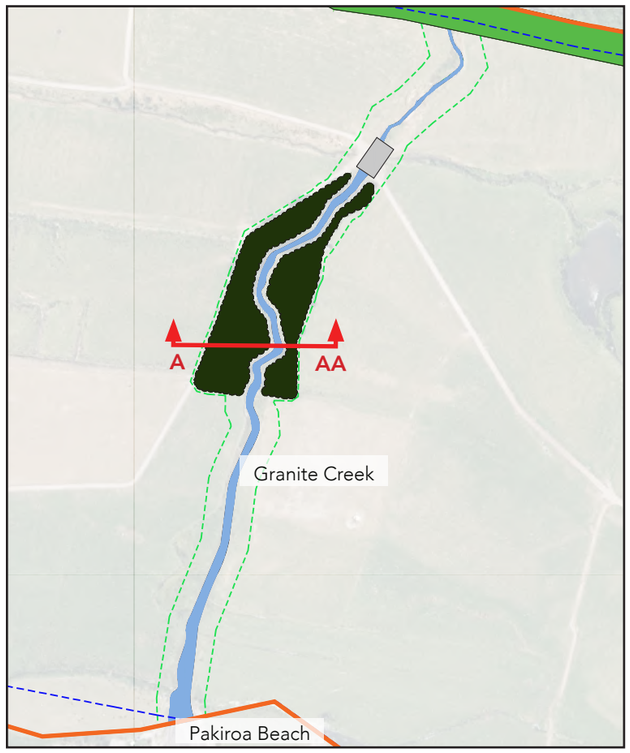
- Consent Area
- Mining Disturbance Setback (Typically 20m Wide Unless Indicated Otherwise)
  - 20m from SNA-PUN-049
  - 20m from private property boundaries outside SRB
  - 20m from Granite Creek
  - 50m from MHWS
- 20m Setback from Granite Creek
- Existing River
- Existing Drain

1:5,000

0 50 100 200 300 400 500M N

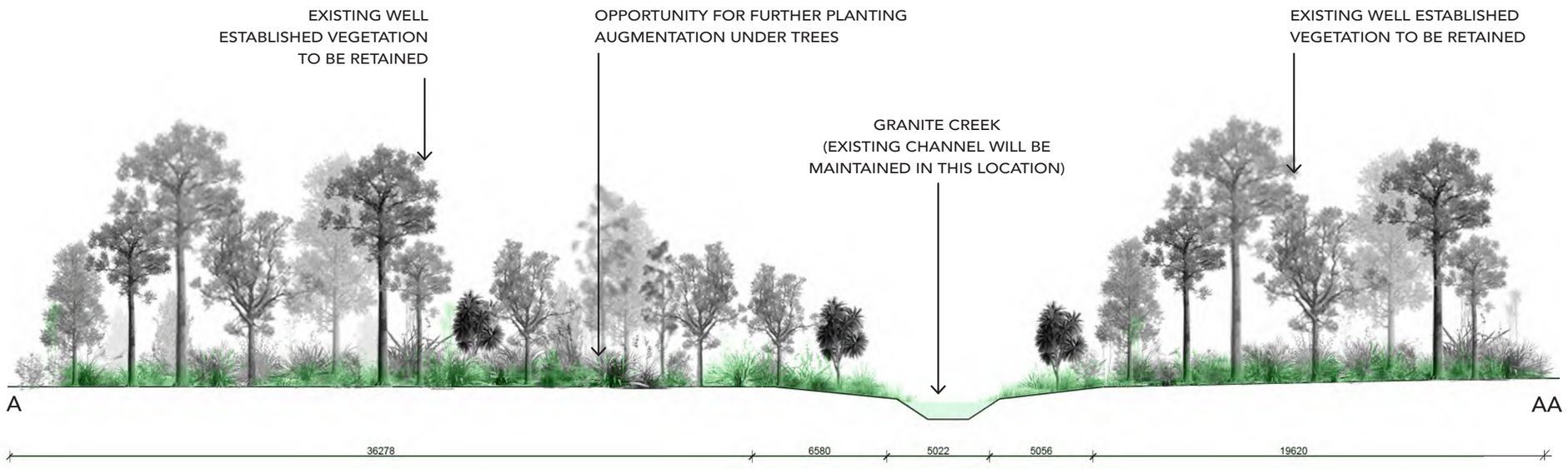
5.0	LANDSCAPE MITIGATION	PRE-MINING SECTION 3: SOUTH OF CARGILL ROAD	PROJECT NUMBER 2410	REVISION C	SCALE 1:5000@A3 1:2500@A1	DESIGN: GHLA DRAWN: EM APPVD: NC	DATE 3/03/2026

6.0 LANDSCAPE MITIGATION - PRE-MINING GRANITE CREEK



KEY PLAN - PRE MINING SECTION 1 FROM PAGE 6

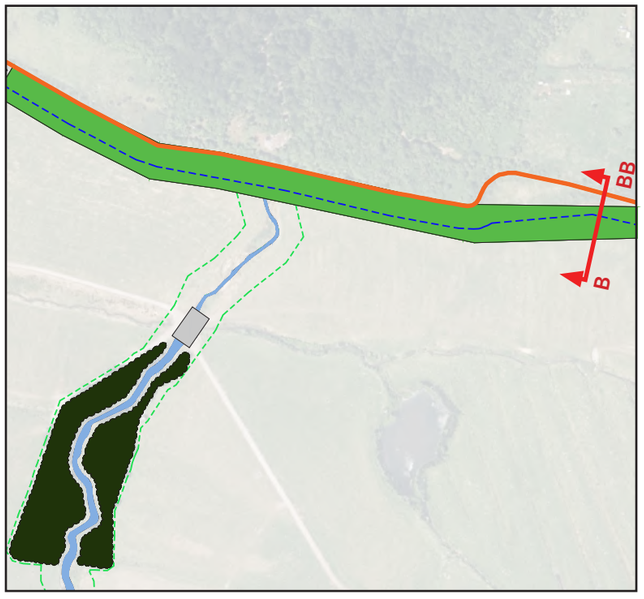
Existing planting adjacent to Granite Creek (to be retained)



SECTION A-AA_GRANITE CREEK SECTION - VEGETATION TO BE RETAINED
SCALE 1:250

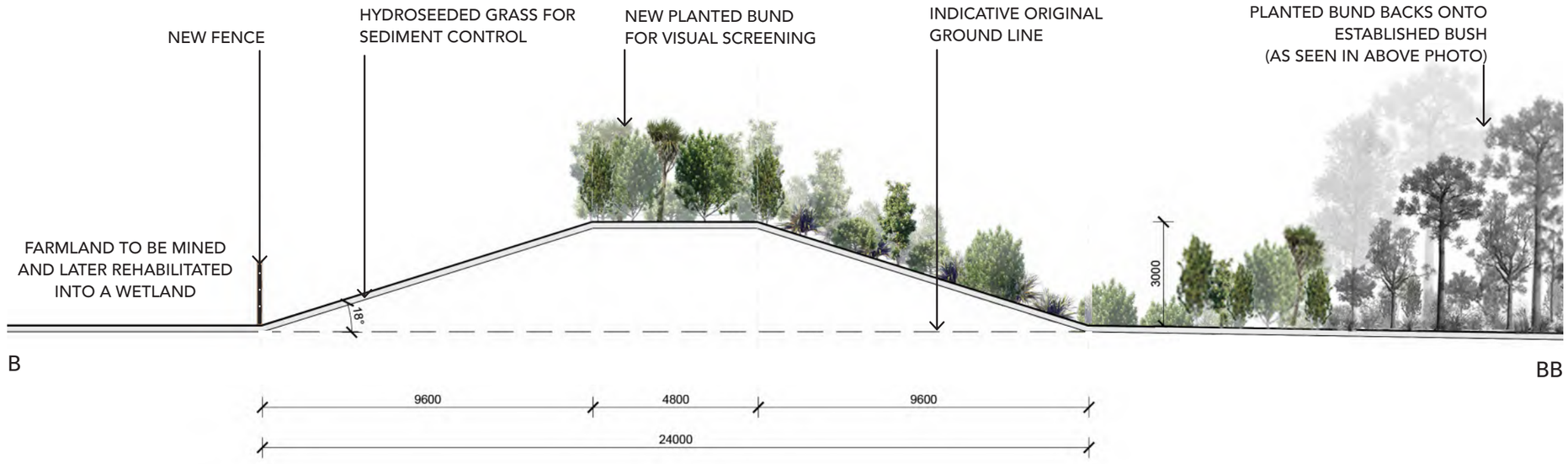
6.0	LANDSCAPE MITIGATION	PRE-MINING GRANITE CREEK	PROJECT NUMBER 2410	REVISION C	SCALE 1:250 @ A3	DESIGN: GHLA DRAWN: EM APPVD: NC	DATE 3/03/2026

7.0 LANDSCAPE MITIGATION - PRE-MINING PLANTED BUNDS



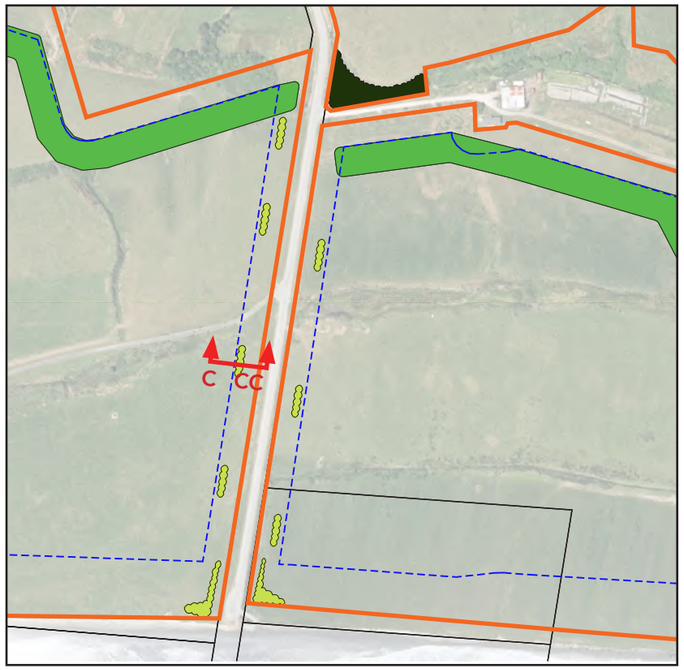
KEY PLAN - PRE MINING SECTION 2 FROM PAGE 7

Existing farm environment and adjacent bush, near where the new Warren Road planted bund will be located



B-BB BUND _ TYPICAL 3M HIGH BUND
SCALE 1:150

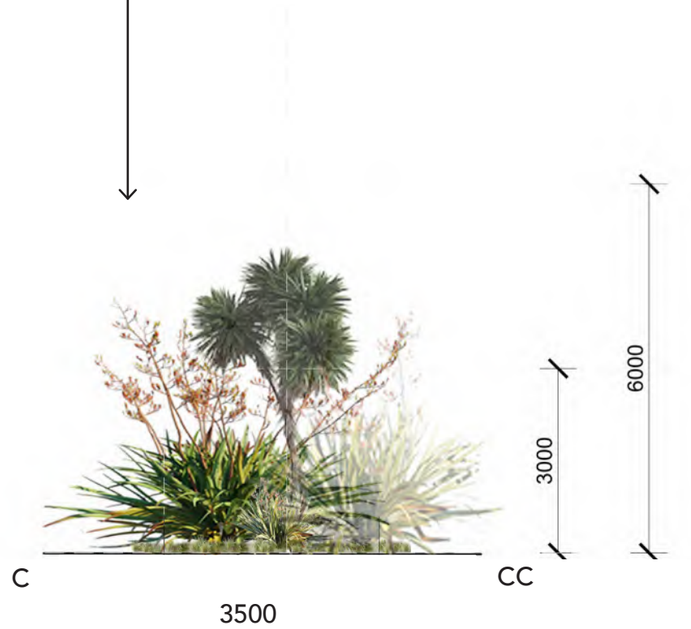
8.0 LANDSCAPE MITIGATION - PRE-MINING CARGILL ROAD NATIVE PLANTING



KEY PLAN - PRE MINING SECTION 3 FROM PAGE 8

INDICATIVE CLUSTER SCREENING PLANTING - PLAN
SCALE 1:100

MULTIPLE ROWS OF STAGGERED VISUAL SCREENING FOR SOFTENING OF MINING ACTIVITIES
(Mixture of flax and small trees).

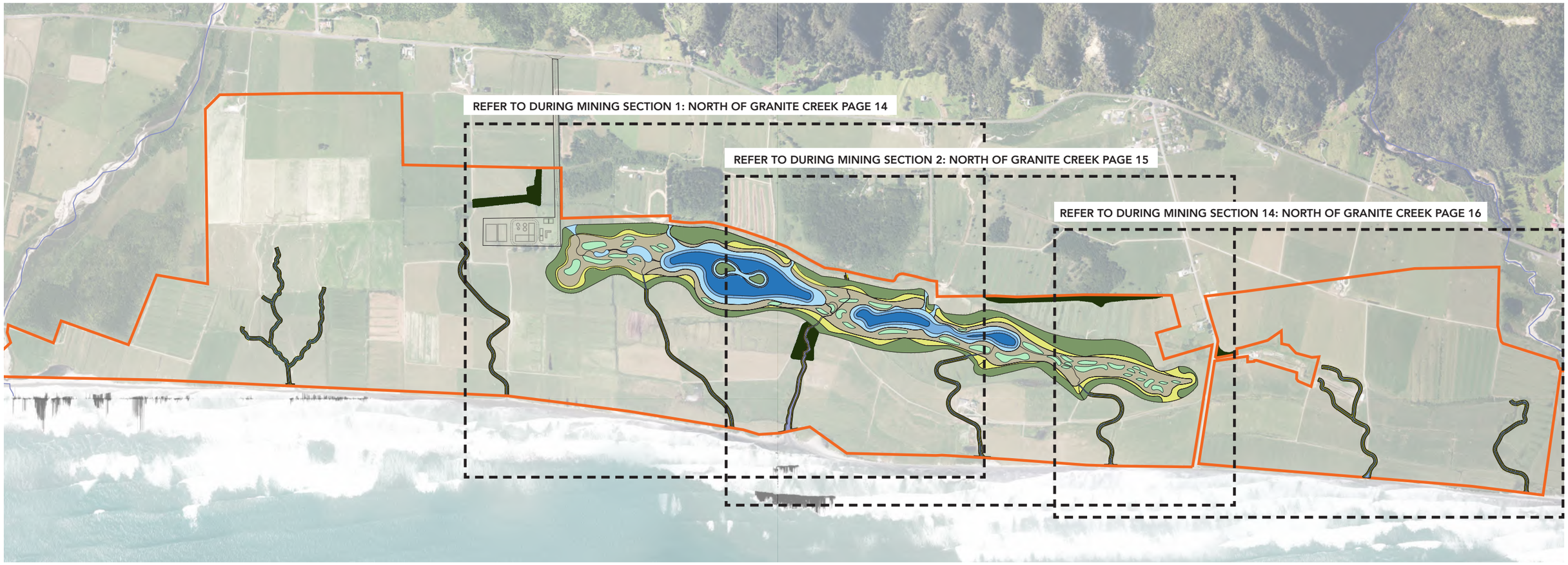


INDICATIVE CLUSTER SCREENING PLANTING - SECTION C-CC
SCALE 1:100

Note:
The section shows a typical design for the clusters of planting that will be implemented along Cargill Road within the 20 metre setback area. The aim is to screen and soften some of the mining activity when it comes closest to Cargill Road. This is balanced with the desire to maintain some views up and down the coast and not create a 'tunnel' effect along Cargill Road.

LANDSCAPE REHABILITATION - DURING MINING

9.0 LANDSCAPE REHABILITATION PLAN - DURING MINING KEY PLAN



KEY

- Shallow Marsh - Average Depth 0.4m
- Mid-depth Water - Average Depth 1m
- Deep Open water - Average Depth 2m
- Flaxland and Dry Edge Vegetation
- Carex Rushlands
- Raupo Wetland
- Raised Islands
- Riparian Planting
- Existing Planting to be Retained
- Consent Area

1:15,000

0 100 500 1000 1500M

N

Note:
The aim of this During Mining Key Plan is to set out the different landscape areas to be rehabilitated into a large wetland and smaller riparian margins during mining. Each of the black boxes refers to an individual sheet (page). These pages correspond with the Mining Sections (stages) outlined in the Project Description accompanying the application. The end goal is to have a well functioning large connected wetland of about 53.7 hectares in size.

10.0 LANDSCAPE REHABILITATION PLAN - DURING MINING SECTION 1: NORTH OF GRANITE CREEK

Refer to cross sections DD and EE on page 17 for further planting details

DD

D

EE

E

Warren Road

Connects to wetland plan on page 15

Realigned and rehabilitated waterbody after mining has passed through area

Granite Creek (existing alignment to be retained)

Pakiroa Beach

KEY

- Shallow Marsh - Average Depth 0.4m
- Mid-depth Water - Average Depth 1m
- Deep Open water - Average Depth 2m
- Flaxland and Dry Edge Vegetation
- Carex Rushlands
- Raupo Wetland
- Raised Islands
- Riparian Planting
- Existing Planting to be Retained
- Consent Area

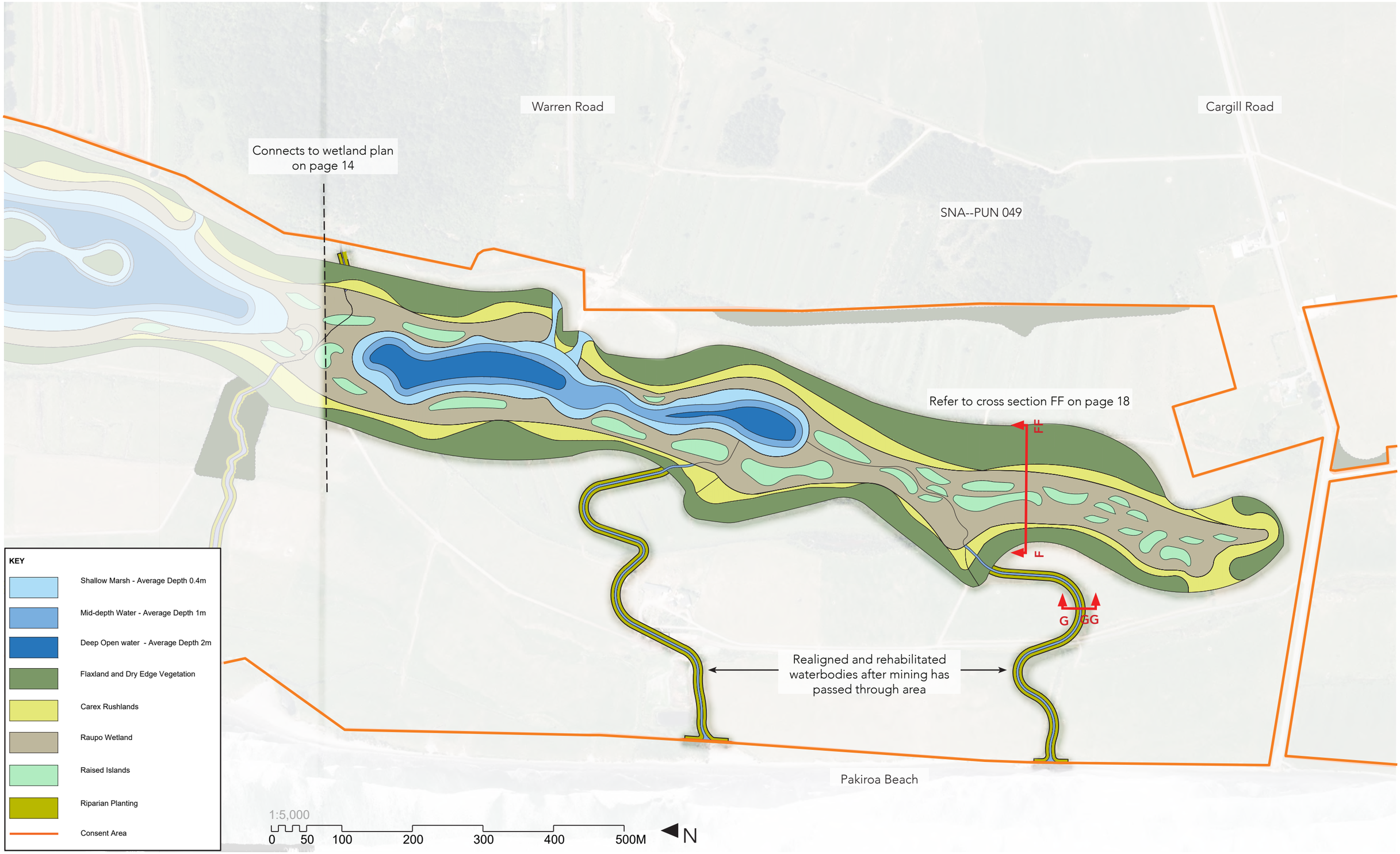
1:5,000

0 50 100 200 300 400 500M

N

10.0	LANDSCAPE MITIGATION	DURING MINING SECTION 1: NORTH OF GRANITE CREEK	PROJECT NUMBER 2410	REVISION C	SCALE 1:5000 @ A3	DESIGN: GHLA DRAWN: EM APPVD: NC	DATE 3/03/2026	14

11.0 LANDSCAPE REHABILITATION PLAN - DURING MINING SECTION 2: SOUTH OF GRANITE CREEK

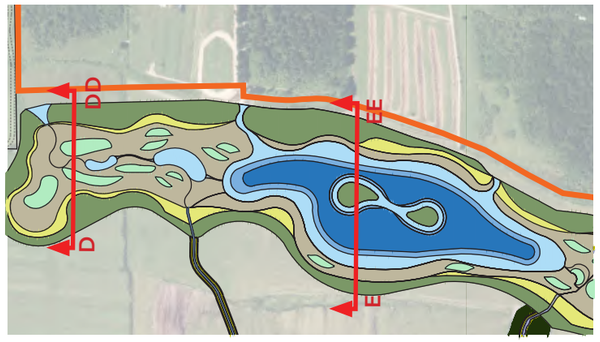


11.0	LANDSCAPE MITIGATION	DURING MINING SECTION 2: SOUTH OF GRANITE CREEK	PROJECT NUMBER 2410	REVISION C	SCALE 1:5000 @ A3	DESIGN: GHLA DRAWN: EM APPVD: NC	DATE 3/03/2026

12.0 LANDSCAPE REHABILITATION PLAN - DURING MINING STAGE 3: SOUTH OF CARGILL ROAD

12.0	LANDSCAPE MITIGATION	DURING MINING SECTION 3: SOUTH OF GRANITE CREEK	PROJECT NUMBER 2410	REVISION C	SCALE 1:5000 @ A3	DESIGN: GHLA DRAWN: EM APPVD: NC	DATE 3/03/2026

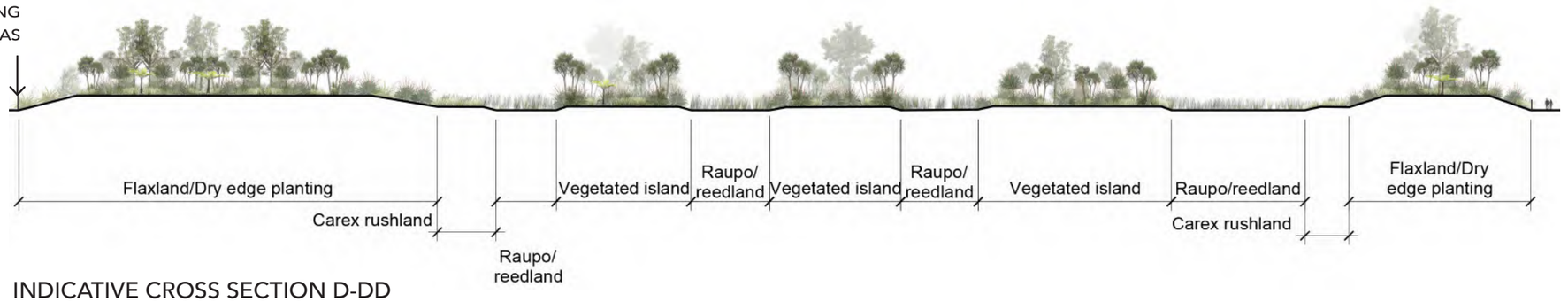
13.0 LANDSCAPE REHABILITATION - DURING MINING SECTION 1: NORTH OF GRANITE CREEK



KEY PLAN - DURING MINING SECTION 1 FROM PAGE 13

Note:
The design and layout of the well functioning large connected wetland has been informed by Landscape Architects, Ecologists and Hydrologists working together.

NEW STOCK PROOF FENCING ON THE OUTSIDE OF ALL THE PLANTING AREAS

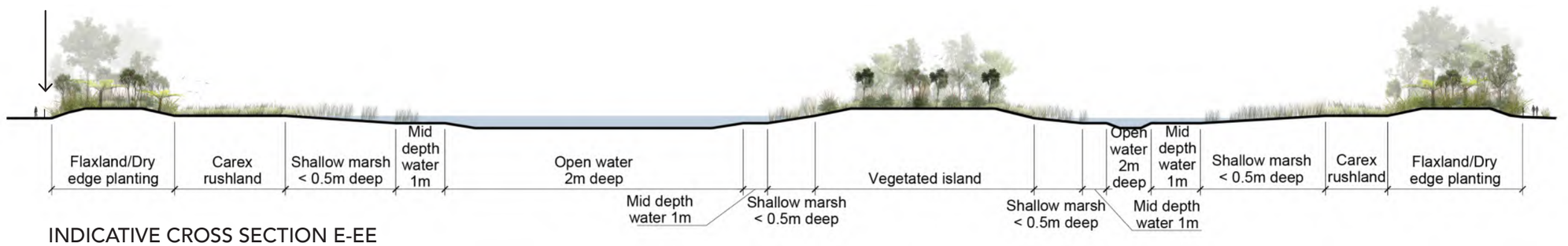


INDICATIVE CROSS SECTION D-DD

1:750

0 5 10 20 30 45 60M

NEW STOCK PROOF FENCING ON THE OUTSIDE OF ALL THE PLANTING AREAS



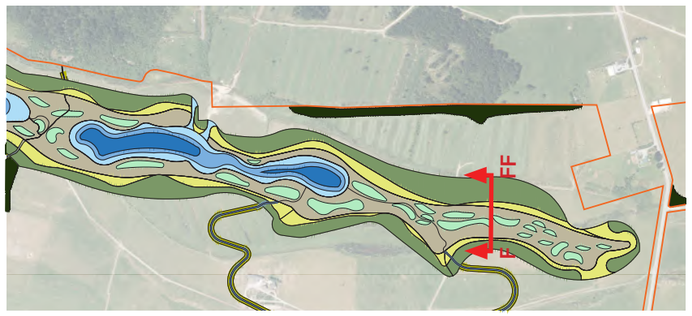
INDICATIVE CROSS SECTION E-EE

1:1,000

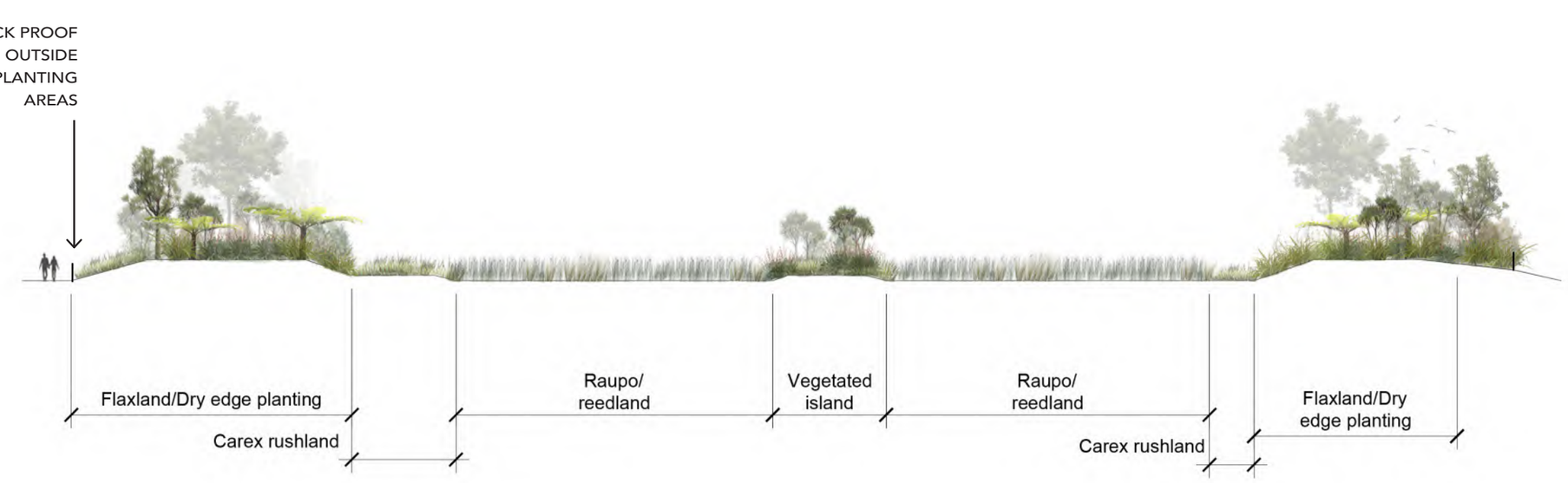
0 10 20 30 40 50 60 70 80 90 100M

13.0	LANDSCAPE MITIGATION	DURING MINING SECTION : NORTH OF GRANITE CREEK	PROJECT NUMBER 2410	REVISION C	SCALE AS SHOWN	DESIGN: GHLA DRAWN: EM APPVD: NC	DATE 3/03/2026

14.0 LANDSCAPE REHABILITATION - DURING MINING SECTION 2: SOUTH OF GRANITE CREEK



KEY PLAN - DURING MINING SECTION 2 FROM PAGE 13

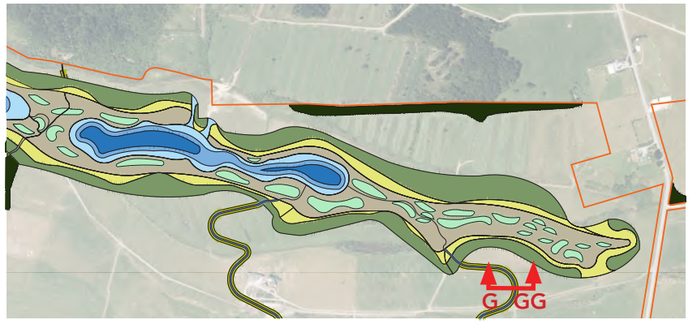


INDICATIVE CROSS SECTION F-FF

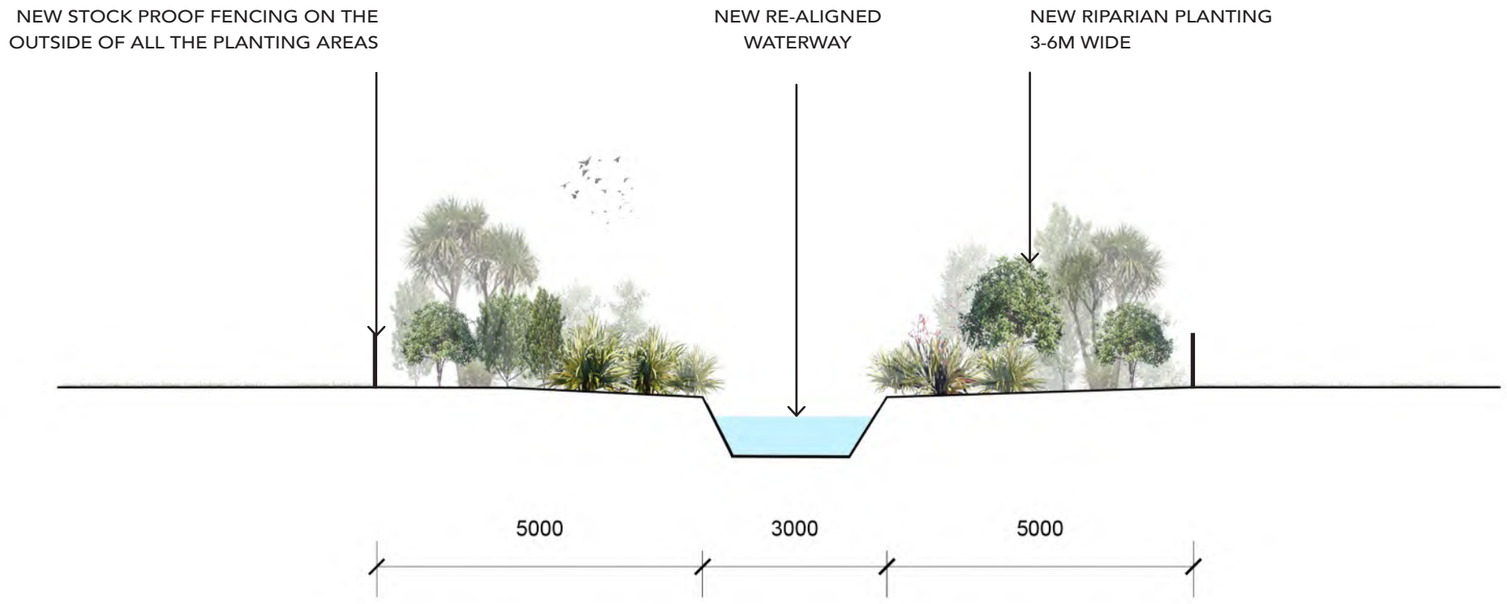
1:500

0 5 10 20 30 40 50M

15.0 LANDSCAPE REHABILITATION - DURING MINING SECTION 2: REALIGNED WATERWAY



KEY PLAN - DURING MINING SECTION 2 FROM PAGE 13



INDICATIVE CROSS SECTION G-GG

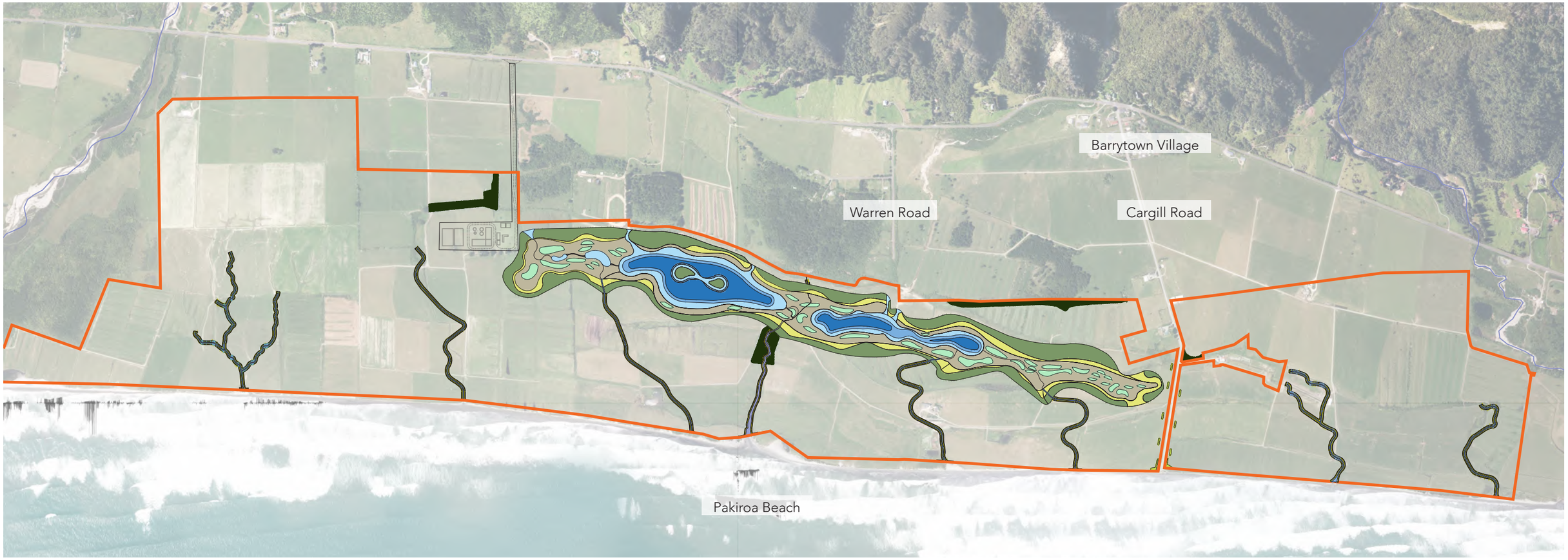
1:500

0 5 10 20 30 40 50M

Note:
Cargill Road will not be realigned.

LANDSCAPE REHABILITATION - POST MINING

16.0 LANDSCAPE REHABILITATION PLAN - POST MINING FINAL OUTCOME: SECTIONS 1, 2 & 3 COMBINED



KEY

- Shallow Marsh - Average Depth 0.4m — Total Area: 5.2ha
- Mid-depth Water - Average Depth 1m — Total Area: 2.8ha
- Deep Open water - Average Depth 2m — Total Area: 5.3ha
- Flaxland and Dry Edge Vegetation — Total Area: 15.3ha
- Carex Rushlands — Total Area: 5.3ha
- Raupo Wetland — Total Area: 15.6ha
- Raised Islands — Total Area: 4.1ha
- Riparian Planting — 3-6m in width either side of channel
- Existing Planting to be Retained
- Consent Area

TOTAL WETLAND AREA: 53.7ha Approximately

1:15,000

0 100 500 1000 1500M

N

Note:
At the completion of mining activity the consent area will have:

- The existing planting areas that were retained
- Clusters of new planting along Cargill Road
- New riparian planting along waterbodies (four primary ones which have been realigned, plus Granite Creek)
- An extensive well functioning connected new wetland of approximately 53.7 hectares.

16.0	LANDSCAPE MITIGATION	DURING MINING FINAL OUTCOME: SECTIONS 1, 2 & 3 COMBINED	PROJECT NUMBER 2410	REVISION C	SCALE 1:10,000@A3 1:5000@A1	DESIGN: GHLA DRAWN: EM APPVD: NC	DATE 3/03/2026

17.0 LANDSCAPE SPECIES AND INDICATIVE GROWTH RATES

Below are the plant species that will be used for mitigation and rehabilitation planting.

- An approximate growth rate of 0.40-0.60m per year has been determined in consultation with the project Landscape Architect [Mrs Crawford] and project Ecologist [Mr Bramley]. The combined experience of these two individuals notes that these plants will sit at a lower growth rate for the first two years following planting, and will have an increase in growth rates in following years. It is also noted that larger individual specimens have a longer 'sitting' period than smaller ones.
- Growth rates can be influenced by seasonal fluctuations, maintenance, moisture/precipitation, exposure, ground conditions, and type of plant species.
- **Note:** The plant species proposed to be used are shown in Schedule of Species below, although other similar species may be used in addition to those listed (e.g., if a particular species is unavailable to source or if for any reason a species is deemed unsuitable at a later stage).

INDICATIVE PLANT GROWTH

Year of growth	Native Plant Height
1	Seed Collection
2	0.4 - 0.6m at planting
3	0.8 - 1.2m
4	1.2 - 1.8m
5	1.6 - 2.4m
6	2.0 - 3.0m
7	2.4 - 3.6m
8	2.8 - 4.2m
9	3.2 - 4.8m

SCIENTIFIC NAME	COMMON NAME	SCREENING	BUND	RIPARIAN	WETLAND	ULTIMATE SIZE (m) wxh
Aristotelia serrata	makomako, wineberry		x	x		3 x 6
Carex geminata	rautahi			x	x	1x1
Carex secta	purei			x	x	1.5 x1.5
Carex virgata	pukio	x	x	x	x	0.5 x 1
Coprosma propinqua	mikimiki	x	x	x	x	2.5 x 5
Coprosma robusta	karamu		x	x	x	2.5 x 5
Cordyline australis	tī kōuka, cabbage tree			x	x	2 x 6
Dacrycarpus dacrydioides	kahikatea, white pine			x	x	5 x 50
Juncus edgariae	edgar's rush			x	x	1 x 1
Metrosideros robusta	northern rata		x	x	x	3 x 15
Melicytus ramiflorus	māhoe, whiteywood		x	x	x	2.5 x 8
Phormium tenax	harakeke, korari, New Zealand flax	x	x	x		2 x 3
Pittosporum eugenioides	tarata, lemonwood		x	x		3 x 6
Pittosporum tenuifolium	kohuhu		x	x	x	3 x 6
Rhopalostylis sapida	nīkau	x	x			3 x 15
Typha orientalis	raupō, bull rush				x	1.5 x 2.3

18.0 PLANTING PALETTE

TREES

Aristotelia serrata
Makomako / Wineberry

Cordyline australis
Cabbage tree

Dacrycarpus dacrydioides
Kahikatea / White Pine

Metrosideros robusta
Northern Rata

Melicytus ramiflorus
Mahoe / Whiteywood

Pittosporum eugenioides
Tarata / Lemonwood

NATIVE SHRUBS

Pittosporum tenuifolium
Kohuhu / Black Matipo

Rhoplostylis spaida
Nīkou

Carex geminata
Rautahi, Cutty grass

Carex secta
Makura Sedge

Carex virgata
Pukio / Swamp Sedge

Juncus edgariae
Wiwi

Coprosma propinqua
Mingimingi

Coprosma robusta
Karamu

Typha orientalis
Raupo /Bull rush

Phormium tenax
Harakeke / NZ Flax

Appendix D

Archaeological report

New Zealand
Heritage Properties Ltd
Investing In Our Heritage

Barrytown Mineral Sands Project – Southern Resources Block

An Archaeological Assessment for the Southern Resource Block (SRB)

Report Prepared for TiGa Minerals and Metals Ltd
c/-Tai Poutini Resources Ltd
Author: Bree Wooller
Reviewed by: Dr Naomi Woods

Barrytown Mineral Sands Project – Southern Resources Block

An Archaeological Assessment for the Southern Resource Block (SRB)

Prepared by New Zealand Heritage Properties Ltd
Dunedin | Invercargill | Christchurch & Wellington (trading as Underground Overground Archaeology Ltd)
+643 477 3933 | www.heritageproperties.co.nz

Project Details

Archaeological Site No.	K31/11, K31/12
Site Address	Mining disturbance area within the Southern Resource Block, Barrytown, Greymouth. Encompassing 20 land parcels: Section 7, Block V, Waiwhero SD Part Section 5 Block IX Waiwhero SD Lot 1 DP 406050 Part RS 2634 Part RS 2635 Part RS 2639 Part RS 2928 RS 2929 RS 2930 RS 2931 RS 2932 RS 2933 RS 4033 RS 3316, Lot 1 DP 3548 Lot 1 DP 2719 Road reserve parcel ID 3700202 Road reserve parcel ID3702892 Road reserve parcel ID 3699494 RS 2927
Client	TiGa Minerals and Metals Ltd c/- Tai Poutini Resources Ltd
Client Contact	Luke McNeish, Tai Poutini Resources Ltd
Client Address	100 Mackay Street, Greymouth 7805
Report Authors	Bree Wooller
Reviewed By	Dr Naomi Woods, Megan Lawrence, Victoria Ross
Nominated s45 Approved Person	Bree Wooller
Report Submitted To	TiGa Minerals and Metals Ltd c/- Tai Poutini Resources Ltd, Grey District Council, and Heritage New Zealand Pouhere Taonga
Document Control ID	J012014_AA_REV D

Document Control

Revision No.	Date Submitted	Description	Prepared By	Reviewed By
A	20/01/2025	Issued to client, client forwarded on to Ngāti Waewae.	BW	NW, ML
B	27/02/2025	Minor edits from the client, updating text and figures to reflect change in consent area	BW	NW, VR
C	16/06/2025	Minor edits following HNZPT pre-application meeting	BW	NW
D	13/02/2026	Edits after client legal review and refinement of project scope for FH application	BW	NW, DC

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This report has been prepared for the sole use of the client in relation to a specific work program described in Section 1.2 of this assessment. This report and the information contained herein are subject to copyright. Ownership of the primary materials created in the course of the research remains the property of the named researchers and New Zealand Heritage Properties Ltd. This report remains the property of the client and New Zealand Heritage Properties Ltd. The professional advice and opinions contained in this report are those of the consultants, New Zealand Heritage Properties Ltd, and do not represent the opinions and policies of any third party. The professional advice and opinions contained in this report do not constitute

legal advice and are only current for the proposed work as described in Section 1.2. This report does not represent the views or cultural values of tangata whenua.

Cover Photo: Looking west down Cargill Road, towards the project area before dredging. West Coast Recollect (1930) 'Barrytown Hotel 1930s'. Available at: https://westcoast.recollect.co.nz/nodes/view/20884?type=all.

Executive Summary

TiGa Minerals and Metals Ltd are proposing to undertake mineral sand mining activities across 411.69ha at Barrytown, Grey District, West Coast. New Zealand Heritage Properties Ltd (NZHP) has been commissioned by Luke McNeish of Tai Poutini Resources Ltd on behalf of the clients to undertake an archaeological assessment of the mining disturbance zone within the Southern Resource Block (SRB), Barrytown, Greymouth (encompassing 20 land parcels, see project detail table above) for an archaeological authority application and resource consent application. The area outside of the mining disturbance zone is not covered by this assessment. This assessment considers the impact that the proposed works will have on any archaeological sites that are present within the project area.

This assessment identified that the project area was traversed by an ara tawhito, with manawhenua travelling through the area. The wetland areas in the east of the project area likely provided sources of mahinga toi and kai, while the dune systems along the western perimeter may have provided nohoanga. The two archaeological sites in the project area (K31/11, K31/12) were both find spots possibly relating to wetland artefact caching behaviours. The site survey found no evidence to suggest either find spot was related to other archaeological features in the vicinity of the recorded site, and therefore neither site will be affected by the proposed works. The site survey identified an area of raised dunes on the western perimeter of the site which might have been a suitable spot for a nohoanga. The coastal margin of the site may contain midden/oven sites, while other findspots may be encountered across the project area including in areas previously disturbed by dredging activity and hump and hollowing.

Later nineteenth century occupation of the project area centred on miners' blacksanding along the foreshore and squatting nearby. The historical record identified several mining claims and hut sites along the foreshore as well as the first Barrytown School. The first school site is in the dredge zone so no archaeology will remain in situ. There is reasonable cause to suspect that unrecorded gold-mining and historic-domestic sites will be encountered along the coastal margin. The location of these sites cannot be identified with certainty due to nature of early transient occupation in the area.

Although the project area has undergone a large amount of surface modification, the dredged areas may contain redeposited archaeological material not in situ. Hump and hollowed areas may have intact archaeology under the humps. As the history of the area records largely transient and ephemeral occupation across the project area, archaeology could be encountered anywhere across the site. NZHP has identified areas where there is a higher potential for archaeological remains to be encountered. Due to the scale of the mining operation, there is no scope for earthworks within the mining disturbance area to avoid archaeology.

This archaeological assessment has identified that there is reasonable cause to suspect that unrecorded artefact find spots, midden/oven sites, mining-gold and historic-domestic sites are present within the project area and will be affected by the proposed mineral sand mining. The unrecorded sites are considered to have **medium** archaeological value. Due to the nature of the proposed works the overall impact of the works on the archaeological values of unrecorded sites will be moderate to major.

For the purposes of the FTAA, NZHP has also considered the significance of any adverse impact of the proposed works on the archaeological landscape more broadly. Given the archaeological monitoring of high-potential areas, recording, analysis and reporting on any archaeological or heritage features modified by the proposed works (as set out in more detail below) NZHP supports approvals being granted under the FTAA, including a resource consent application and archaeological authority to modify the sites and considers in the wider context of the sites (i.e. private farmland) that the adverse impacts will be **low in significance.**

On the basis of this assessment, NZHP supports this application with the following recommendations:

1. **Authority Application:** As the proposed works described in Section 1.2 could affect unrecorded archaeological sites, an archaeological authority under Section 44 of the HNZPTA 2014 must be obtained from HNZPT prior to any modification of the site.
    a. The previously recorded sites (K31/11, K31/12) are destroyed so will not be impacted.
    b. If development plans are altered from those reviewed for this assessment, then HNZPT and NZHP must be alerted, as any changes may alter the assessment of effects or invalidate the authority.

2. **Protection of sites/features:** As a first principle, every practical effort must be made to avoid damage to any archaeological site, whether known, or discovered during any redevelopment of the site.
    a. **Drystone structure under Cargills Road -** To avoid damaging the structure the Cargill Road bund should not be built up against this structure. The use of heavy machinery should by limited or monitored in proximity to the structure, to limit the potential damage from vibrations. Dust and vibration plans, when finalised by the client, should be provided to NZHP to inform future protections for the structure as necessary.

3. **Site Instruction:** All works must be carried out in accordance with a site instruction. Any amendments to the site instruction will require prior written approval from HNZPT. The site instruction will include the points outlined in Section 10.2.2.

4. **Contractor Briefing:** All contractors working on the project must be briefed by the s45 approved person (or person nominated on their behalf) on the possibility of encountering archaeological evidence, how to identify possible archaeological sites/features during works, the archaeological work required by the conditions of the authority, and contractors' responsibilities with regard to notification of the discovery of archaeological evidence to ensure that the authority conditions are complied with. NZHP recommends that the briefing be undertaken in an office space to best enable the briefing to be presented digitally, thus maximising engagement.

5. **Archaeological Monitoring:** All earthworks that may affect an archaeological site must be monitored by the s45 approved person (or person nominated on their behalf) in accordance with the site instruction.
    a. Any archaeological features and material encountered shall be recorded, analysed, and interpreted in accordance with current archaeological practice and as outlined in the site instruction.

6. **Archaeology of Māori origin:** If archaeological material of Māori origin is discovered at any stage, all work must stop within 20m of the find. NZHP will assist the authority holder in contacting all relevant parties including tangata whenua via Ngāti Waewae and HNZPT in accordance with the site instruction.
    a. Any taonga tūturu are *prima facie* the property of the Crown who will be notified of the find. Taonga tūturu will be registered with the Ministry for Culture and Heritage. NZHP, in collaboration with manawhenua, shall notify the Ministry of Culture and Heritage and establish the most appropriate temporary storage, management and care for taonga tūturu, until such time as traditional or actual ownership is determined, with an appropriate institution or kaitiaki.

7. **Kōiwi (human remains):** Should kōiwi be encountered, all work must stop within 30m of the find. NZHP will assist the authority holder in contacting all affected parties as soon as practicable, including tangata whenua via Ngāti Waewae, HNZPT, and the police. The Ngāi Tahu policy for kōiwi tangata shall also be followed (Te Rūnanga o Ngāi Tahu, 2019).

8. **Reporting:**
    a. Within 20 working days of the completion of on-site archaeological work, the site record forms must be updated or submitted to ArchSite.

b. Within 12 months of the completion of on-site archaeological work, a final report on any archaeological material that is found must be prepared in accordance with *ASG12 Archaeological Report Guideline* (HNZPT, 2023) and submitted to HNZPT for inclusion in the digital library, Ngāti Waewae and to the Grey District Council.

Abbreviations

Abbreviation	Definition
HNZPT	Heritage New Zealand Pouhere Taonga
HNZPTA 2014	Heritage New Zealand Pouhere Taonga Act 2014
NZAA	New Zealand Archaeological Association
NZHP	New Zealand Heritage Properties Limited
RMA 1991	Resource Management Act 1991
SRB	Southern Resource Block

Glossary

The following terms were sourced from the Kāi Tahu Ki Otago Natural Resources Management Plan (Kāi Tahu Ki Otago, 2005) and Heritage New Zealand Pouhere Taonga (HNZPT, 2014).

Te Reo Māori	English
Hapū	Sub-tribe, extended whānau
Iwi	Tribe
Ngāi Tahu ki Otago	The four Papatipu Rūnaka and associated whānau and rōpū of the Otago Region
Kāika/Kaik/Kāinga	Settlement, place of residence
Karakia	Prayer, incantation
Kaumatua	Respected elder
Kōiwi / kōiwi	Human remains
Mahika kai/ Mahinga kai	Places where food is produced or procured
Mahika toi/ Mahinga toi	Places where non-food resources were gathered
Manawhenua	Those who exercise customary authority or rakātirataka
Papatipu	Original/traditional Māori land
Rakātira/Rangatira	Chief
Rakātirataka/Rangatiratanga	Chieftainship, decision-making rights
Rohe	Boundary
Rōpū	Group
Rūnaka/Rūnanga	Local representative group or community system of representation
Takata whenua/Tangata whenua	The iwi or hapū that holds mana whenua in a particular place
Takiwā	Area, region, district
Taoka/Taonga	Treasured object
Tapu	Sacred
Te Tai o Poutini	West Coast
Tikaka/Tikanga	Lore, customary values and practices
Tūpuna/Tīpuna	Ancestor
Umu	Earth oven
Umu-tī	Earth oven used for cooking cabbage tree (tī)
Urupā	Burial place
Wāhi Tapu	Places sacred to takata whenua
Whakapapa	Genealogy
Whānau	Family

Acknowledgements

New Zealand Heritage Properties acknowledges and thanks the following individuals who assisted in this project:

- Luke McNeish, Nichola Costley, Mike Meehan Tai Poutini Resources Ltd
- All the landowners who assisted with the survey
- Leah Harding (survey), John Parker (maps), Naomi Woods (project management), Victoria Ross (QC) from NZHP

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1 Introduction

TiGa Minerals and Metals Ltd are proposing to undertake mineral sand mining activities across 411.69 ha at Barrytown, Grey District, West Coast (Figure 1-1). New Zealand Heritage Properties Ltd (NZHP) has been commissioned by Luke McNeish of Tai Poutini Resources Ltd on behalf of TiGa Minerals and Metals Ltd to undertake an archaeological assessment of the mining disturbance area in the Southern Resource Block at Lot 1 DP 406050 SEC 1 4 4034 PT SEC 5 BLK IX Waiwhero SD, located on Cargill Road, Barrytown, Greymouth. This archaeological assessment has been prepared to assess the archaeological potential of the project area and to consider the impact that the proposed works will have on any archaeological sites. Archaeological sites are areas that witnessed human occupation prior to the year 1900 and can provide information on the history of New Zealand through archaeological investigation; archaeological sites are protected under the Heritage New Zealand Pouhere Taonga Act 2014 (HNZPTA 2014).

1.1 Project Area

The project area is defined as the mining disturbance area located in the Southern Resource Block, Cargill Road, Barrytown, Greymouth, encompassing 20 land parcels, including three road reserves. The area of the Southern Resource Block outside of the mining disturbance zone is not covered by this assessment. A summary of the project area is provided in Table 1-1 and the location of each land parcel is shown in Appendix A. There have been two archaeological sites previously recorded in the project area and the entire project area is in the Pounamu Management Area overlay under the proposed Te Tai o Poutini Plan (TTPP).

Table 1-1. Summary of project area.

Legal Description	Southern Resource Block, Barrytown, Greymouth. Encompassing 20 land parcels: **S**ection 7, Block V, Waiwhero SD Part Section 5 Block IX Waiwhero SD Lot 1 DP 406050 Part RS 2634 Part RS 2635 Part RS 2639 Part RS 2928 RS 2929 RS 2930 RS 2931 RS 2932 RS 2933 RS 4033 RS 3316, Lot 1 DP 3548 Lot 1 DP 2719 Road reserve parcel ID 3700202 Road reserve parcel ID3702892 Road reserve parcel ID 3699494 RS 2927
Landowner	Newall Brothers Limited, Cargill Rd Barrytown Limited, Nikau Deer Farm Limited, Barrytown Farms Limited, Charles Nelan Cabraal, Kim Denise Burnett, Stephen Rex Burnett, Land Information New Zealand, Grey District Council.
Territorial Authority	Grey District Council
Archaeological Site No.	K31/11, K31/12
Previous Archaeological Authorities	NA
New Zealand Heritage List/Rārangi Kōrero	NA
Covenant or Heritage Order	NA
Scheduled on District Plan	Pounamu Management Area overlay under the proposed TTPP
Reserve Status	NA
Statutory Acknowledgement Area	NA
Customary Marine Title	NA

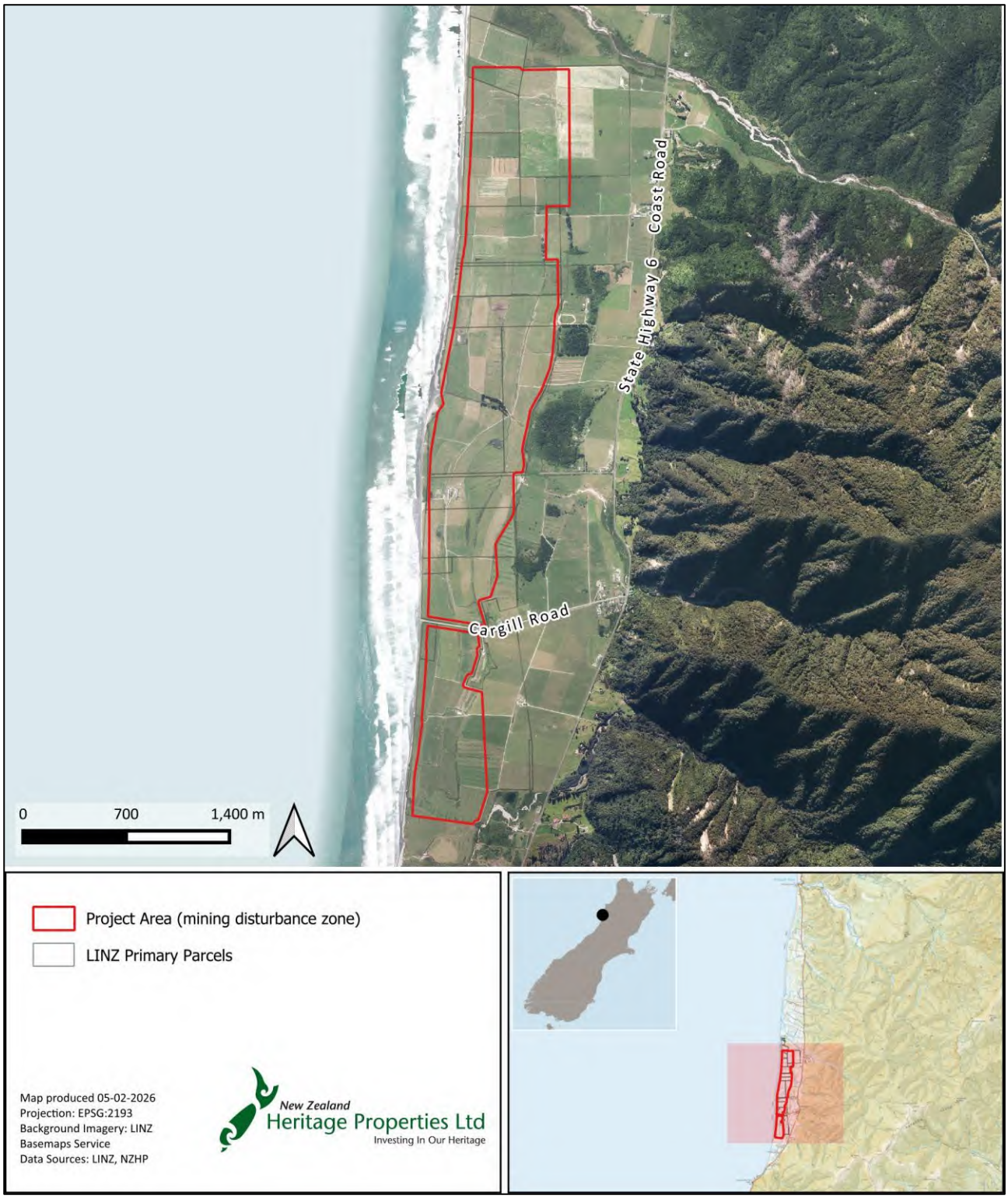

Figure 1-1. Project area in Barrytown, Greymouth.

1.2 Proposed Activities

TiGa Minerals and Metals Ltd are proposing to undertake mineral sand mining on the Barrytown Flats. The project will seek to mine both previously mined and unmined areas across the consent area. The sand mining and processing aims to obtain ilmenite, garnet, and other minerals. The proposed plans for the project are provided in the Project Description of the Application with the location of the project area as shown in Figure 1-1. The following proposed activities have the potential to affect archaeology:

Pre-mining activities

- The excavation of the starter pit area (100m x 100m)

- The excavation of the mine settling pond and water management infrastructure (Mine Water Facility) (**MWF**)
- Removal of topsoil on the site of the Wet Concentrator Plant (WCP)

Mining activities

- Removal of vegetation and topsoil within the mining areas. Earthworks to remove the vegetation and topsoil across the project area will be required to a depth of approximately 0.2 – 0.6m below surface.
- Initiation of mining across approximately 280ha area. Earthworks will be required to a depth of up to 10m below surface to extract the sand ore.
- The removed materials will be either returned to the mined areas or used to build bunding.

2 Statutory Requirements

The legislative requirements relating to archaeological sites and artefacts are detailed in the following sections. While this application is being made under the Fast Track Approvals Act 2024, the two main pieces of legislation that provide protection for archaeological sites are the Heritage New Zealand Pouhere Taonga Act 2014 (HNZPTA 2014) and the Resource Management Act 1991 (RMA 1991). Artefacts are further protected by the Protected Objects Act 1975.

2.1 Heritage New Zealand Pouhere Taonga Act 2014

HNZPT administers the HNZPTA 2014, and the purpose of this Act is to promote identification, protection, preservation, and conservation of New Zealand's historical and cultural heritage. The HNZPT Act outlines the archaeological authority process for any work affecting archaeological sites, where an archaeological site is defined as

(a) any place in New Zealand, including any building or structure (or part of a building or structure), that--:
  (i) was associated with human activity that occurred before 1900 or is the site of the wreck of any vessel where the wreck occurred before 1900; and
  (ii) provides or may provide, through investigation by archaeological methods, evidence relating to the history of New Zealand; and
(b) includes a site for which a declaration is made under section 43(1)

Additionally, HNZPT has the authority (under section 43(1)) to declare any place to be an archaeological site if the place

(a) was associated with human activity in or after 1900 or is the site of the wreck of any vessel where that wreck occurred in or after 1900; and
(b) provides, or may be able to provide, through investigation by archaeological methods, significant evidence relating to the historical and cultural heritage of New Zealand.

Any person who intends carrying out work that may damage, modify or destroy an archaeological site, or to investigate a site using invasive archaeological techniques, must first obtain an archaeological authority from Heritage HNZPT. The process applies to sites on land of all tenure including public, private and designated land. The Act contains penalties for unauthorised site damage or destruction.

The archaeological authority process applies to all sites that fit the HNZPTA definition, regardless of whether

- the site is recorded in the New Zealand Archaeological Association (NZAA) Site Recording Scheme (ArchSite), listed by HNZPT, or scheduled under a district plan;
- the site only becomes known about as a result of ground disturbance, and/ or;
- the activity is permitted under a district or regional plan, or a resource or building consent has been granted.

HNZPTA also maintains the New Zealand Heritage List/ Rārangi Kōrero (the List) of Historic Places, Historic Areas, Wāhi Tapu, and Wāhi Tapu Areas. The List includes some significant archaeological sites. The purpose of the List is to inform members of the public about such places and to assist with their protection under the Resource Management Act 1991 (RMA).

2.2 Resource Management Act 1991

The RMA 1991 defines historic heritage as those natural and physical resources that contribute to an understanding and appreciation of New Zealand's history and cultures, derived from archaeological, architectural, cultural, historic, scientific, or technological qualities. Historic heritage includes historic sites historic sites, structures, places, and areas; archaeological sites; and sites of significance to Māori (including wahi tapu); and surroundings associated with the natural and physical resources. These categories are not mutually exclusive, and some archaeological sites

may include above ground structures or may also be places that are of significance to Māori. It should be noted that this definition does not include the 1900 cut-off date for protected archaeological sites as defined by the HNZPTA 2014. Any historic feature that can be shown to have significant values must be considered in any resource consent application.

The RMA requires city, district, and regional councils to manage the use, development, and protection of natural and physical resources in a way that provides for the well-being of today's communities while safeguarding the options of future generations. The protection of historic heritage from inappropriate subdivision, use, and development is identified as a matter of national importance (section 6f).

The RMA 1991 requires local authorities to develop and operate under a district plan. Te Tai o Poutini Plan is a proposed combined district plan for the West Coast. The proposed plan identifies important heritage buildings and sites, and important trees and sites of significance to Poutini Ngāi Tahu. Part 2 of the Proposed Te Tai o Poutini Plan encompasses Historical and Cultural Values, Ngā Uara ā-Ahurea, ā-Hītori Hoki.

Iwi/hapu management plans are planning documents that are recognised by an iwi authority, relevant to the resource management issues, including heritage, of a place and lodged with the relevant local authority. They have statutory recognition under the RMA 1991. Iwi management plans set baseline standards for the management of Māori heritage and are beneficial for providing frameworks for streamlining management processes and codifying Māori values. Iwi management plans can be prepared for a rohe, heritage inventories, a specific resource or issue or general management or conservation plans (NZHPT, 2012).

The hapū who hold mana whenua in Te Tai o Poutini are Ngāti Waewae. Under section 74(2A) of the RMA, territorial authorities, in preparing or changing a district plan, must take into account planning documents recognised by iwi. Ngāti Waewae have been involved in the preparation of Pounamu Management Plans which have been recognised by Te Rūnanga o Ngāi Tahu as planning documents. These iwi management plans have been taken into account in the Te Tai o Poutini Plan through participation of Poutini Ngāi Tahu representatives during development of the plan.

2.3 Protected Objects Act 1975

The Protected Objects Act 1975 was established to provide protection of certain objects, including protected New Zealand objects that form part of the movable cultural heritage of New Zealand. Protected New Zealand objects are defined by Schedule 4 of the act and includes archaeological objects and taonga tūturu. Under Section 11 of the Protected Objects Act 1975, any newly found Māori cultural objects (taonga tūturu) are automatically the property of the Crown if they are older than fifty years and can only be transferred from the Crown to an individual or group of individuals through the Māori Land Court. Anyone who finds a complete or partial taonga tūturu, accidentally or intentionally is required to notify the Ministry of Culture and Heritage within:

(a) 28 days of finding the taonga tuturu; or

(b) 28 days of completing field work undertaken in connection with an archaeological investigation authorised by HNZPT.

3 Methodology

This archaeological assessment has been prepared in accordance with HNZPT's (2019) guideline on preparing an archaeological assessment. Presented below are the methods used to gather information to identify the archaeological potential of the project area, determine the archaeological significance, and assess the effects of the proposed work on archaeological values.

3.1 Research to Identify Archaeology and Inform Archaeological Values

The first half of this report provides the information gathered to inform on the archaeological values of the project area, including the setting, historical background, archaeological context, and the site visit. Documentary research was undertaken to inform the background research sections of this assessment. The physical environment section documents the setting of the project area, its land use, and considers environmental factors that may influence how the site was occupied through time. The historical background first provides an overview of human history for the wider area before narrowing down on evidence that is specific to the project area itself to determine the nature and significance of the archaeology. Previous archaeological research and investigation for the project area provide an understanding of research results, areas of modification, and informs on the potential for the proposed works to affect archaeology. This section also considers the wider archaeological context, including the consideration of sites recorded near the project area and how artefact find spots, midden/oven sites, gold mining sites, and historic-domestic sites are represented in the archaeological record at the local, regional, and national level. Sources utilised for this research include:

- Published primary and secondary sources for the West Coast and gold mining,
- Kā Huru Manu,
- Historic newspaper articles through PapersPast,
- Historic photographs on West Coast Recollect
- Historic maps accessed via Prover and from Archives New Zealand,
- ArchSite,
- The HNZPT archaeological reports digital library,
- New Zealand Heritage List/Rārangi Kōrero,
- Retrolens aerials
- LINZ LiDAR imagery

3.2 Survey Methodology

Three key sources of information were compiled and analysed as part of the archaeological surveys. These included aerial imagery, LiDAR and a physical survey of the survey area. Where sites could not be identified or accessed due to health and safety constraints, vegetation, or topography, during the pedestrian survey, the recent LiDAR and historical imagery, alongside information from previous archaeological investigations, were used to inform an understanding of site location and spatial extent.

3.2.1 Aerial Imagery

Historic aerial imagery, dating to the 1950s and 1980s of the survey area was accessed via Retrolens. The aerial imagery was compared with features identified during the physical survey, the 2020-2022 LiDAR data, and the drone photos supplied by Tai Poutini Resources. By comparing the historical images with more recent data, it was possible to recognise archaeological potential, and identify features established in the 1950s or onwards and the extent to which mining from the 1950s onwards has impacted archaeological sites throughout the survey area.

3.2.2 LiDAR

LiDAR is a useful in identifying points of interest (POI), establishing site extents and spatial relationships of sites and features that are not identifiable or obvious when on the ground. In recording and heritage management of

archaeological sites Jones & Bickler (2018) have identified that while New Zealand archaeologists are proficient and better at detecting individual sites at a local level, "visual manual detection at larger scaler is both time consuming and costly" (Jones & Bickler, 2018). In contrast LiDAR data can generate terrain models for larger areas covered in heavy and dense vegetation, as well as areas of rough terrain that are difficult to physically survey. Not only does LiDAR offer the ability to identify previously unrecorded sites in such areas, it also helps to map previously recorded sites as well as refine data collected prior to GIS and GPS. Even where archaeological sites have in the past been well drawn and mapped these are predominantly not georeferenced and frequently not to scale. LiDAR can be used to refine site extents and boundaries with geographical precision (Jones & Bickler, 2017).

LiDAR data from 2020-2022 was accessed via LINZ. Visual inspection of the LiDAR data provided included examination of raster-derived surfaces (i.e. hillshade) and high-resolution contours in order to identify unrecorded archaeological sites and define recorded archaeological sites. Details attained from the LiDAR data included location, extent and types of possible archaeological sites, which contributed to interpretation of individual sites as well as wider archaeological landscapes throughout the survey area. The LiDAR data also displayed distinguishable evidence of twentieth century dredging, ploughing, and hump and hollowing and its potential impact on archaeological sites.

3.2.3 Pedestrian Surveys

A survey of the project area was undertaken in December 2024 by NZHP archaeologists Bree Wooller and Leah Harding.

A GPS unit loaded with previously recorded sites was carried and the survey paused when previously recorded or unrecorded features were encountered to allow for closer inspection. The locations of previously recorded sites were inspected and photographed noting any evidence of in situ archaeology as well as the potential condition of any subsurface material, while features that may be indicative of an unrecorded archaeological site were recorded in detail and plotted on the GPS.

All areas of known pre-1900 activity and areas without extensive twentieth century modification were surveyed by paddock in 20m transects (Figure 7-1). The boggy terrain and non-traversable waterways of the area did not allow for standardised transects to be adhered to in some paddocks. Fields which had been humped and hollowed were surveyed along the humps as the hollows were generally filled with water and foliage. Due to the extent of modern surface modification, after no evidence of archaeology was encountered in fourteen heavily modified paddocks (i.e. humped and hollowed areas), no further modified paddocks were transected. Instead, these were viewed from the perimeter only. Extensive stretches of the project area were dredged in the twentieth century. Eight dredged paddocks were surveyed to determine the extent of the modification and sections of the coastal margin of the dredge zone were transect surveyed to determine the condition of the edge of the project area. Additionally, fields with livestock or without safe access points were not transacted but viewed from the perimeter. Areas that could not be accessed or viewed were studied through the LiDAR imagery and aerial photographs, which went some way to offset these limitations.

3.3 Assessment of Archaeological Values

Section 46 of the HNZPTA 2014 requires an assessment of archaeological values as well as Māori and other relevant values to the archaeological site. The assessment of archaeological and other values is based on criteria established by HNZPT (2019):

- The **condition** of the site(s).
- Is the site(s) unusual, **rare or unique**, or notable in any other way in comparison to other sites of its kind?
- Does the site(s) possess **contextual value**? Context or group value arises when the site is part of a group of sites which taken together as a whole, contribute to the wider values of the group or archaeological, historic or cultural landscape. There are potentially two aspects to the assessment of

contextual values; the relationship between features within a site, and the wider context of the surroundings.

- **Information potential**. What current research questions or areas of interest could be addressed with information from the site(s)? Archaeological evaluations should take into account current national and international research interests, not just those of the author.
- **Amenity value** (e.g. educational, visual, landscape). Does the site(s) have potential for public interpretation and education?
- Does the site(s) have any special **cultural associations** for any particular communities or groups (e.g., Māori, European, Chinese.)

The criteria outlined above help to build an overall assessment of significance of a site, and NZHP have adopted the following levels of overall archaeological value (Table 3-1). These levels of significance follow the recommendations proposed by Department for Transport (2008); although, this steers away from the use of local, regional, and local importance, which Kerr (2013) argues is irrelevant to the assessment process. It is important to note that it is not possible to fully understand the archaeological significance of subsurface sites, and that the significance of a site may change on the basis of what is found during the work programme.

Table 3-1. Levels of overall archaeological value (adapted from DoT, 2008).

Level of Significance	Criteria
Very High	• World Heritage Sites (and proposed sites) • An archaeological site of acknowledged international importance
High	• Listed archaeological sites, including those of listing quality and importance o Category 1: places of special or outstanding historical or cultural heritage significance or value; o Category 2: places of historical or cultural heritage significance or value; and • Scheduled archaeological sites, including those of scheduling quality and importance • Archaeological sites with exceptional values
Medium	• Archaeological sites that can be shown to have moderate values
Low	• Archaeological sites with limited value, including those that are highly represented, have low information potential, have poor preservation, and/or poor survival of contextual association
Negligible	• Sites with very little surviving archaeological interest
Unknown	• The importance of the site is not yet known

3.4 Assessment of Effects

After determining that there is evidence that archaeology is present within the project area and evaluating its archaeological value, an assessment of the effects of the proposed work on those values was completed. Specifically, consideration was given to the following matters as outlined by HNZPT (2019):

- How much of the site(s) will be affected, and to what degree, and what effects this will have on the values of the site(s).
- Whether the proposed work may increase the risk of damage to the site(s) in future. For example, change from farming to residential use may make sites vulnerable to increased pedestrian and vehicular activity.
- Whether a re-design may avoid adverse effects on the site(s). It is recognised that detailed evaluation of alternatives may be beyond the scope of the archaeological assessment, however, some consideration of alternatives should be considered where possible.
- Possible methods to protect sites, and avoid, minimise or mitigate adverse effects should be discussed. These will form the basis of any recommendations in the final section.

The magnitude of impact on archaeology is defined below with a scale ranging from no impact to major impact. In most instances these impacts are adverse; however, there may also be positive impacts on the site.

- **Major** - impact to the archaeological site, such that the site is totally altered (*e.g.*, a site is totally destroyed).
- **Moderate** - impact to the archaeological site, such as the asset is significantly modified (*e.g.*, at least half of a site is affected)

- **Minor** - impact to the archaeological site, such that the asset is slightly different (*e.g.*, a small portion of the site is affected).
- **Negligible** - slight changes to archaeological site that hardly affect it.
- **No impact** - the works will not affect the site.

4 Physical Environment and Setting

The project area is located in Barrytown, Grey District on the West Coast of the South Island (Figure 4-1). Barrytown is a small farming settlement approximately 25km by road north of Greymouth. Barrytown flats is situated on a narrow strip of land to the west of the Paparoa Range. The project area is bounded by Pakiroa Beach (17 Mile Beach) on the western side and the Canoe Creek Scenic Reserve to the north. State Highway 6 runs to the east, albeit not adjacent, of the project area.

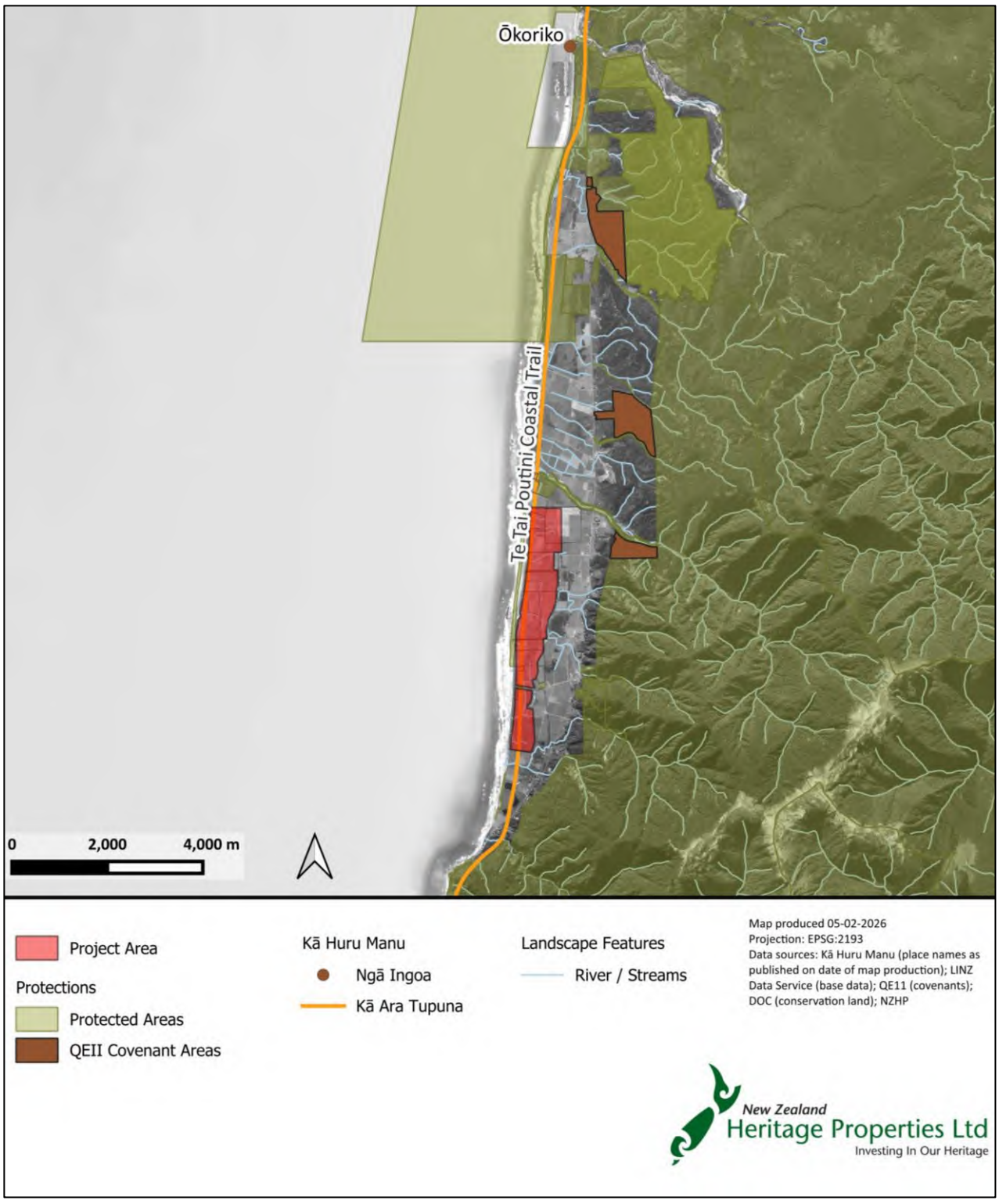

Figure 4-1. The broader geographical setting of the Barrytown Flats.

4.1 Geomorphology

Te Tai o Poutini, the West Coast of Te Waipounamu, lies along the boundary between the Pacific and Australian tectonic plates, with the plate boundary being clearly marked by the Alpine Fault, forming the western edge of the Southern Alps. To the east of the Alpine Fault, the most commonly found type of rock is greywacke, a hard, grey muddy sandstone that contains bands of shale. Closer to the Alpine Fault, the deeply buried greywacke has metamorphosed into schist, while pounamu can be sourced from small areas of schist north-east of Hokitika. The project area is within the Pounamu Management Area overlay under the proposed Te Tai o Poutini Plan (TTPP). To the west of the Alpine fault, the rocks are more varied, with the oldest rock type being greywacke, containing intrusions of several types of granite. These are overlaid by layers of softer sedimentary rocks, including mudstone, sandstone, conglomerate, and limestone. Coal-bearing rocks are widespread, with coal having been mined at a number of locations (Nathan, 2012). Mesothermal gold is contained within the greywacke, which is predominant on Te Tai o Poutini, and is incorporated into the faulted areas of the hard rock source, known as shear zones. When the hard rock sources, such as the West Coast greywacke, are eroded away, it becomes auriferous gravels (Karoro Formation). Alluvial gold is the result of rivers or glaciers having flowed over auriferous gravels, washing, and sorting the gold, which then allows for the formation of concentrations of heavy gold deposits in certain layers. This often meant that alluvial gold deposits were much richer than their hard-rock sources (Walrond, 2012). The majority of gold deposits within the Grey District are alluvial, consequently, the area hosts a dynamic timeline of mining activities throughout recent history which have left irreversible scars across the landscape.

The wider landscape surrounding Barrytown Flat is largely public conservation land with forest and scrub coverage, with three QEII Covenant Areas to the northeast of the project area (Figure 4-1). The native bush is a mix of coastal podocarp, broadleaf, and lowland hardwoods. An area of significant indigenous biodiversity (PUN-49), situated to the west of the boundary of the site is identified as a potential Significant Natural Area (SNA) under the proposed Te Tai o Poutini Plan (TTPP). To the north of the project area, Ōkoriko (Razorback Point) is situated at the outlet of the Punakaiki River (Te Rūnanga o Ngāi Tahu, 2025). To the south, the Motukiekie Rocks are located off the coastline near Waiāniwaniwa (Ten Mile Creek). The island was likely utilised for resource procurement, as kiekie (Freycinetia banksii) was highly valued for weaving (Te Rūnanga o Ngāi Tahu, 2025). The Te Tai Poutini Coastal Trail runs through the project area (Figure 4-1).

The project area is crossed by a series of little creeks that originate from the Paparoa Ranges and drain into Tasman Sea (Figure 4-1). Granite Creek and Little Granite Creek flow through the project area, as well as lots of smaller tributaries particularly along the westerns coastal margin. The coastal margins would have originally consisted of sandy loam dune formations; however, these have largely been eroded or modified by twentieth century activities. The terrain is very waterlogged, with peaty sediments noted in the tributaries. The project area is all in pasture with the exception of areas of wetland planting along the margins and in the waterlogged areas. The nature of the pasture varied by paddock with some areas having short grass coverage with a large amount of stock trampling, through to other fields with long, reedy growth, obscuring the ground surface.

4.2 Landscape Transformations

A vast amount of the project area has previously been modified with extensive dredging and hump and hollowing taking place in the twentieth and twenty-first centuries. The waterways running through the site have been modified for drainage and stock supply with most having been straightened to align with the farm layouts. Over the last 50 years some vegetation clearance has been undertaken, primarily gorse removal for farming purposes. The project area is currently being utilised for dairy farming.

5 Historical Background

The following sections give an overview of Māori and Pākehā settlement in Te Tai o Poutini and the Grey District to provide context to understand the history of the area. Through this research it is possible to begin to identify what type of physical, cultural, and social processes have shaped the form and distribution of archaeological material. This chapter then moves on to outline the history of the project area, situated in Barrytown.

5.1 Māori Occupation of Te Tai o Poutini

From the snowy maunga to the sea waters of the taniwha Poutini, Te Tai o Poutini is of immense significance to Poutini Ngāi Tahu. From the earliest times, pounamu was the main reason for settlement on Te Tai o Poutini, with the central region near the project area being at the heart of Poutini Ngāi Tahu legends, customs, and traditions. Te Tai o Poutini lies within the traditional boundaries of Ngāi Tahu, who are the largest iwi in Te Waipounamu (the South Island), comprised of people descended from the tribe's five primary hapū (Ngāti Kurī, Ngāti Irakehu, Ngāti Huirapa, Ngāi Tūāhuriri and Ngāi Te Ruahikihiki) along with earlier Rapuwai, Hawea, Waitaha, and Ngāti Mamoe ancestors. The hapū who hold mana whenua in Tai o Poutini are Ngāti Mahaki o Makaawhio and Ngāti Waewae; together they are known as Poutini Ngāi Tahu. The rohe of Poutini Ngāi Tahu extends over the entire West Coast Region from Kahurangi Point to Piopiotahu (Milford Sound) and inland to Ngā Tiritiri o te Moana (the Southern Alps).

In the eighteenth century, Raureka, a Ngāti Wairangi rangatira was the first person to find a way across Ngā Tiritiri-o-Te-Moana, the Southern Alps. Raureka, who was born at Lake Kaniere to the south of the project area, arrived in the Arowhenua region and was taken in by a party of Ngāi Tūhaitara, who were amazed by her pounamu toki. Word of Raureka's journey, and the pounamu that could be gathered *en route*, soon spread (Madgwick, 2024; Te Rūnanga o Ngāi Tahu, 2022; Te Rūnanga o Ngāi Tahu, Te Rūnanga o Ngāti Waewae, & Te Rūnanga o Makaawhio, 2018).

5.1.1 Pā and Kāinga

A lot of what is known of the settlement of Te Tai o Poutini comes from traditional oral histories and later nineteenth century ethnographic accounts recorded by Pākehā. By the nineteenth century, kāinga (villages) were largely permanently occupied and were situated near the mouths of the major rivers. However, during summer, kāinga could often be sparsely populated as groups dispersed to undertake a range of seasonal activities. When Pākehā arrived in Te Tai o Poutini, Māori settlements were concentrated along the central coastline, although, archaeological evidence also suggests that kāinga and nohoanga (seasonal camps) stretched along the western seaboard (Anderson, 1982). Later Pākehā noted the presence of small, isolated settlements in these areas, where Māori communities stayed while procuring pounamu (Anderson & Prickett, 1982; Ngāi Tahu, 2021). To the south of the project area the closest kāinga was Kararoa, which had been occupied by Ngāti Rārua and Te Āti Awa who had married into Poutini Ngāi Tahu (Madgwick, 2024). To the north, a small seasonal pa, Kawatiri, was occupied near modern day Westport (Madgwick, 2024).

5.1.2 Mahinga Toi

Mahinga toi refer to places where non-food resources were gathered. Pounamu (greenstone) is of particular importance to Māori, with the stone manufactured into tools such as adzes, chisels, and knives, as well as items of ornamentation such as hei tiki (pendant) (Te Rūnanga o Ngāi Tahu, 2022). The major sources for pounamu along Te Tai o Poutini are along the Arahura and Taramakau Rivers (Figure 5-1). Raw pounamu was also traded for other resources, and spread throughout both Te Waipounamu and Te Ika-a-Māui (the North Island) (Jacomb *et al* 2010). There were a number of ara tawhito (traditional routes) that were used to transport pounamu, and those seeking it, over Kā Tiritiri-o-te-moana (the Southern Alps), with the major routes crossing the Haast and Harper's Pass (Figure 5-1). The project area is within the Pounamu Management Area overlay under the proposed Te Tai o Poutini Plan (TTPP).

There are plentiful legends associated with the central region of Te Tai o Poutini, from the hills of Ōhonu (Hohonu Range) to Turiwhate, the entire Arahura and environs, including Kawhaka, Tuhua, Timuaki, Raparapahoe, Mt Tara o Tama (the great mountain of the pounamu explorer Tama Ahua) and as far as Mt Kaniere (Mt Harman), named for sawing the pounamu. Historic sources (West Coast Times, 1903) note a large amount of harakeke (flax) growing across the project area prior to it being cleared. Harakeke was a valued resource to Poutini Ngāi Tahu with it being recognised as a taonga species in the Ngāi Tahu Claims Settlement Act 1988 (Tumahai, 2010).

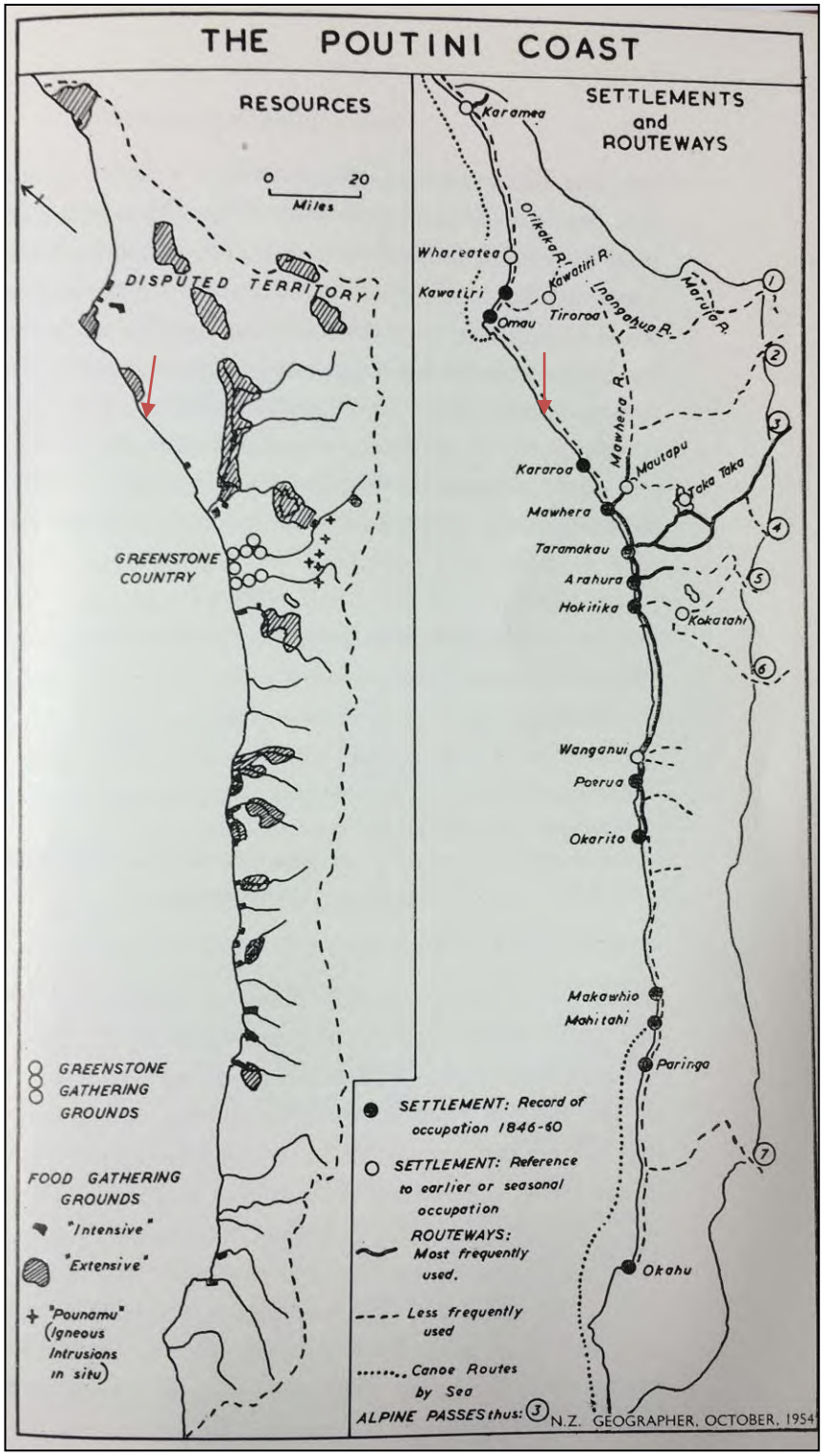

Figure 5-1. Map showing kāinga, mahinga toi and kai areas, and ara tawhito in Te Tai o Poutini at the time of Pākehā contact (1840s). Note: the project area is indicated by the red arrows (McCaskill, 1954).

5.1.3 Mahinga Kai

Te Tai o Poutini was also associated with mahinga kai (food gathering places) utilised by people living in the region, as well as travelling parties. Freshwater sources were fished for tuna (eel), grayling, and īnanga (whitebait), while forested areas were fowled for kiw, weka, kākāpō, kākā, kōkō (tūī) and kūkupu (kererū) (Madgwick, 2024). In the vicinity of the project area, tītī were lured into Pakiroa (Barrytown) and disorientated by the lighting of large fires at dusk, before being caught and clubbed (Madgwick, 2024). Berries and vegetables, such as tree fern pith, kōareare (the edible rhizome of raupō), mamaku, podocarp berries, and rarely, bracken fern root and nikau palm, were also gathered. Historic sources note copious amounts of harakeke and raupō in the area during the nineteenth century (SO 7873, SO 7948), which are both valued mahinga kai plant sources to Poutini Ngāi Tahu (Tumahai, 2010). Kokopu, koura, and tuna would have been gathered from the streams in the project area, with bird species such as putakitaki and weka found grazing in the wetlands within the project area (Tumahai, 2010).

Kūmara and Taro were reported to have been grown by Poutini Ngāi Tahu throughout the Poutini coastline, with the temperate climate and less severe winters than the eastern regions allowing for horticulture (Madgwick, 2024). Ethnographic accounts record the use of rocks to keep the crops warm and the tubers were wintered in rua (Madgwick, 2024).

5.1.4 Ara Tawhito and Nohoanga

Ara tawhito are traditional travel routes, and these criss-crossed Te Tai o Poutini, connecting the pā of Arahura, Taramakau, and Māwhera with the great Ngāi Tahu trading centre of Kaiapoi Pā. The Te Tai Poutini Coastal Trail traverses the coastline from Māwhera (Greymouth) to Mohua (Golden Bay), including through the western extent of the project area. Madgwick (2024), notes that the section of the ara tawhito which ran along the long smooth beach of pakiroa adjacent to the project area was a stark contrast to the particularly treacherous steep cliffs to the north. As noted, the nearby Taramakau was a major ara tawhito, which was often difficult to traverse, but which did provide a route over Kā Tiritiri o te Moana (Southern Alps) through Nōti Taramakau (Harper Pass). This route, one of the lowest and easiest to traverse, was valued as part of the wider lifeways cycle for access to pounamu.

Nohoanga, literally meaning 'a place to sit', traditionally refers to seasonally occupied sites. Nohoanga were an integral part of the mobile lifestyle of tīpuna (ancestors) as they moved around Te Waipounamu undertaking various seasonal expeditions for resource procurement, trade and maintaining social relationships. No inland settlement sites or nohoanga have been investigated in Te Tai o Poutini, although secondary information inferred from artefact findspots suggests that nohoanga would have been close to inland rivers or streams (Department of Conservation, 2010). A cave site in the Razorback Ridge, to the north of the project area, was noted in Nicholl's 1990 survey of Barrytown Flat (Nichol, 1990) and might have been evidence of a nohoanga.

Figure 5-2. Beachcombing black sand for gold (West Coast New Zealand History, 2014)

5.2 Contact and Post-Contact Period Occupation of Te Tai o Poutini

The settlement of Barrytown begun with the Canoe Creek gold rush in 1867 with miners digging on the beach and in the stream for gold (May, 1962). Canoe Creek is just to the north of the project area, with early mining claims extending into the proposed mining disturbance zone (SO 3682, SO 3687). The first gold seekers moved into the Seventeen Mile beach area to work the black sands of the foreshore; an activity known as "blacksanding" (Mines Department, 1906). Sand was put through a sluice boxes and gold collected (Figure 5-2). Beach mining came to be practised extensively at Barrytown, Brighton, and Charleston (between Cobden and Cape Foulwind), but while several rich pockets were found, the deposits proved exceedingly patchy (Westport Times, 1879). Miners extended their searches to gold to the terraces to the east of the beach flat with mining undertaken in the foothills well into the twentieth century (Harris, 1916). The settlement came into being at the height of the rush in 1879, which at the time there was 2000 residents in the area (Cyclopedia Company Ltd, 1906). The settlement was initially named Barryville after a particularly respectable miner who was among the party that first discovered gold in the area (Grey River Argus, 1880d). Later contention arose when officials tried to rename the settlement Fosberry, resulting in a petition from the locals to retain its original name in 1880 (Grey River Argus, 1880c). The settlement became known as Barrytown from December that year (Grey River Argus, 1880a). By the beginning of the twentieth century there were 64 permanent residents in the township with 60 more in the wider vicinity, with the town containing a hotel, school, post office, and church (Cyclopedia Company Ltd, 1906) (Figure 5-3).

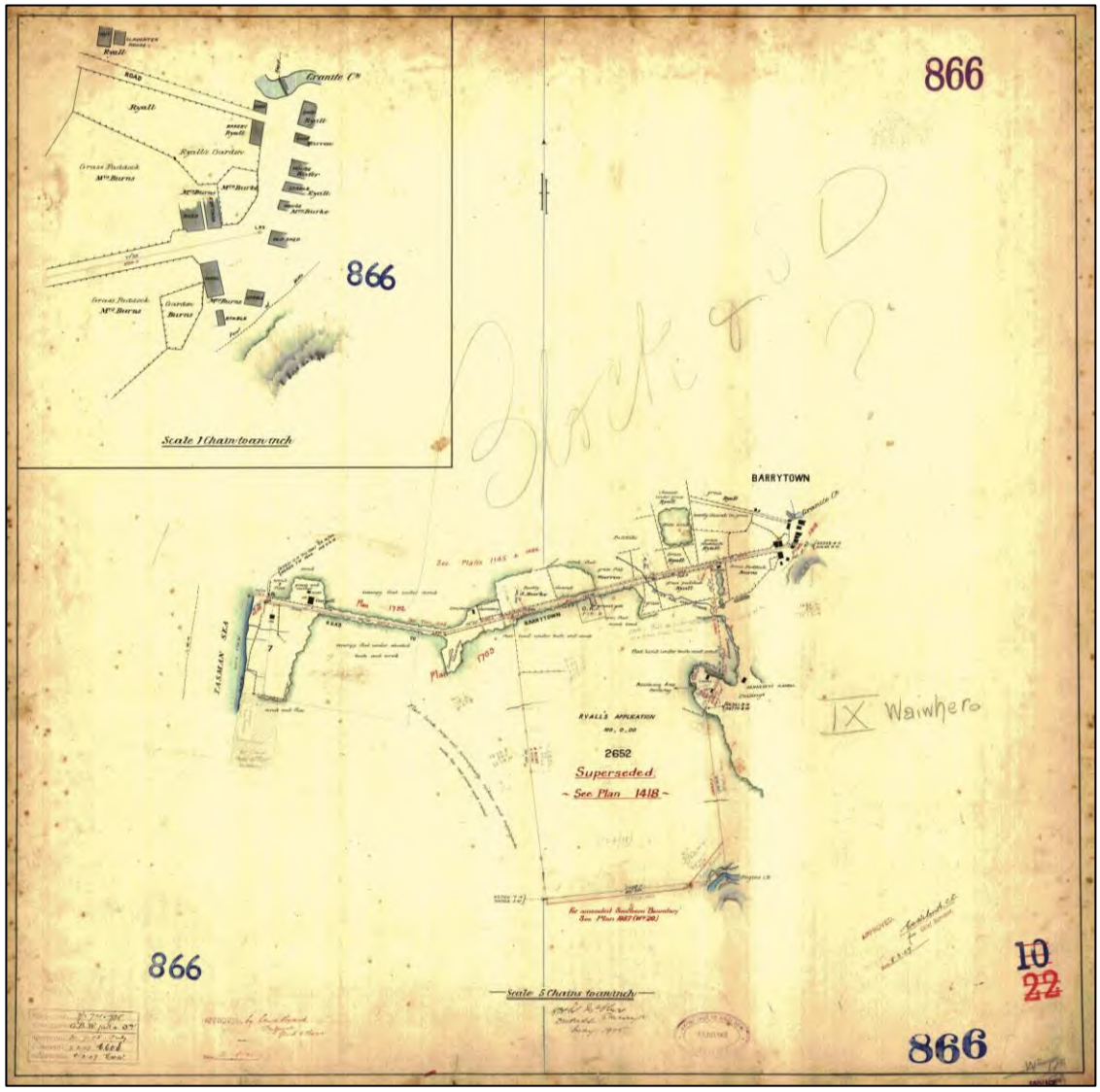

Figure 5-3. Extent of the township in proximity to the project area illustrated in 1907 (SO 866).

5.3 History of the Project Area

The project area is located on the Barrytown Flats on the foreshore of Pakiroa Beach. The Te Tai Poutini Coastal Trail traversed the coastline in the vicinity of the project area. The wetland environment of the project area would have had important mahinga kai and mahinga toi resources for Poutini Ngāi Tahu passing through. Historic sources note copious amounts of harakeke and raupō in the area during the nineteenth century (SO 7873, SO 7948), which are both valued mahinga kai plant sources to Poutini Ngāi Tahu (Tumahai, 2010). Kokopu, koura, and tuna would have been gathered from the streams in the project area, with bird species such as putakitaki and weka found grazing in the wetlands within the project area (Tumahai, 2010).

Following the arrival of Pākehā and the signing of the Arahura Deed, the project area was surveyed as Crown Land, with the project area located in Block V and IX of the Waiwhero Survey District (Mackay, 1860). Early pākehā settlement in the project area was largely transient and associated with the gold rush at Canoe Creek and blacksanding activities along the foreshore (Cyclopedia Company Ltd, 1906). Settlement was primarily focussed along the foreshore with the old coast road running along the western extent of the project area (Figure 5-7). The eastern project area remained as wetland with dense scrub cover until the twentieth century (SO 866, SO 1145, SO 1789). Legal land boundaries were not of significance in early phases with huts and mining activities frequently located in Crown Land (SO 866, SO 3687, S0 7948). The majority of the land parcels in the project area were subdivided in the twentieth century with flax milling, land clearance, and grazing activities taking place (SO 1145, SO 1789, SO 1944).

The largest transformation in the project area occurred from the 1930s after the northern project area was included in the Barrytown Gold Dredging Ltd claim and the southern area in McKechnie's claim (SO 3059, SO 3109). The landscape was permanently altered from 1937 by large scale dredging, with the land being converted back into farms from 1945 (Figure 5-4, Figure 5-5, Figure 5-6, Figure 5-7). Further modification took place with the construction of irrigation ditches, access tracks in the following years with large scale hump and hollowing taking place after 1981 (Retrolens, 1981).

Figure 5-4. Dredging in the southern portion of the project area for the Barrytown dredge in 1936 (West Coast Recollect, 1936).

Figure 5-5. Dredged area (blue line) in the project area (red line) in 1951 (Retrolens, 1951).

Figure 5-6. Barrytown Flats showing dredge ponds and the road along the beach (West Coast Recollect, 1940).

The following sections will detail the history of the project area, and a summary of key events is provided in Table 5-1. Histories have been organised by block in the following sections.

Table 5-1. Summary of key events and land transactions in the project area. Events directly related to archaeological features or deposits are highlighted in blue.

Year	Event	Source
Pre-1860	Māori ara tawhito and nohoanga in use nearby	Te Rūnanga o Ngāi Tahu, 2022
1860	Arahura Deed was signed, project area surveyed as Block V and IX, Waiwhero Survey District	Mackay, 1860
Block V Waiwhero, SD		
1880	Education reserve (Res. 1339) subdivided from Block V. Construction on School started.	Grey River Argus 1880b, SO 3687
1881	School opened in Education reserve (Res. 1339)	Grey River Argus 1881
1881	Section 6 (later becomes Section 7, Block V) in the northern corner of the project area is subdivided by this date and occupied by Raymond Poschich, a miner.	SO 3687
1901	Settlement and old water races illustrated along the foreshore adjacent to the school reserve.	SO 7948
1901	James Trent & George Davies apply for Special Claim G.26 along the foreshore from modern section RS2933, crossing Warren Road, to midway up RS 2932.	SO 7948
1905	Cargill has a home, shed, fence in a cleared area at southern edge of project area.	SO 866
1909	Section 2639 surveyed and occupied by D. Dennehy. Dennehy's Drain cutting through vacant land to the west. Warren Road (ID 3700202) formed.	SO 1145
1916	Remaining land subdivided into RS 2931, 2930, 2929, 2928, 2927, 3316, 3255. Road ID 3702892 also surveyed at this time	SO 1944
1934	All the above land parcels, except for RS 3255, are Surveyed as Part of Special Claim G. 157 for C. McKechnie.	SO 3109
1939	School moved from education reserve to a new site outside of the project area.	
1940	Eastern part of section part of Special Claim No G178, Barrytown Gold Dredging Ltd. Described as swampy with bush.	SO 8611
1952	Education reserve (Res. 1339) re-surveyed as Section 4033, Block V Waiwhero.	SO 4574
Block IX Waiwhero SD		
1875	Evan H. Lewis leases section 7, Block IX Waiwhero. The surrounding land is shown to be unsubdivided and owned by the Crown, with road reserves on the northern and western aspects.	SO 3683, SO 3687
1881	E.H. Lewis occupying northern part of property with a claim in the northwestern corner of the site along Cargill Road.	SO 3687
1889	M. Hannah & others shown as having a claim along the foreshore for the extent of the project area	SO 7873
1905	Section 7 occupied by Lewis has a dwelling house and fences in a clearing in the northwestern area of the property.	SO 866
1905	Several claims are shown along the foreshore, including P.(?) Warren and MacKays. However, these appear to not have been occupied but not subdivided.	SO 865
1913	Section 3201 subdivided along Cargil Road, where Cargill's clearing illustrated in 1905 is sectioned off.	SO 1709
1931	Sections 1657 and 1656 to the south are subdivided.	SO 2881
1934	All land in Sections 3201, 1656 and 1657 are surveyed as part of Special Claim G. 157 for C. McKechnie. The eastern portion of Section 7 is included in Special Claim G. 157. The western portion is not part of the claim and becomes Part Section 5 Block IX Waiwhero.	SO 3109

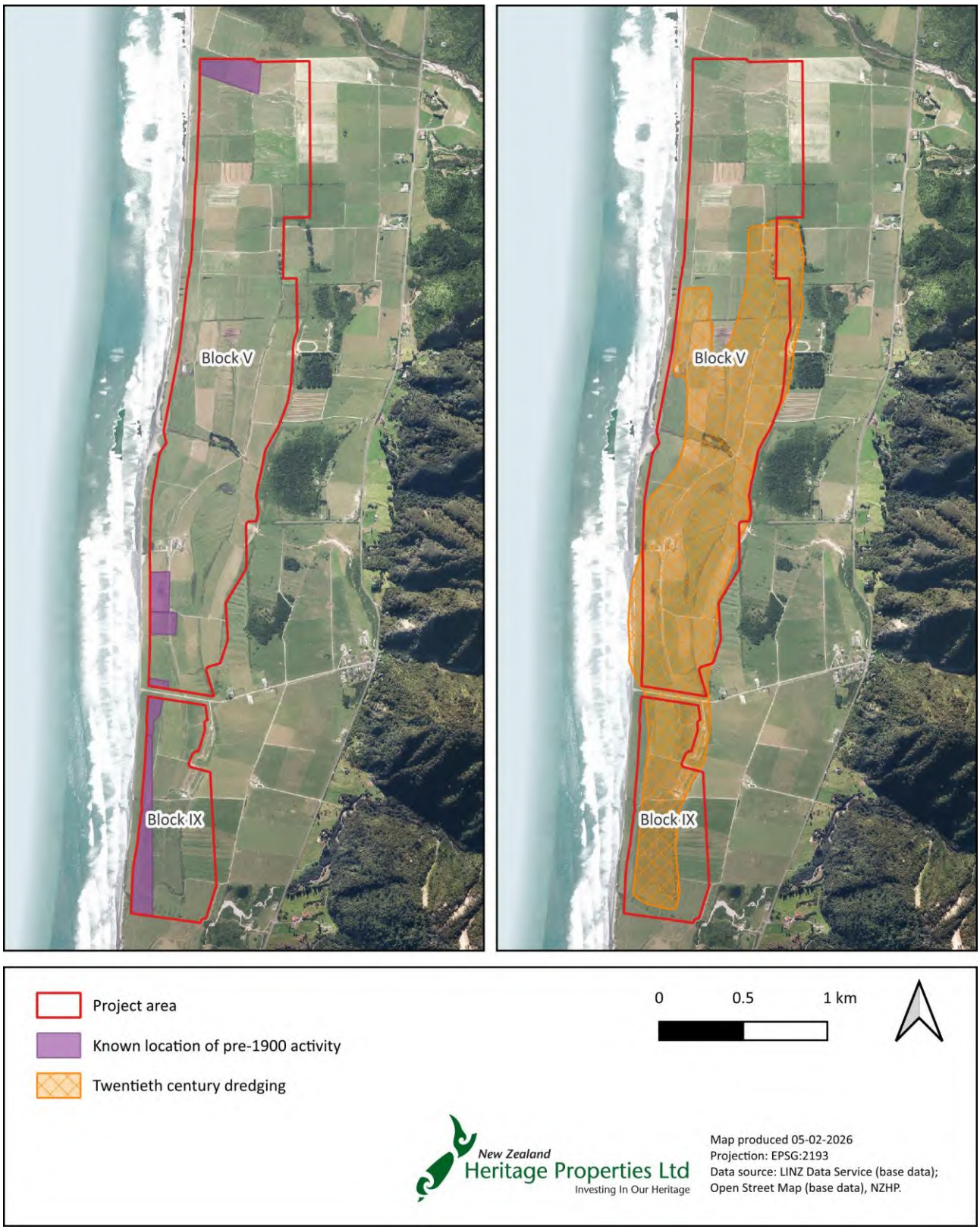

Figure 5-7.The known location of historically recorded pre-1900 activity (left). Twentieth century dredging within the project area (right). Dredge shapefile supplied by the client.

5.3.1 Block V Waiwhero Survey District

The section of the project area to the north of Cargill Road was originally part of Block V Waiwhero Survey District. Pre-1900 occupation occurred at the northern end of the block, at the southern end of the block adjacent to Cargill Road, and in an education reserve just north of Cargill Road (Table 5-1). As mining activities were taking place in the vicinity, such as the early Canoe Creek claims which extend into the northern project area, it is possible

that transient mining occupation, or other associated activities, were taking place within the project area prior to 1900 for which there is little information in the historical record.

The first school in Barrytown was located on the foreshore, approximately 310m north of Cargill's Road (Figure 5-8, Figure 5-9). Construction began in 1880 with the school opening in 1881 (Grey River Argus, 1880b, 1881). From later photos, the school appears to be a single room timber structure with an A-frame roof and sash windows, with a lean-to on its northern end (Figure 5-8). The opening of the school was considered an important milestone within the Barrytown community with one local remarking '*…it was quite a treat to see boys and girls wending their way to the seat of knowledge, instead of roaming about the bush as they did formerly'* (Grey River Argus, 1881).

By 1881, the land south of Canoe Creek, including at the northern aspect of the project area, was occupied by Raymond Poschich (SO 3687, Figure 5-9). Poschich was listed as living in Canoe Creek in the 1878 electoral roll (Grey River Argus, 1878) and along with his sons, was involved with gold mining in the area with several claims and mentions of water races and dams involved with their workings (Grey River Argus, 1881, 1885). Section 7, Block V, was still under the occupation of the Poschich family by 1916, with landscape changes seen in the form of a lagoon crossing into the section (SO 1944).

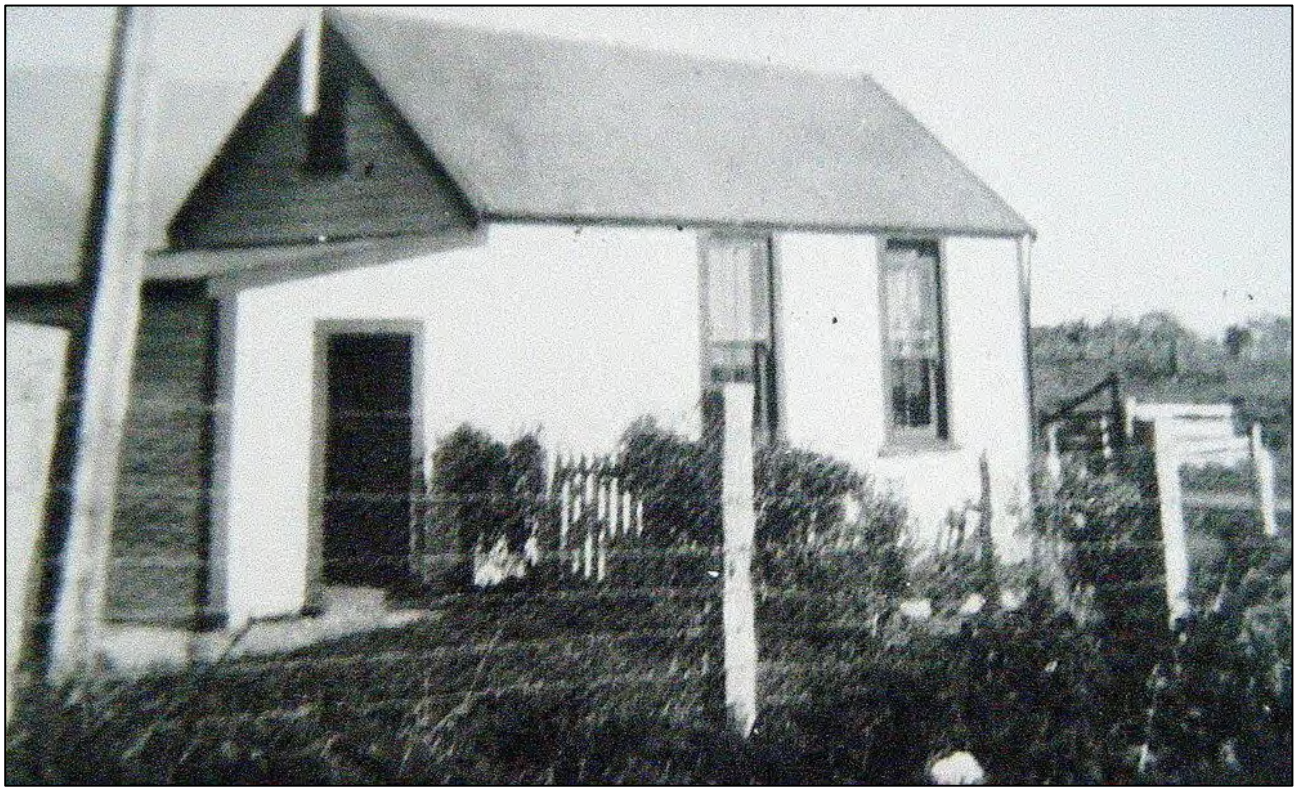

Figure 5-8. Barrytown School, situated in the education reserve Block V, in 1917 (West Coast New Zealand History, 1917).

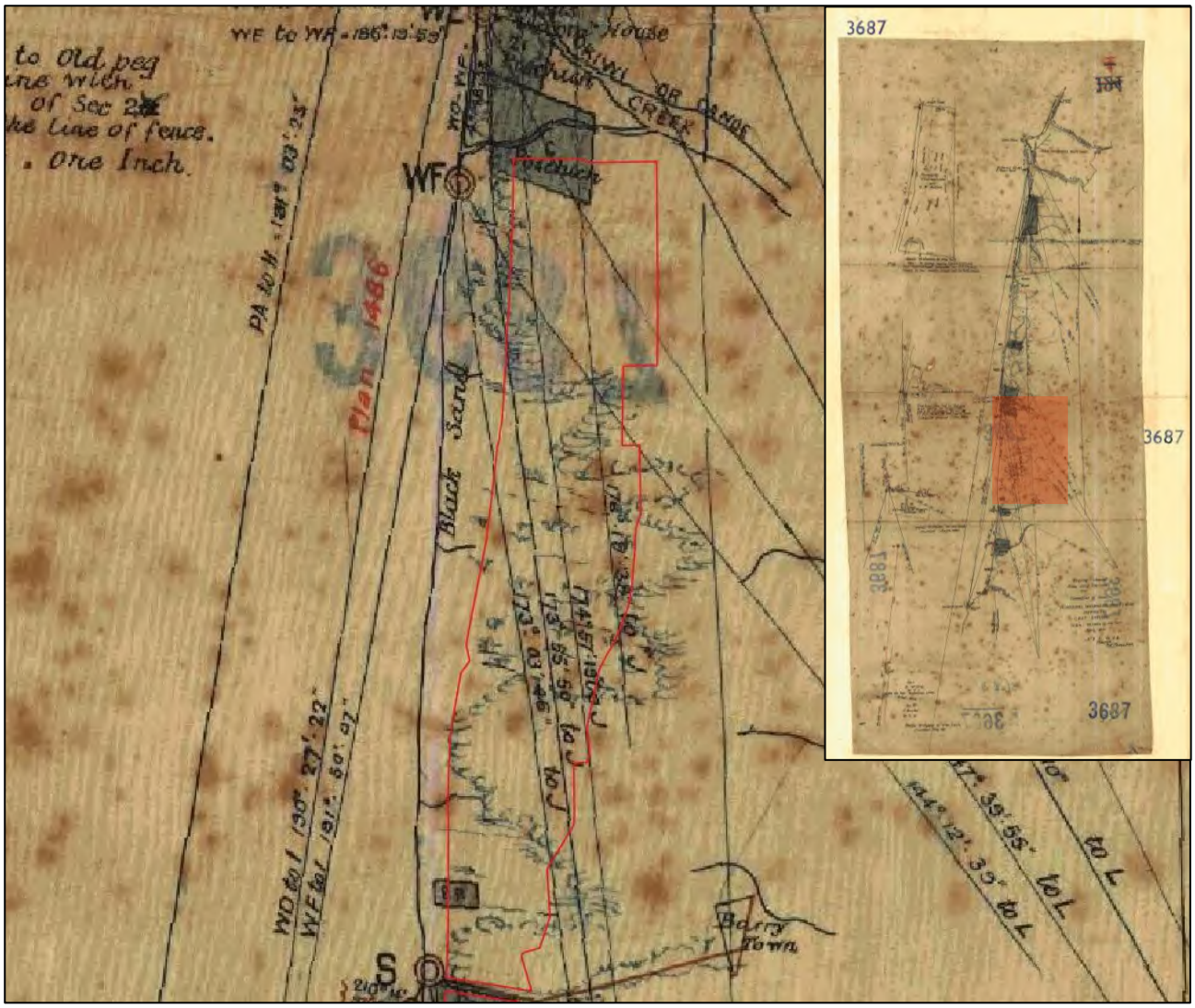

Figure 5-9. Claims of Poschich (north) in Section 6, and the education reserve in Block V, Waiwhero SD in 1881 (SO 3687). Approximate extent of PA in Block V outlined in red.

Additional pre-1900 activity in Block V was recorded outside of the formal land divisions. A 1901 survey plan of Special Claim G.26 shows a small mining settlement just north of the education reserve with a hut and several water races (SO 7948, Figure 5-10). A hut on the foreshore is labelled as being occupied by 'Millar', as well as two water races, one belonging to Cargill, both labelled as being 'old' (Figure 5-10). The identity of Millar could not be established; however, it is highly likely that these features were present prior to 1900. Peter Cargill was recorded to be living at Seventeen Mile Beach and working as a miner by 1878 (Ancestry.com, 1878). A 1905 survey map shows he had a house, shed, and fence in a cleared area to the north of Cargills Road (SO 866, Figure 5-11). The surrounding land is shown to be swampy flat under flax.

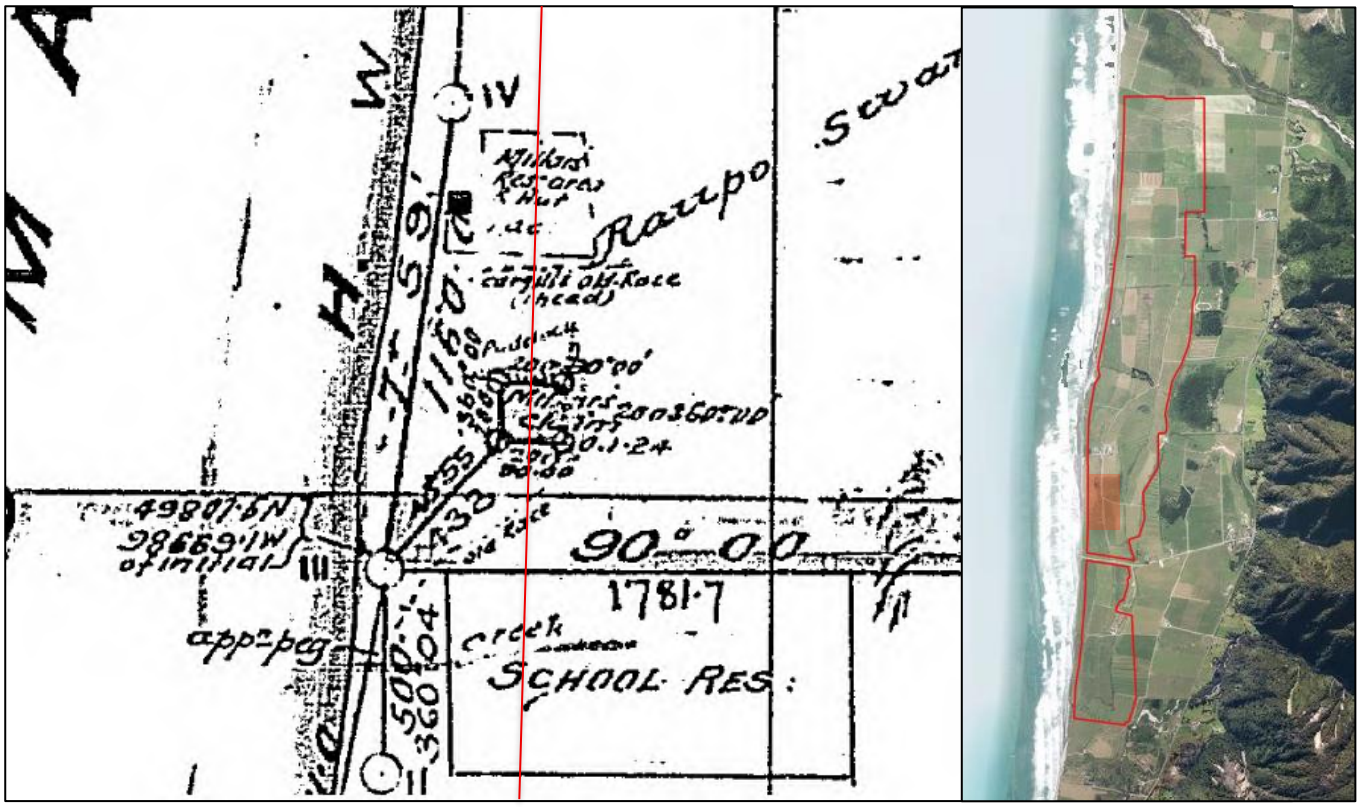

Figure 5-10. The small mining settlement adjacent to the school (SO 7948). Approximate western border of the project area in red. Location indicated in inset of the PA.

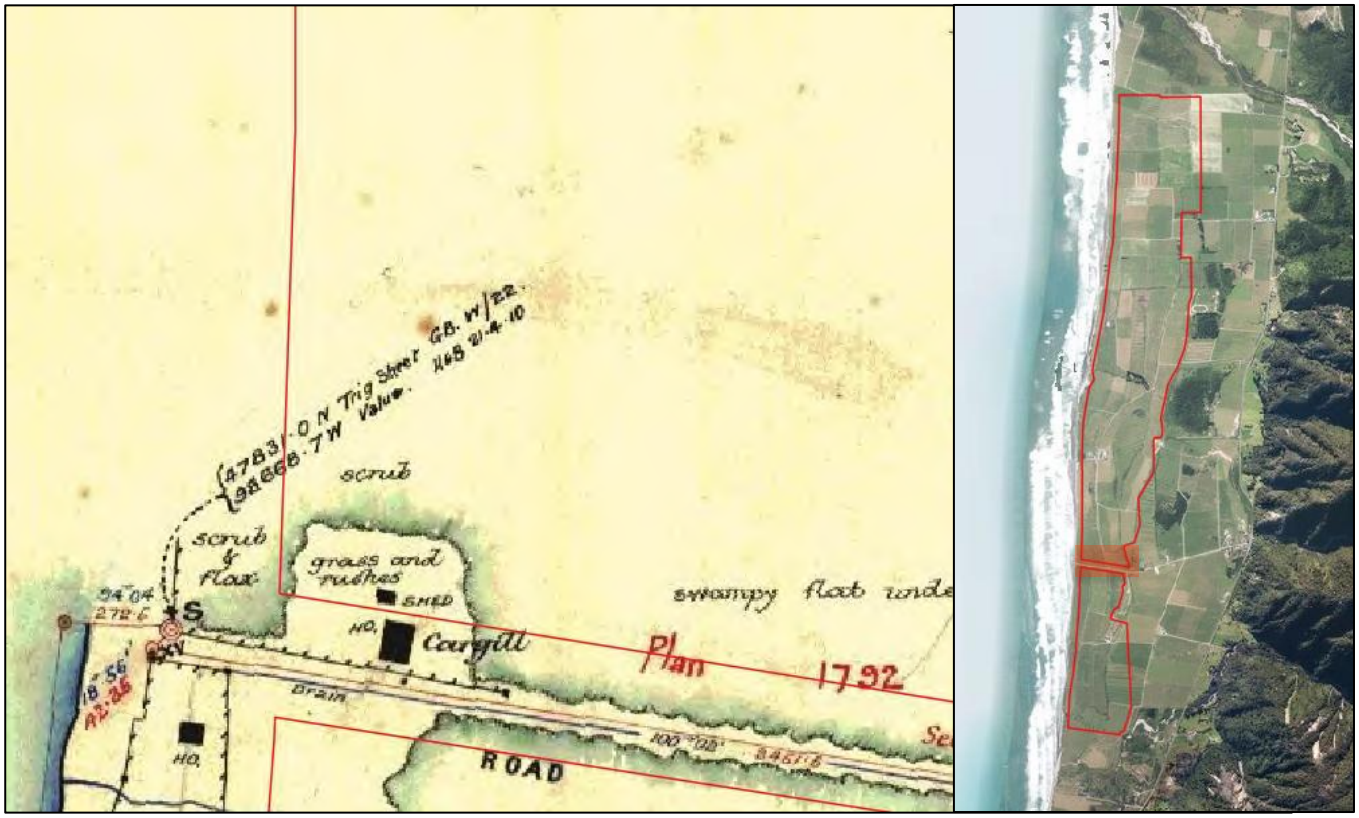

Figure 5-11. Cargill's house and shed just to the north of Cargill Road in 1905 (SO 866) Project area in red. Location indicated in inset of the PA.

The rest of Block V, Waiwhero District was subdivided in the early twentieth century. Section 2639 was surveyed in 1909 and occupied by Dennehy who was undertaking flax milling in Barrytown from 1903 (West Coast Times,

1903). He excavated a drain to the west through what would become RS 2932, to drain the swampy land to gather flax (Greymouth Evening Star, 1914). The initial track, underlying the modern Warren Road (Road ID 3700202) was created to transport flax from the harvesting areas to the mill in Barrytown (Grey River Argus, 1924). The remaining land parcels and road reserves were surveyed to their modern appellations in 1916 (SO 1944), prior to being incorporated into C. McKechnie's Special Claim G. 157 in 1934 (SO 3109). The northern sections of the project area, previously occupied by Poschich, were included as part of Special Claim No G178, Barrytown Gold Dredging Ltd in 1940.

The school was relocated to the eastern end of Cargill Street in 1939 after the old school became too small (Greymouth Evening Star, 1939). Additionally, the surrounding land was surveyed as part of Special Claim G.157 in 1934, with widescale dredging activities taking place around the school thereafter. The old school site was surveyed as Section 4033, Block V, Waiwhero SD in 1952. Although the section was not originally part of Special Claim G.157, 1950s aerials indicate dredging activity across the section (Retrolens, 1951). In the aerials only the foreshore to the west, outside of the project area remains intact and there is no indication of a surviving school building on the site (Figure 5-12).

Figure 5-12. Education reserve (red rectangle) within the dredged zone in 1951 (Retrolens, 1951). The yellow rectangle indicates the dredged area which once contained the small mining settlement adjacent to the school.

5.3.2 Block IX Waiwhero Survey District – encompassing Lot 1 DP 406050, Part Section 5, Block IX Waiwhero SD

The section of the project area to the south of Cargill Road was originally part of Block IX Waiwhero Survey District. Pre-1900 settlement in the project area was centred along Seventeen Mile Beach, with several special

claims and dwellings established along the coast (Figure 5-13, Figure 5-14). The surrounding land moving inland was described as a mix of swampy flat under stunted bush and shrub, and flat land with poor soil, with nikau, supplejack, with a few rimu and rata (Figure 5-14).

Evan H. Lewis had a claim in the northwestern corner of Block IX by 1881 fronting Cargill Road which was subdivided off to become Section 7, Block IX, Waiwhero Survey District (later became Part Section 5) (Figure 5-13). By 1905, Lewis had a cleared section with a dwelling house and fencing just outside of the project area (Figure 5-14). M. Hannah & others had a claim along the foreshore, which had been transferred to Warren and Mackay by 1905, however the land was not further subdivided at this time (Figure 5-15).

Most of Block IX Waiwhero encompassed by the project area was included as part of the Special Claim G.157 for C. McKechnie in 1934 (SO 3109), with the exception of the southern extent which was originally part of McIlroy's claim and the parcel encompassed by Part Section 5, Block IX Waiwhero SD, which was the eastern portion of Lewis' original claim.

Figure 5-13. Claims of E.H. Lewis (Section 7) in Block IX, Waiwhero SD in 1881 (SO 3687). Extent of PA in Block IX outlined in red.

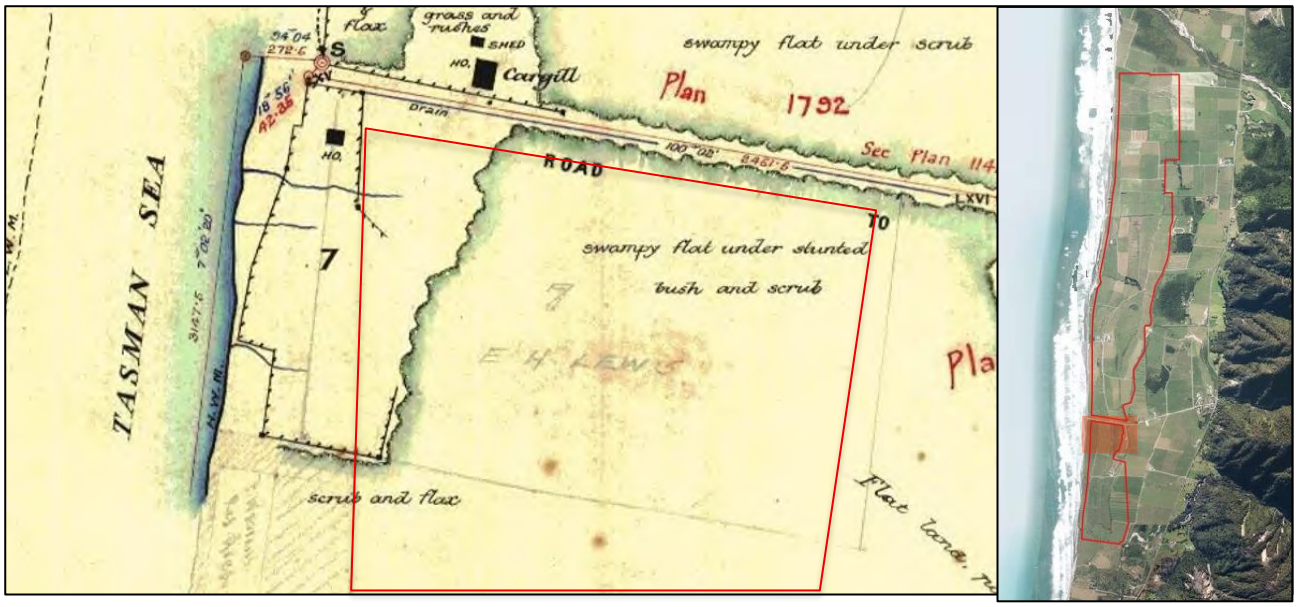

Figure 5-14. Section 7 occupied by E.H. Lewis in 1905 (SO 866). Approximate project area encompassing Block IX, Waiwhero SD in red.

Figure 5-15. McKay's claim along the western edge (SO 865).

6 Previous Archaeological Investigations and Archaeological Context

This section examines the broader archaeological and heritage context of the project area, considering the previously recorded archaeological sites as well as other archaeological and heritage sites within the vicinity. The locations of previously recorded sites near the project area are detailed in Section 6.2. However, please note that the recorded sites only reflect those identified to date and thus may not be a true representation of the distribution of sites in the area.

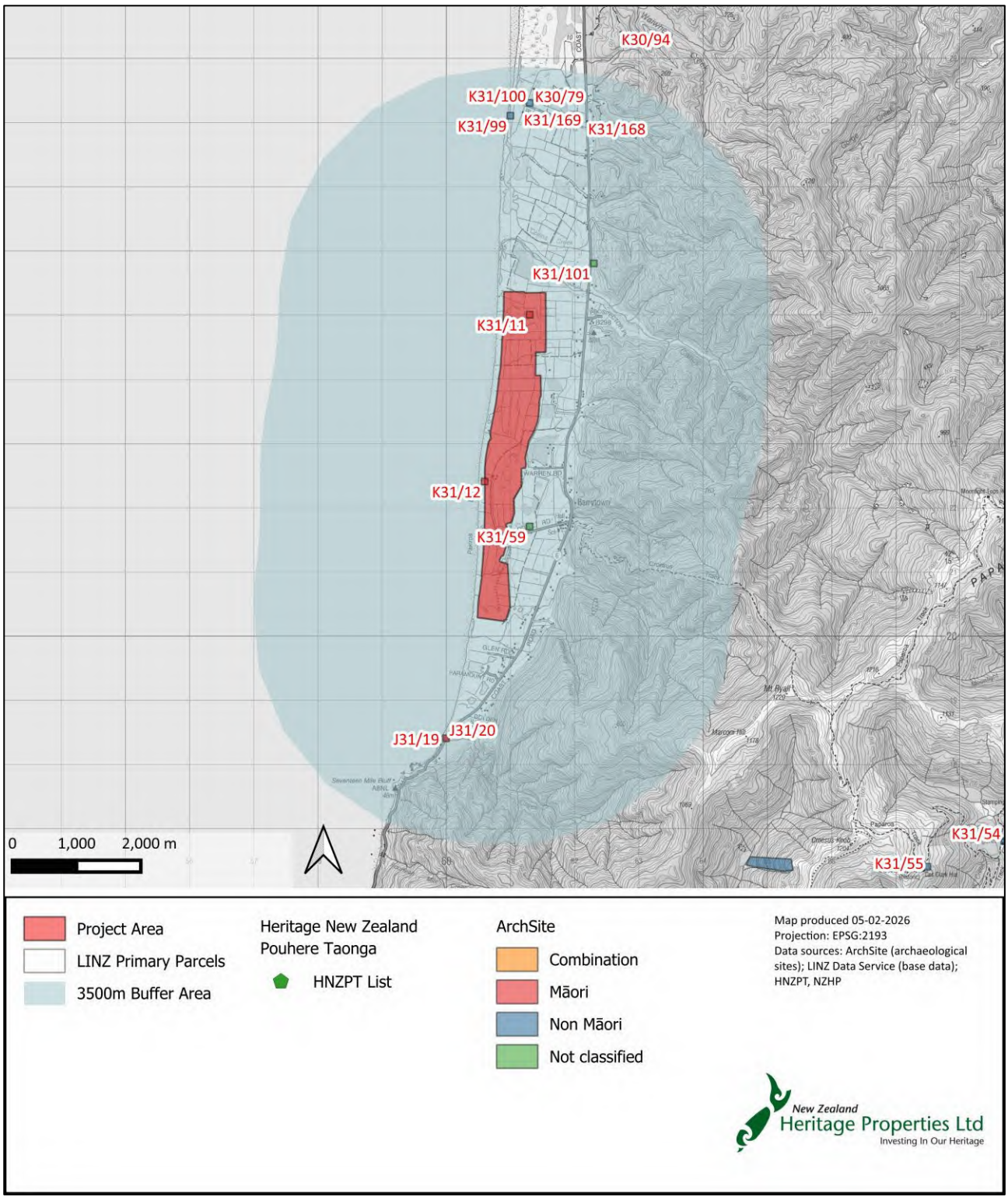

Figure 6-1. Previously recorded archaeological sites within the vicinity of the project area.

6.1 Previous Research and Investigations within the Project Area

There are two archaeological sites recorded within the project area: K31/11 and K31/12. The site records document artefact findspots that were reported in 1981 by a local landowner; neither site has been visited by an archaeologist (Voight, 1981a, 1981b).

Part of a shaped patu and a small greenstone chisel were recorded as K31/11 and a shaped greenstone pendant as K31/12. Additionally, the forms note other pieces of greenstone pebbles from Canoe Creek to Cargill Road (Voight, 1981a, 1981b). Both sites were described as located along the beach. K31/11 is located in the northern part of the project area, to the south of Canoe Creek. The site has been recorded inland, which does not match the description on the context form. The second find spot, K31/12, is further to the south in proximity to Warren Road. The presence of these findspots on the beach suggests that they may have eroded out of the foreshore and therefore increases the potential for other material to be present in the area.

There is no evidence to suggest that archaeological investigations have previously taken place in the project area.

6.2 The Wider Archaeological Context

There are nine recorded sites within a 3.5km radius of the project area (Table 6-1) (Figure 6-1). Only two sites are directly associated with Māori occupation, with two midden/oven site types (J31/19, J31/20) recorded to the south of the project area. The other seven sites are three mining-gold site types, three historic-domestic sites associated with gold mining occupation, and one burial/ cemetery.

It must be noted that these only represent the extent of recorded archaeology and are not representative of the full extent of possible archaeological remains in the area. Just 5km to the north of the project area where extensive surveys were carried out in 1977 and 1990, a large number of archaeological features associated with Māori occupation were encountered including midden, stone working areas, fireplaces, find spots, pits, terraces, and a cave shelter (Nichol, 1990). The lack of sites in proximity to the project area is a result of the area not having been previously surveyed and of extensive disturbances rather than a reflection of the distribution of pre-1900 activity. Nichol (1990) argues that that the distribution of sites and findspots in the vicinity of Canoe Creek may suggest the presence of a major unrecorded site in the area, and that the most likely spots for features to be encountered would be along the dune ridges and in the drier areas. Nichol (1990) reasons that due to the large populations inhabiting and traveling through the area it is inevitable that burials will be encountered during any large scale mining work on the Barrytown Flats, however no further evidence has been found to support the presence of burials within the project area.

The midden/oven sites (J31/19, J31/20) were recorded to have eroded out of the dune system at the southern end of Pakiroa Beach. Both noted the presence of mussel and charcoal. The gold mining sites were located to the north of the project area with trenches (K30/79), pits (K31/99), as well as the subsurface remnants of buildings (K31/169) recorded. The hut sites are located to the east of the project area close to Coast Road. The huts have been recorded based on the presence of stone rubble in rectangular arrangements (K31/100, K31/168) and on historical information with further evidence from domestic plant patterning. The cemetery (K31/59) is immediately to the east of the project area; it is noted to largely be derelict with only 21 graves still visible.

Table 6-1. List of recorded archaeological sites within 2.5km radius of the project area

ArchSite	Brief Description	Site Type	Ethnicity
J31/19	Shell midden	Midden/Oven	Māori
J31/20	Midden	Midden/Oven	Māori
K30/79	Curvilinear depression - mining trench	Mining - gold	Non- Māori
K31/100	Hut site	Historic- domestic	Non- Māori
K31/101	Hut sites	Historic- domestic	Non- Māori
K31/168	Possible stone hut site	Historic- domestic	Non- Māori

K31/169	Building remains	Mining - gold	Non- Māori
K31/59	Cemetery	Burial/cemetery	Non- Māori
K31/99	Depressions - possible prospectors' pits	Mining - gold	Non- Māori

6.3 Potential Unrecorded Archaeological Sites

Based on the documentary evidence and previous archaeological investigations in the vicinity, this assessment has identified the possibility of encountering unrecorded artefact find spots, midden/oven, mining-gold, and historic-domestic site types within the project area.

6.3.1 Artefact Find Spots

This assessment has found that unrecorded findspots may be encountered in the project area. Find spots are the only previously recorded site types within the project area. Due to the presence of the nearby ara tawhito, Poutini Ngāi Tahu would have ventured across the project area to procure resources while travelling. Artefacts caches have frequently been found in wetland areas across Aotearoa with highly valuable material often cached for safe-keeping or for functional purposes (Gumbley, Johns, & Law, 2004; Phillips, Johns, & Allen, 2002). Additionally, early Pākehā occupation in the area was transitory with little permanent settlement, there is the possibility of finding discarded artefacts from the early gold miners in the project area.

Across Aotearoa there are 1913 find spots recorded in total with 44 of these being in Te Tai o Poutini. The find spots predominantly record adzes and other lithics, while three record the presence of canoe/waka and one records a glass bottle cache.

6.3.2 Midden/oven Sites

Unrecorded midden/oven sites may be encountered within the project area. Midden/oven sites are common around the coast of Aotearoa with 3477 recorded in Te Waipounamu, 131 of which are found within Te Tai o Poutini. They are the most common site type in the previously surveyed area of the northern Barrytown Flats with just over half of all sites recorded in the area being midden/oven site types. Several have been recorded in proximity to the project area in the coastal dune system. These sites are common throughout coastal New Zealand. It is not surprising that multiple midden sites have been identified on Barrytown Flats and along Pakiroa Beach due to the ara tawhito crossing the project area and the abundant mahinga kai which would have once been present in the area.

6.3.3 Gold Mining Sites

This assessment has determined that there is the potential for encountering unrecorded mining sites. Given that the documentary resources have identified that the project area was occupied by miners with several mining claims within the project area, and that the beach was an area used for blacksanding, there is the potential that mining evidence may be encountered in the project area.

Across Te Waipounamu, there are more than 3800 mining – gold sites and a further 191 sites associated with other forms of mining that have been previous recorded in the ArchSite database. As of December 2024, there were 1721 recorded archaeological sites within Te Tai o Poutini, 810 of which are classified as gold – mining, accounting for 47% of all sites in the district. However, it should be noted that this number will be much higher as this only includes the sites that have been recorded to date. This number does also not consider related sites, such as miner's huts, ancillary structures, etc. which may be classified differently on ArchSite. The previously recorded sites are largely concentrated in Te Tai o Poutini, Central Otago, and in smaller pockets in the Marlborough, Tasman, and Southland Districts. The nature of gold mining sites is varied as features relate to different working aspects of the gold fields and trace chronological differences in mining technology and equipment. For example, many features relate to the storage and movement of water required for sluicing and hydraulic elevating (e.g., water races, reservoirs, ponds, aqueducts, dams), others relate to the physical remains of mining activities (e.g., sluice faces,

tailings, prospecting pits) or the specific equipment and machinery that was utilised (e.g., dredges, stamper batteries, machinery). In addition, there are also often features and materials associated with the domestic lives of miners living near workings (e.g., stone and sod huts, hut floors, artefacts).

6.3.4 Historic-Domestic Sites

This assessment has determined that there is the potential for encountering unrecorded historic-domestic sites. Given that the documentary resources have identified several small huts in the project area as well as indicating that there were many miners blacksanding along the foreshore and squatting nearby, there is the potential that historic-domestic site types may be encountered in the project area.

Historic-domestic sites are common around Aotearoa but underrepresented in Te Tai o Poutini, with 13376 recorded in Te Waipounamu, only 103 of which are found within the West Coast. Recorded historic-domestic sites in the district primarily relate to mining settlements, with small transitory structures such as hut sites and camp sites being the most common historic-domestic site type.

7 Results of the Site Survey

A site visit was carried out on 10 to 12 December 2024 by Bree Wooller and Leah Harding to record the extent and condition of visible archaeology and to identify areas of modification within the project area that may affect the condition of subsurface archaeology (Figure 7-1). Based on the twentieth century history of the site, large extents of the area were dredged as well as heavily modified for agricultural activities. Both activities involved extensive earthworks which would have modified any archaeology that would have been detectable on the surface, although deeper archaeology may still be present. Sample areas of heavy modification were surveyed, to establish the improbability of identifying archaeology through a transect survey, before they were excluded. Areas of known pre-1900 activity were still surveyed regardless of modification. The following section will describe the results of the site survey, documenting the site setting and condition of potential pre-1900 features.

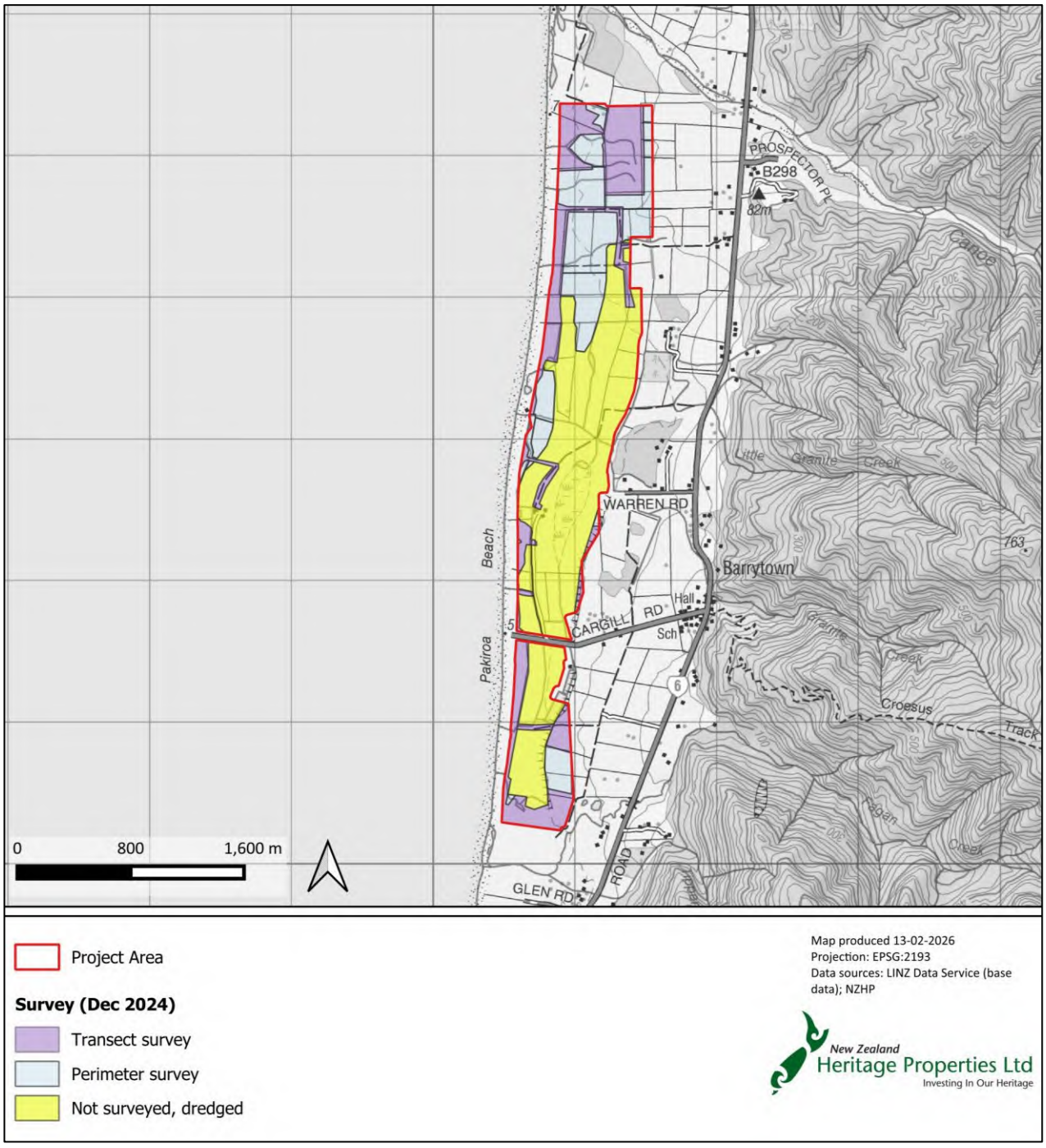

Figure 7-1. Map of project area showing areas surveyed. A map of the transects walked is provided in Appendix A.

7.1 Setting

The project area is situated to the west of the settlement of Barrytown on the flats adjacent to Pakiroa Beach (Seventeen Mile Beach). The land is primarily used for farming and consists of fenced paddocks, with access ways, and drainage ditches transecting the landscape.

The site survey found a large portion of the surface area has previously been disturbed through ploughing, dredging, and hump and hollowing (Figure 7-2). Approximately a third of the project area had been humped and hollowed. In the hollows the deposits were waterlogged and boggy, and at times were overgrown with foliage (Figure 7-3). A large portion of the project area has previously been dredged. A sample of dredged sections were transacted; the terrain was undulating, boggy, and covered in tussock and short grasses.

The terrain and foliage cover varied across the project area. Numerous creeks and tributaries criss-cross the landscape, resulting in large swaths of uneven, boggy terrain covered in long 300-500mm grass and tussocks (Figure 7-4). Some areas were waterlogged to the extent that they were not traversable. Elsewhere the terrain was gently undulating to flat and covered with short tussocky grass (Figure 7-4, Figure 7-5). Some fields appeared to have been extensively grazed and heavily rutted by stock, while others had deep plough lines. No evidence of pre-1900 material was visible in the surveyed disturbed areas.

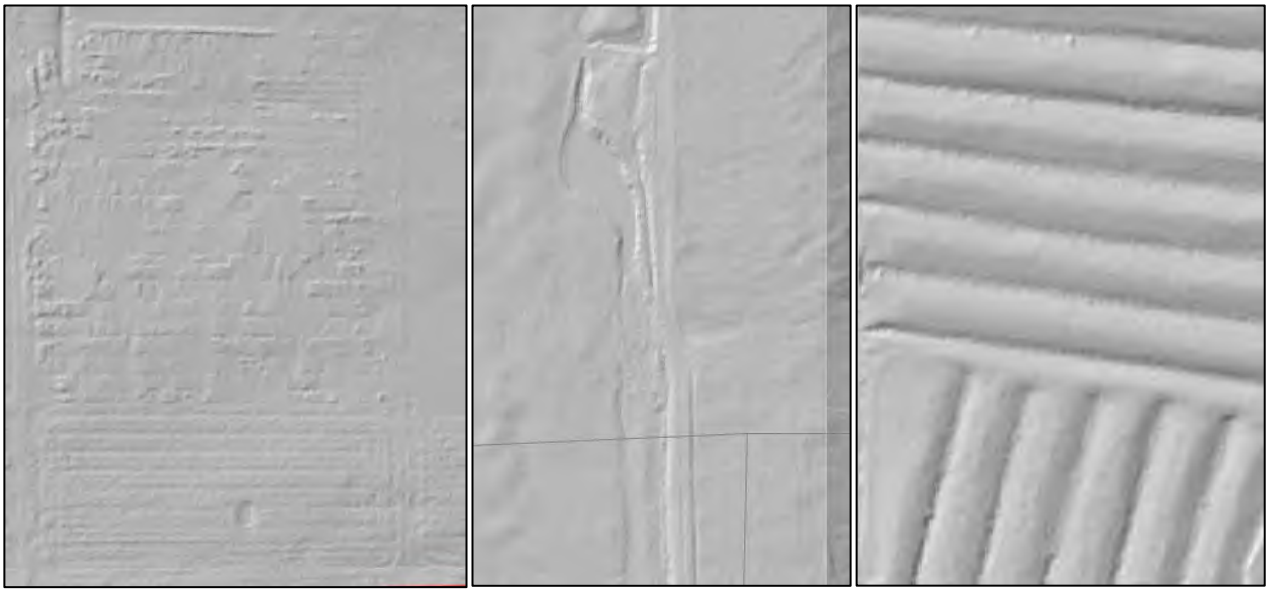

Figure 7-2. Ploughing (left), dredging (centre), and hump and hollowing (right) in the project area as seen in the LiDAR imagery.

Figure 7-3. Hump and hollowing in the eastern fields, looking northeast (Wooller, 2024).

Figure 7-4. Tributaries in RS 2927, looking north. Note the tussocky grass in the foreground and the grazed pasture in the background (Wooller, 2024).

Figure 7-5. Foreshore with cobbled beach, looking south (Wooller, 2024).

Figure 7-6. Eroded bank along the foreshore adjacent to Lot 5, looking east, scale bar = 500mm (Wooller, 2024).

7.2 Results

Three points of interest (POI) were identified and recorded during the pedestrian survey of the project area, while the recorded locations of the archaeological sites (K31/11 and K31/12) were revisited with no evidence of archaeology found. The following sections will discuss the survey results by historic block.

7.2.1 Block V Waiwhero Survey District

No archaeological features or material was found in Block V, Waiwhero District. The locations of known activity and recorded archaeological site were revisited and are discussed below.

7.2.1.1 Find Spot K31/11

No evidence of archaeological features or deposits were found in the recorded location of K31/11. The findspot is located in a boggy paddock between two creeks with small tributaries crossing through the vicinity of the

recorded archaeological site (Figure 7-7). The surface was covered in long tussocky grass that obscured the surface; however, sections of eroded creek and stock rutting showed no evidence of archaeological material. A survey of the LiDAR imagery and aerials show no evidence of archaeological features in the vicinity (Figure 7-8).

Figure 7-7. Vicinity of K31/11, looking west (Harding, 2024).

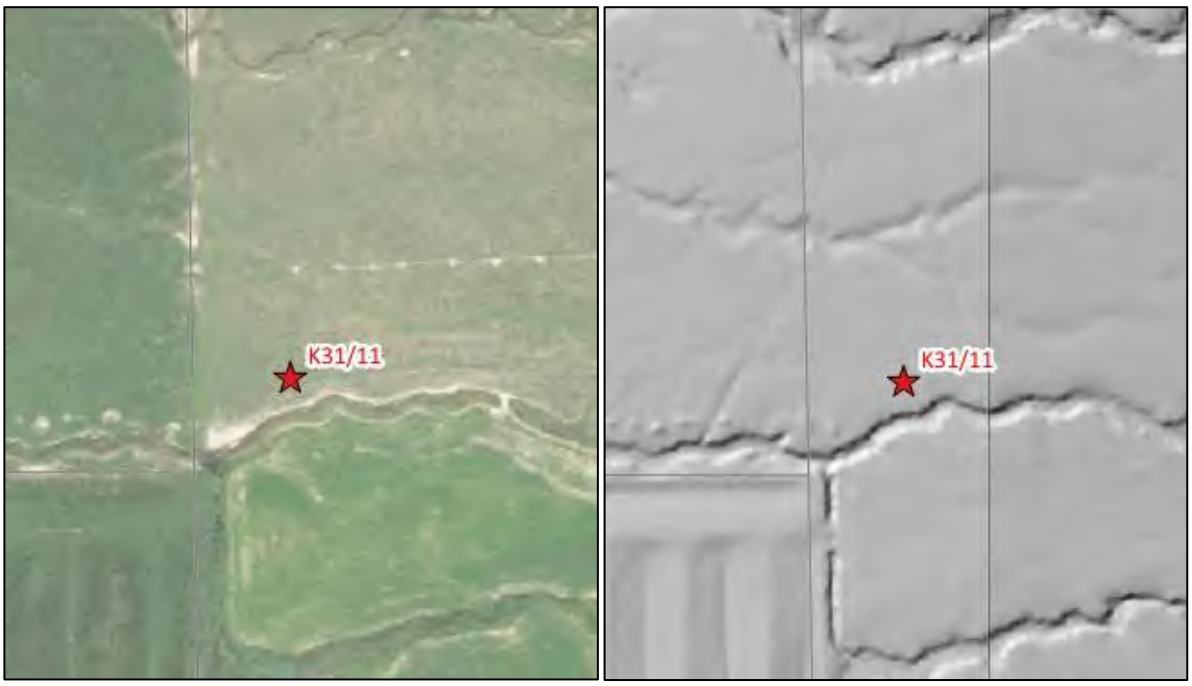

Figure 7-8. Modern aerial (left) and LiDAR imagery (right) showing the approximate location of K31/11. Note the site location is an approximation based on an oral account.

7.2.1.2 Find spot K31/12

No evidence of archaeological features or deposits were found in the recorded location of K31/12. The findspot is on the margin of the dredged zone, with only a small coastal strip and a section of wetland which had not been

dredged. Harakeke, umbrella sedge, and tussock were growing along the foreshore, while the shoreline was covered in cobbles, so visibility was poor (Figure 7-9, Figure 7-10). A survey of the LiDAR imagery and aerials show no evidence of archaeological features in the vicinity (Figure 7-11).

Figure 7-9. Foreshore in proximity of findspot K31/12, that has not been dredged, looking north (Wooller, 2024).

Figure 7-10. Foliage growth and stone coverage in proximity to find spot K31/12. Looking east, scale bar 500mm (Wooller, 2024).

Figure 7-11. The vicinity of find spot K31/12 shown in the 1951 aerial (left) and the LiDAR imagery (right). Note the site location is an approximation based on an oral account.

7.2.1.3 Poschich's Claim

South of Canoe Creek, gold mining activities were undertaken in the northern part of the project area by 1881. The primary occupant was Raymond Poschich who had several claims in the area with historical sources noting water races and dams in relation to the Poschich's workings in Barrytown Flats. Only the southern edge of Poschich's claim is within the project area. No evidence of archaeological deposits or features associated with Poschich's claim were located within the project area. The area was extensively humped and hollowed, which presumably would have destroyed any archaeological evidence, such as water races or hut sites, within the project area (Figure 7-12). However, depending on the mechanism used, pockets of features may remain under the humps, while find spots relating to his occupation and mining activities may be present subsurface.

Figure 7-12. Hump and hollowing in what was Poschich's Claim. Looking southwest. The extent of the ground disturbance can also be seen on the LiDAR, right (Poschich's claim in purple).

7.2.1.4 Educational Reserve and the Adjacent Mining Settlement

No evidence of archaeological deposits or features were located at the site of the former school, and the pre-1900 settlement consisting of Millar's hut and Cargill's water races. The area was recorded to have been previously

dredged, and this was supported by the survey results (Figure 7-13, Figure 7-14). The surveyed area was gently undulating, likely the result of redeposited dredge material. The boundary between the dredged zone and the coastal margin was not visible. An irrigation channel ran along the southern perimeter. The field had been ploughed previously, and although there was modern concrete chunks and metal noted along the coastal margin, there was no evidence of pre-1900 material relating to the school on the property.

Figure 7-13. Looking northwest across the former Educational Reserve (Wooller, 2024).

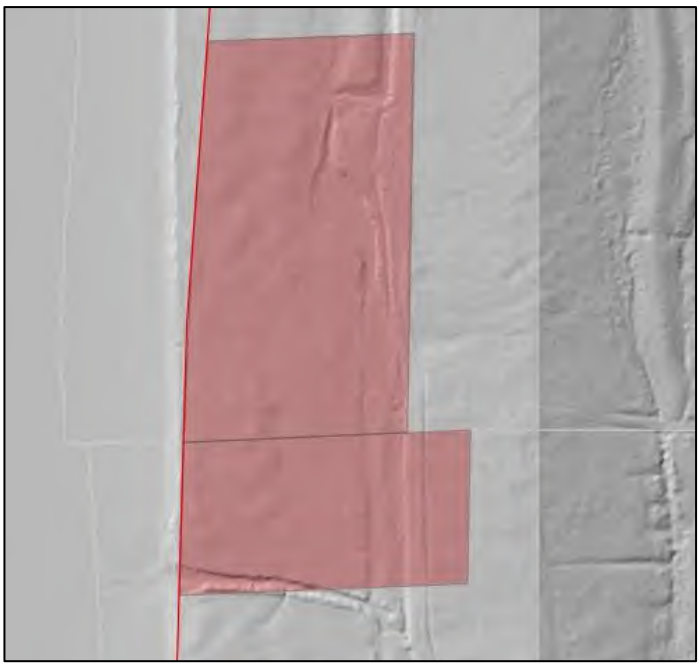

Figure 7-14. LiDAR imagery showing the area of pre-1900 activity (red) as dredged.

7.2.1.5 Cargill's Hut Site

No definite evidence of archaeological deposits or features were located at Cargill's hut site. However, the site visit noted that the boundary of the dredging appeared to be further to the east than previously thought, indicating that subsurface remains relating to Cargill's settlement may be present within the project area. Based on historic plans,

the hut site appears to be just outside the project area; however, potential remains for posts or foundations relating to out buildings including the shed, fence posts, or artefacts relating to Cargill's occupation (Figure 5-11). A large cluster of arum lilies were observed just outside the project area in this location. The plants were of interest as arum lilies were not noted elsewhere on the survey and were a common ornamental garden plant favoured by early European settlers in New Zealand. A discrete cluster may be indicative of historic planting.

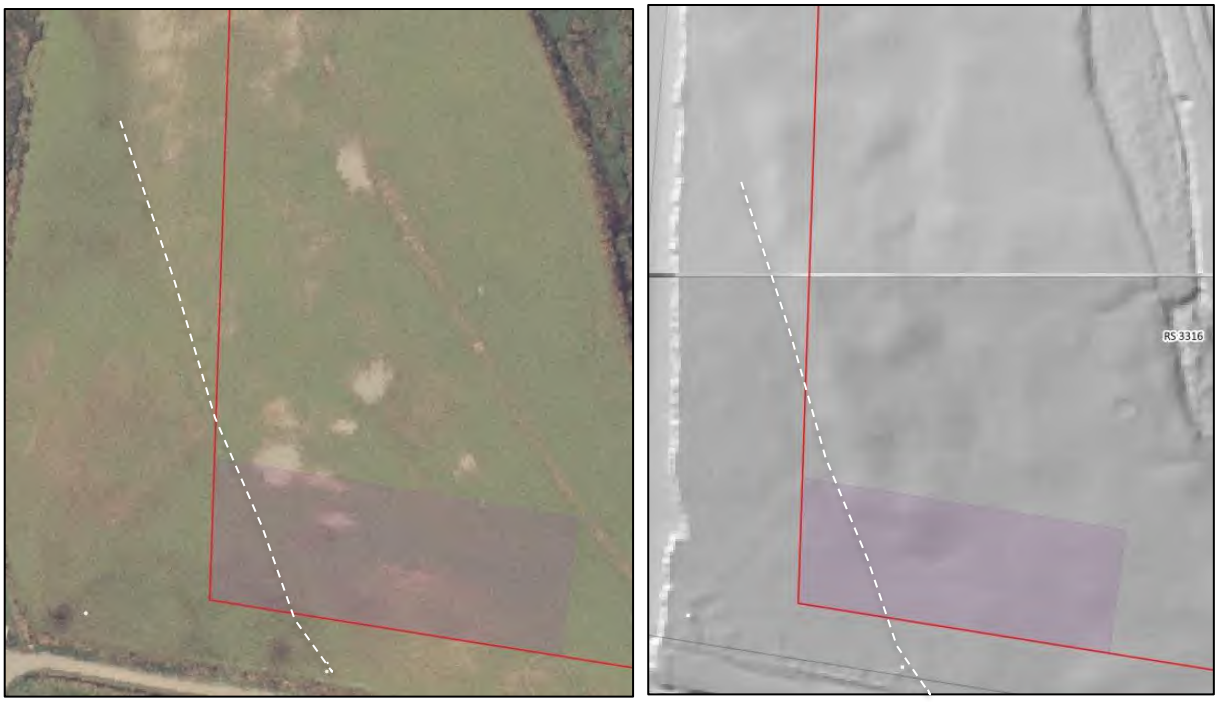

Figure 7-15. The location of Cargill's settlement (purple) and the suspected edge of dredging (white dotted line), pictured overlaying the 1981 aerial (left)and the LiDAR imagery (right).

Figure 7-16. Arum lily patch, looking west (Wooller, 2024).

7.2.1.6 Dune Ridge System (POI 001-002)

Along the foreshore in the northwestern corner of RS 2932, there are two high ridge formations within the project area which appear to have been a somewhat unmodified part of the original dune landscape (Figure 7-17, Figure 7-18, Figure 7-19). However, a drain and a pond were excavated directly to the east of the ridges sometime between 1951 and 1981 (Retrolens, 1951, 1981) and there is the possibility the ridges are formed from the spoil from the drain (Figure 7-20). This could not be de determined from aerial imagery or historic photos of Barrytown Flats.

If the ridges were dune formations they would be of interest as they may have formed a high point in the surrounding wetland environment, making them a prime spot for a nohoanga for manawhenua travelling up and down the coastline. The dunes are approximately 870m north of the findspot K31/12. However, the landscape to the south of the dunes has been highly modified by the excavation of Dennehy's drain in the early twentieth century, dredging, and then hump and hollowing. The dunes appear to be denser and more compact than the terrain of surrounding paddock which was boggy and heavily rutted from livestock. The area was planted in short grass. The high dune ridges stretch along an extent of approximately 300m, while smaller dunes continue north for a further 200m.

Figure 7-17. Looking north across the ridges (Harding, 2024).

Figure 7-18. Undulating slope looking northwest (Harding, 2024).

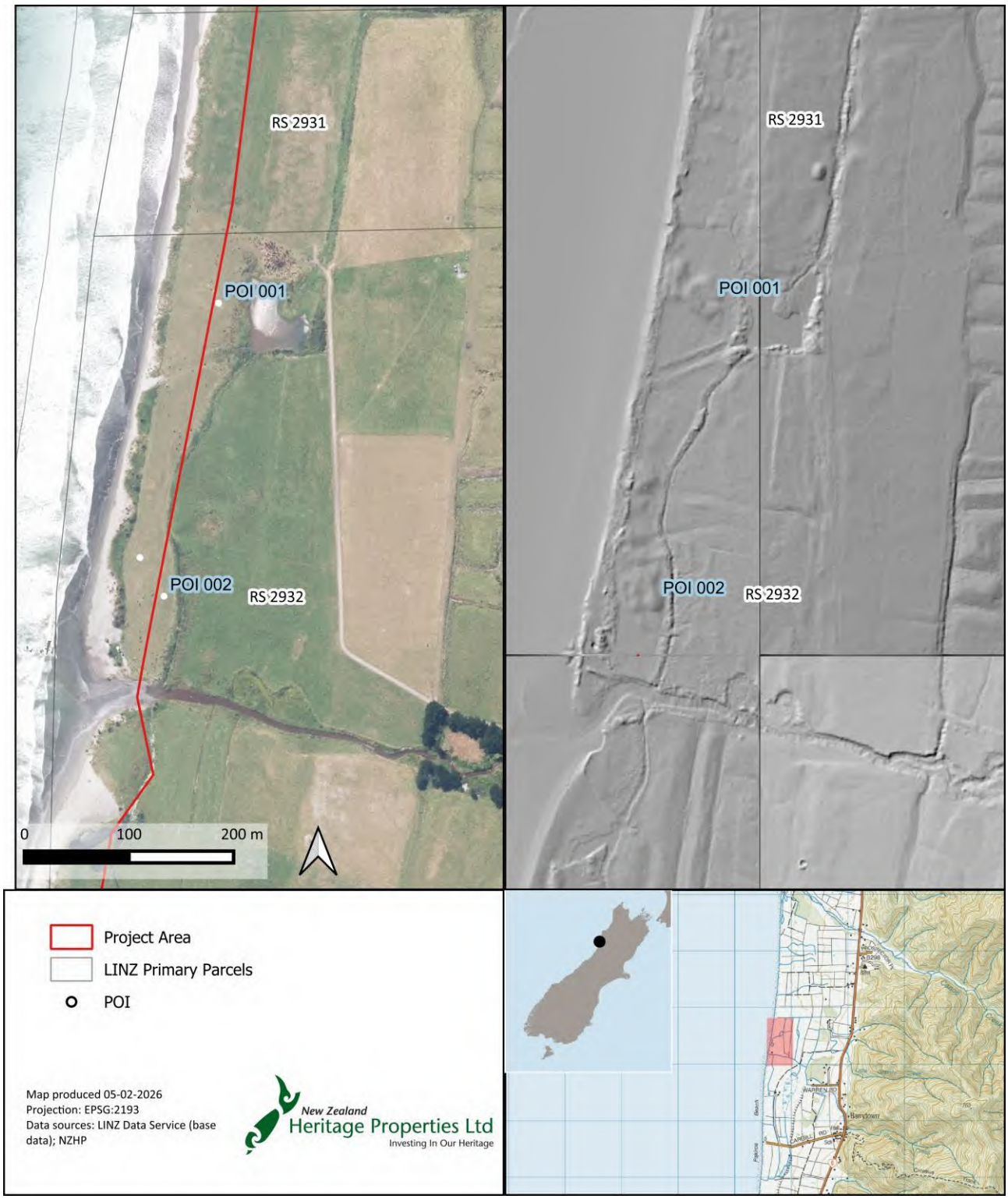

Figure 7-19. Points of interest in relation to modern property boundaries and as shown on shown on LiDAR imagery just within the project area

Figure 7-20. Aerial imagery 1951 (left) and 1981 (right). Ridge areas circled in red (Retrolens, 1951, 1981).

7.2.2 Block IX Waiwhero Survey District

No archaeological features or material was found in Block IX, Waiwhero District. One suspected archaeological feature, a drystone structure (POI 003) was identified. The locations of known activity were revisited and are discussed below.

7.2.2.1 Cargill Road Drystone Structure (POI 003)

Beneath Cargill's Road on its southern aspect the remnants of a stacked drystone masonry structure are visible (Figure 7-21). The feature consists of two walls extending up from the ditch and extending into the road reserve. Although the project area has a twenty-metre setback from Cargill Road and the drystone feature, the feature might inadvertently by modified by the creation of the Cargill Road bund, by vibrations, or dust accumulation.

Figure 7-21. Stacked drystone structure beneath Cargill Road (Wooller, 2024).

7.2.2.2 Lewis' Claim

No evidence of archaeological deposits or features were located at the site of Lewis' mining claim (Part Section 5, Block IX Waiwhero SD). The survey indicated that the project area intersecting with the historic claim had been heavily disturbed by hump and hollowing, and this was supported by LiDAR results (Figure 7-22). The surveyed area had regular flattened humps running east-west, with marshy hollows draining into an irrigation channel at the edge of the dredge zone. The margin between the disturbed area and the undisturbed coastal strip was clear, however, only the disturbed zone is within the project area.

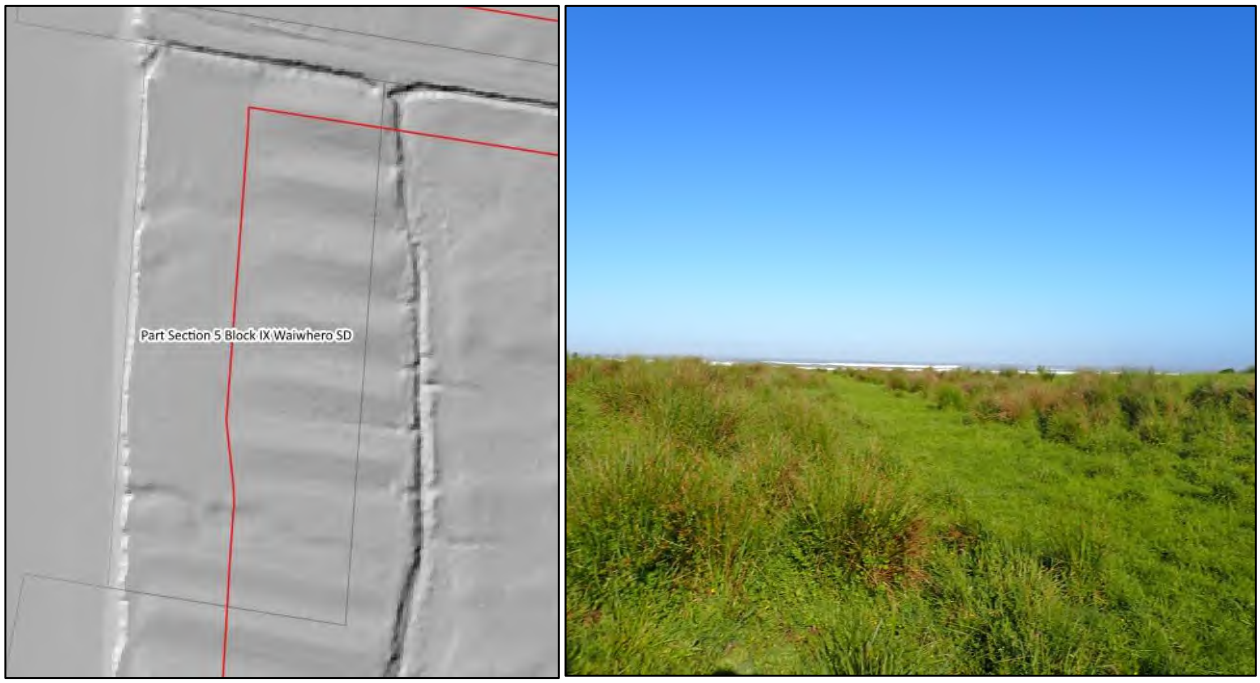

Figure 7-22. The eastern edge of Lewis' Claim shown to be humped and hollowed in the LiDAR data (left) and during the survey, looking west (right). The red line indicates the project area boundary.

7.2.2.3 Hannah's Claim

No evidence of archaeological deposits or features were located at the site of Hannah's mining claim (Lot 1 DP 406050, Block IX Waiwhero SD). The survey indicated that the project area intersecting with the historic claim had been heavily disturbed by dredging initially, then hump and hollowing (Figure 7-23, Figure 7-24). The extent of modern disturbance was supported by LiDAR results (Figure 7-24). The surveyed area had marshy undulating ground, associated with the dredging and overgrown waterways in the artificial linear hollows. The humped areas were narrow and steep forming dry high points running north south along the foreshore and along the southern edge of the dredge zone. The southwestern corner had modern irrigation channels excavated parallel to the foreshore but otherwise appears undisturbed. Likewise, a paddock along the western edge is recorded to have been on the margin of the dredge zone, however the site visit identified this area to be less undulating than the surrounding land and may have been undisturbed. This was also observed in the LiDAR imagery (Figure 7-24).

Figure 7-23. Hump and hollowing within Hannah's claim, looking southeast (Wooller, 2024).

Figure 7-24. LiDAR imagery of the project area (left). The red line indicates the project area, and the yellow dotted line is the eastern side of Hannah's claim. The southwestern corner of the project area (right), with irrigation channel running through. Looking south (Wooller, 2024).

8 Research Results

The historical and archaeological research, as well as the results of the archaeological survey, indicate that there is a high potential that pre-1900 archaeological features and deposits survive within the project area and will be impacted by the proposed works. Encountered archaeology will be associated with artefact find spots, midden/oven sites, mining-gold sites, and/or historic domestic sites.

Prior to Pākehā arrival in the area, the coastline was traversed by manawhenua travelling along an ara tawhito, with the dune ridges in the project area possible sites of nohoanga as well as mahinga toi and mahinga kai within the wetland inland area. During the survey the recorded locations of the two find spots (K31/11 and K31/12) in the project area were revisited and no further material was identified. This is not surprising given that the site locations were recorded based on oral reports from landowners in the 1980s, and the extent of land modifications and farming activities that have taken place since then. The sites of the two find spots (K31/11 and K31/12) are considered destroyed on the basis of the site record forms and the site visit, and they will not be further discussed. The site record forms have been updated to reflect the results of the survey. However, the presence of the findspots in proximity to each other is indicative that there is a high potential other subsurface sites are present in the vicinity. Although the project area has undergone a large amount of surface modification, in situ subsurface areas remain intact outside the dredged area, particularly in the northern project area, and may contain artefacts while the dredged areas may contain redeposited archaeological material. As the proposed works involve intensive earthworks within the project area, including in proximity to the coastal margins and historic wetland areas, **there is reasonable cause to suspect that Māori artefacts will be encountered within the project area.** POI 002 – 003 record what appears to be an area of intact dune surface which may have provided a dry sheltered spot with good visibility of the surrounding landscape and may have been utilised as a nohoanga. This is further supported by the presence of the nearby find spot K31/11, **suggesting there is reasonable cause to suspect Māori archaeology will be encountered and affected by the proposed work** along the western margin of the project area in RS 2932 (Figure 8-1).

Early Pākehā activity within the project area was transient and associated with the gold rush at Canoe Creek, with later beach mining activities taking place along the foreshore of Seventeen-Mile Beach. Early mining claims were recorded in the project area to the south of Canoe Creek in the northern project area (Porschich), and along the foreshore to the south of Cargill Road (Lewis, Hannah, Warren). No evidence of archaeological features or deposits were found during the survey of these areas, with a large amount of modern disturbance recorded. However, small sections of land along the western and southern margins of the project area, within the mining claims, appear relatively undisturbed. The surrounding archaeological landscape indicated that archaeological features such as water races, prospecting pits, and hut sites are located within areas of pre-1900 mining activity, with these not always being visible prior to excavation, so **there is reasonable cause to suspect that archaeology relating to mining may be present across the project area, with a higher chance of encountering these** in discrete patches in the western and southern portions of Lot 1 DP 406050, Block IX, Waiwhero SD (Figure 8-1).

With the development of Barrytown and more permanent occupation in the area there was the construction of a schoolhouse and several dwellings in the project area. The site of the first school was in the project area, however the area has been dredged, and it is unlikely any archaeology remains intact. Settlement at this time was along the foreshore, with the western part of the project area remaining as wetland which was not cleared or drained until well into the twentieth century. Formal subdivision was piecemeal and largely occurred in the twentieth century. However, early beach miners, such as Cargill, were squatting within the project area prior to settlement. Although Cargill's hut site appears to be on the boundary of the dredge zone, his shed and other structures may remain intact. The assessment has determined that **there is reasonable cause to suspect that archaeology related to historic-domestic site types may be present across the project area,** with a higher probability in the southwestern corner of RS 3316 (Figure 8-1).

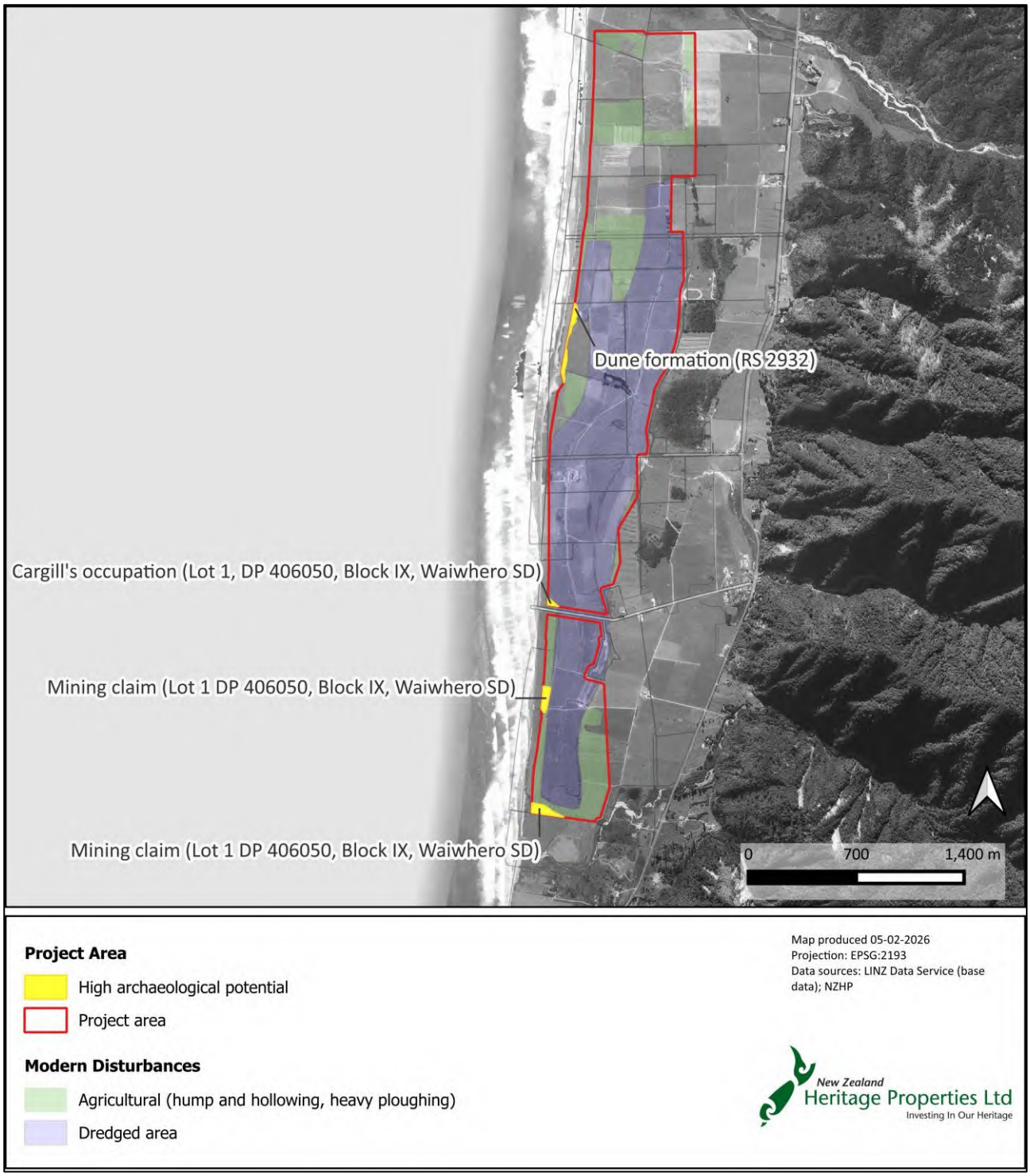

Figure 8-1. High archaeological potential areas and areas of modern disturbance.

8.1 Constraints and Limitations

During documentary research there was a limited number of sources available digitally, this limited the understanding of land transactions and property ownership. However, as most of the occupation was largely transitory during the nineteenth century, the unavailable land transaction data would have added little to the overall understanding of the history of the project area.

The site survey was constrained by a number of factors. Primarily, safe access to survey areas constrained the areas which were able to be transacted. Fields with livestock were not accessed, nor were those with only ponytail fencing separating the livestock from the rest of the paddock. Fields which were deemed to boggy to safely survey, or that

required deep creek crossings, were not accessed. Fields without safe entry points were also not accessed in accordance with NZHP's health and safety regulations. These fields were viewed from an access track or from the fence line. The ground cover in a number of fields had high tussocky grass or other shrub vegetation which limited visibility of archaeological deposits or features. In the first instance, the distance between transects was decreased, however the ground cover still impacted the survey. To minimise the limitations caused by the above factors a thorough desktop survey of LiDAR and aerial photographs was undertaken.

9 Archaeological and Other Values

The following sections summarise the values for unrecorded archaeological sites that may be encountered within the project area.

9.1.1 Unrecorded Artefact Find Spots

An evaluation of the archaeological values is provided for unrecorded artefact finds in Table 9-1. Overall, unrecorded find spots are considered to have **medium** archaeological value depending on their rarity, information potential, and amenity value.

Table 9-1. Summary of archaeological value for unrecorded artefact find spots.

Value	Assessment
Condition	**Subsurface/unknown**: The project area has undergone a vast amount of modification, as a result encountered findspots may not be in situ but redeposited in dredge fill or while excavating field drainage systems.
Rarity or Uniqueness	**Moderate:** This site type is relatively uncommon within the Grey District and nationwide in comparison to other site types.
Contextual Value	**Low-Moderate:** Artefact findspots are recorded as such as they are not found in relation to other features within the context of a wider site. However, Māori artefact find spots in this location would have a higher contextual value than a typical findspot as they would be associated with the ara tawhito that passed through this area. The presence of artefacts provides wider contextual value into the use of a landscape.
Information Potential	**Moderate**: Artefacts have information potential in revealing how people made use of their environment both through the manufacturing of the artefact as well as the purpose it was created for as well as temporal information for transient occupation in the area.
Amenity Value	**Low-Moderate**: Most artefact find spots are discrete and once disturbed they are gone and offer no amenity value in situ. Once retrieved, artefacts provide tangible links to the past, and depending on the artefact may be returned to iwi or displayed in the local museum. However, thus must be done under the direction of manawhenua and in accordance with tikanga.
Cultural Associations	**Māori and Pākehā**

9.1.2 Unrecorded Midden/Oven Sites

An evaluation of the archaeological values is provided for unrecorded midden/oven sites in Table 9-2. Overall, unrecorded midden/oven sites are considered to have **medium** archaeological value depending on their condition, context, and extent.

Table 9-2. Summary of archaeological value for unrecorded midden/oven sites.

Value	Assessment
Condition	**Subsurface/ unknown**: Midden and oven sites are found in a range of conditions, including destroyed, below ground, poor, fair, and good. It is probable many within the project area have been modified or damaged to some extent as a result of erosion as well as impacted by mining and dredging as well as activities as fossicking, ploughing and track cuttings. The presence of such sites near the proposed works, however, is indicative of heightened potential to encounter potentially intact archaeological remains.
Rarity or Uniqueness	**Low:** This site type is common along the adjacent coastline.
Contextual Value	**Moderate**: When considering wider interpretation sites of this type in comparisons to other recorded sites, they have a moderate contextual value as they provide insight into resource use on the wetlands, streams and coastline in this locality providing comparative information for changing patterns of such resource use. Additionally, midden/oven sites will have contextual value to as they would be associated with the ara tawhito that passed through this area.

Value	Assessment
Information Potential	**Low**: Midden/oven sites with single or few features provide limited information on how resources were used and exploited. **Moderate:** Midden/oven sites that form larger site complexes add to our understanding of occupation and activity, resource use and activity within the wider landscape.
Amenity Value	**Low**: Most midden/oven sites with single or few features are located below ground, and most others are eroding out of banks and cuttings or scattered and thus have a low amenity value. **Moderate:** While many larger midden/oven sites are still recorded below ground, they have higher potential to provide more information for public interpretation and education.
Cultural Associations	**Māori**

9.1.3 Unrecorded Mining-Gold Sites

An evaluation of the archaeological values is provided for unrecorded mining sites in Table 9-3. Overall, unrecorded mining sites are considered to have **medium** archaeological value based on their contextual value, information potential, and amenity value.

Table 9-3. Summary of archaeological values for mining sites.

Value	Assessment
Condition	**Subsurface/unknown**: Sites of this type are found in a range of conditions, including destroyed, subsurface, poor, fair and good. It is probable many within the project area have been modified or damaged to some extent as a result of erosion as well as impacted by mining and dredging as well as activities as fossicking, ploughing and track cuttings. The presence of such sites near the proposed works, however, is indicative of heightened potential to encounter potentially intact archaeological remains.
Rarity or Uniqueness	**Low:** This site type is common on the Barrytown Flats.
Contextual Value	**Moderate**: This site when compared to other mining sites in the surrounding area may provide an in depth look at mining strategies along Barrytown Flats.
Information Potential	**Moderate**: This site could provide information about mining strategies and provide spatial data about concerning mining locations.
Amenity Value	**Low-Moderate**: Some unrecorded mining sites may contain features or material that provide good opportunities for public interpretation or education, such as in situ features or artefacts. This will be dependent on their accessibility and condition.
Cultural Associations	**Pākehā and potentially Māori**

9.1.4 Unrecorded Historic-Domestic

An evaluation of the archaeological values is provided for unrecorded historic-domestic sites in Table 9-4. Overall, unrecorded historic-domestic sites are considered to have **medium** archaeological value based on their underrepresentation in Barrytown, contextual value, and information potential.

Table 9-4. Summary of archaeological values for historic-domestic sites.

Value	Assessment
Condition	**Subsurface/unknown**: Sites of this type are found in a range of conditions, including destroyed, subsurface, poor, fair and good. It is probable many within the project area have been modified or damaged to some extent as a result of erosion as well as impacted by mining and dredging as well as activities as fossicking, ploughing and track cuttings.
Rarity or Uniqueness	**Moderate:** Although historic-domestic sites are very common across New Zealand, this site type is underrepresented on the Barrytown Flats with only 5% of identified sites having this site type.

Value	Assessment
Contextual Value	**Moderate**: Although there are few historic-domestic sites recorded in Barrytown, there are many mining historic-domestic sites recorded in New Zealand. A historic-domestic site in the project area has potential to have contextual value on a regional and national level, as well as in association with the surrounding mining activities.
Information Potential	**Moderate**: This site could provide information about the physical structure of miners houses as well as information on coastal mining settlements and mining lifestyles.
Amenity Value	**Low-Moderate**: Some unrecorded domestic sites may contain features or material that provide good opportunities for public interpretation or education, such as in situ features or artefacts.
Cultural Associations	**Pākehā and Māori**

9.1.5 Other Values

Ngāti Waewae are best placed to comment on the cultural values within the project area and NZHP recommends TiGa Minerals and Metals Ltd provide this assessment to Ngāti Waewae for consultation.

No other relevant values (e.g. historic heritage sites) were identified during the assessment.

10 Assessment of Effects and Other Considerations

Section 46 (g)(ii) of the HNZPTA requires an assessment of the effects of the proposed works, as detailed in Section 1.2, on archaeological and other values, which were assessed in the previous section. The assessment of effects takes into account the criteria established by HNZPT (2019) as outlined in Section 3. Also considered here are methods to avoid, minimise, and mitigate any adverse effects to archaeology.

Ngāti Waewae are best placed to comment on the cultural values, and the effects of the proposed works on these values within the project area. As such, NZHP recommends TiGa Minerals and Metals Ltd provide this assessment to Ngāti Waewae for consultation. No other relevant values (e.g. historic) were identified during the assessment.

10.1 Assessment of Effects on Archaeological and Other Values

This assessment has identified that there is the potential to uncover unrecorded artefact find spots, midden/oven sites, mining-gold, and historic-domestic archaeological sites during the works. However, all archaeological remains across the project area are expected to be subsurface, and their location and condition are unknown. As stated in the research results, findspots K31/11 and K31/12 are destroyed, so will not be impacted by the proposed works. It is probable the condition of a vast number of encountered features will be poor due to natural coastal erosion, stock trampling, previous dredging, and environmental modifications (i.e. hump and hollowing). However, despite the likely poor condition of subsurface features, there is still the potential archaeology is present across the site. Unrecorded archaeology that may be encountered include artefact caches, midden and oven features, flumes or sluice boxes.

Although the project area has undergone a large amount of surface modification, the dredged areas may contain redeposited archaeological material not in situ. Hump and hollowed areas may have intact archaeology under the humps. As the history of the area records largely transient and ephemeral occupation across the project area, archaeology could be encountered anywhere across the site. Higher potential areas for encountering archaeology are addressed below.

Considering the large extent of the earthworks across the majority of the project area, **NZHP considers the magnitude of impact on any potential unrecorded archaeological sites will be moderate to major**, dependant on where the site is located. The complete or partial destruction of encountered sites removes them from the archaeological record, having a negative impact on their contextual value, information potential, and amenity value.

- The high archaeological potential zones are on the margins of the project area and likely extend outside of the mining disturbance zone, so encountered archaeology will only be destroyed within the project area, resulting in a **moderate impact.**
- Proposed works are anticipated to result in the complete destruction of any unrecorded archaeological sites encountered within the project area, resulting in a **major impact**.

NZHP recommends that that an archaeologist monitor all earthworks (stripping of topsoil,) that are likely to encounter archaeological remains (see areas of high archaeological, Figure 8-1) until it can be shown that no archaeology survives. NZHP recommends the investigation of all identified areas of archaeological potential to be undertaken in unison prior to the commencement of mining activity.

This assessment has identified that there is potential to encounter unrecorded archaeological sites with importance to mana whenua within the project area. **NZHP recommends that mana whenua should be engaged and have the opportunity to be actively involved.** This includes consultation at the archaeological assessment phase.

10.2 Recommendations to Avoid, Minimise and/or Mitigate Adverse Effects

Recording of archaeological features and deposits along with subsequent analysis and reporting will form a permanent record of the modification of each site. From this record we will increase our understanding of the site and mitigate, to some degree, the loss of contextual value between features and materials at the site level.

10.2.1 Sites and Features to be Avoided or Protected

While it is ideal to plan to avoid archaeological sites, there are no above ground sites in the project area, and it is not possible to plan to avoid the sites due to the scale of the required earthworks within the project area.

A drystone structure (POI 003) was noted under the southern side of Cargills Road, outside of the project area. To avoid damaging the structure the Cargill Road bund should not be built up against this structure. The use of heavy machinery should by limited or monitored in proximity to the structure, to limit the potential damage from vibrations. Dust and vibration plans, when finalised by the client, should be provided to NZHP to inform future protections for the structure as necessary.

10.2.2 Mitigation for Information Loss

NZHP recommends that that an archaeologist monitor all earthworks (stripping of topsoil,) that are likely to encounter archaeological remains (see areas of high archaeological potential Figure 8-1) until it can be shown that no archaeology survives. NZHP recommends the investigation of all identified areas of archaeological potential to be undertaken in unison prior to the commencement of mining activity.

Based on the historical and archaeological research, as well as the archaeological site survey, NZHP has identified areas where there is a higher potential for archaeological remains to be encountered and any earthworks within these zones should be monitored by an archaeologist (Figure 8-1). The high potential areas include features noted in historical maps and those identified during the archaeological survey, as well as a consideration of environmental features which may indicate an increased probability of archaeological material being encountered. Areas of extensive dredging in the twentieth century, as supplied to NZHP by the client, have been excluded from red zones, as the excavation depths of the twentieth century mining works extended into natural deposits. The exception to this is when the survey identified marginal areas within the dredge zone which appear to be intact. By having an archaeologist on site in high-potential areas, the features can be identified as they are exposed (rather than after they are truncated or heavily disturbed) and recorded following best practice. We consider that the on-call protocol alone is not sufficient to mitigate the information loss on site due to the high likelihood of encountering features, many of which are unlikely to be recognised by contractors in the field, such as water races, hut sites, oven features, and others. Beyond this area of high potential, NZHP recommend that work proceed under an on-call protocol (OCP). Find spots may be encountered anywhere on site, including outside of the red zone and in areas thought to have modern ground disturbance, however as artefacts are generally readily identifiable, OCP will be appropriate.

NZHP recommends that topsoil stripping, in high-potential areas where archaeological monitoring is required, be undertaken over consecutive days, at the beginning of each stage of works and prior to any other earthworks taking place in this stage. Within these zones, where archaeological monitoring is recommended, excavations should be undertaken with a hydraulic excavator (not a bulldozer) so that any features exposed are not immediately disturbed further by bulldozer tracks during the process of excavation. Excavations undertaken by hydraulic excavator should be done in systematic scrapes across the archaeological areas to be monitored until natural deposits are reached. As archaeological features are exposed, they will then be excavated by hand and recorded by the archaeologist(s). If archaeological features extend beyond the red zones, archaeological monitoring and recording should continue until the archaeologist is satisfied that no further archaeological material survives.

All archaeology that is encountered should be investigated and recorded to best practice. NZHP recommends that if structures are encountered, they should be recorded to a Level III standard as defined in HNZPT's guide,

Investigation and Recording of Buildings and Standing Structures (2018). Such structures may include hut remains, water races, fluming, and sluice boxes.

Beyond the recording during fieldwork, mitigation for information loss also includes analysis of all artefactual material recovered during the excavations and reporting on all archaeology in a final report. Where archaeology is encountered, further commensurate historic research will be required to provide context to the finds. Site record forms must be created or updated for all sites where archaeology has been encountered.

NZHP recommends that a site instruction be prepared to provide the practical steps for managing the archaeological requirements under the authority, defining the roles and responsibilities of the client, their contractors, and archaeologists. The site instruction will clearly define the areas when an archaeologist must be present, procedures for archaeological monitoring, protocols for the discovery of Māori archaeology and kōiwi, and OCP for the unexpected discovery of archaeology.

Briefings for contractors and project managers are recommended to ensure that all parties understand the conditions of the authority and their individual responsibilities. The briefing will outline when an archaeologist is required on site, the types of archaeology expected to be encountered, and the OCP. Such steps will ensure that archaeological values, such as information value and possible amenity purposes, are increased through appropriate archaeological investigation. NZHP recommends that the the initial briefing should be done in an office space to best enable the digital presentation of the briefing to maximise engagement. Though for those unable to attend in person, the briefing can be done via videoconference (i.e., Zoom, Microsoft Teams, Skype).

10.3 Summary of Effects on Archaeological Values

As discussed, in Section 9, NZHP has identified the potential archaeological values for unrecorded artefact find spots, midden/oven, mining-gold, and historic-domestic sites which may be encountered within the project area. The summary of these values and the impact of the works on these sites is provided here.

The archaeological value for unrecorded find spots, mining-gold, and historic-domestic sites are all considered to have **medium** archaeological value, while unrecorded midden/oven sites are considered to have **medium** archaeological value depending on their condition, context, and extent. Considering the large extent of the earthworks across the majority of the project area, as the works will significantly modify or completely destroy any remains encountered associated with these site types, the impact will be moderate to major.

NZHP considers that the overall impact of the proposed works on the archaeological landscape will be moderate to major. However, with the archaeological monitoring of high-potential areas, recording, analysis and reporting on any archaeological or heritage features modified by the proposed works NZHP supports approvals under the FTAA, including a resource consent application and archaeological authority to modify these sites.

11 Conclusions and Recommendations

This archaeological assessment has identified that there is reasonable cause to suspect that unrecorded artefact find spots, midden/oven sites, mining-gold and historic-domestic sites are present within the project area and will be affected by the proposed mineral sand mining. Therefore, an archaeological authority is required. The two previously recorded sites (K31/11 and K31/12) will not be impacted; however, their presence is indicative of other sites in the vicinity. Due to the presence of the ara tawhito, manawhenua would have ventured through the project area and procured resources from the wetland areas while travelling. Find spots are the only previously recorded site types within the project area and as artefacts caches have frequently been found in wetland areas there is reasonable cause to suspect that unrecorded findspots may be encountered and are considered to have **medium** archaeological value. Midden/oven sites are the most common site type in the vicinity, based on the abundance of mahinga kai which would have once been present in the area there is reasonable cause to suspect that unrecorded midden/oven sites may be encountered along the coastal margin. Unrecorded midden/oven sites are considered to have **medium** archaeological value. Historic era occupation of the project area centred on miners' blacksanding along the foreshore and squatting nearby. As a result, there is reasonable cause to suspect that unrecorded gold-mining and historic-domestic sites are encountered, both of which are considered to have **medium** archaeological value. Due to the nature of the proposed works the overall impact of the works on the archaeological values of unrecorded sites if encountered will be moderate to major. However, with the recommended mitigation outlined in Section 10.2, the overall impact of the works on the unrecorded sites if encountered would be reduced but will remain moderate to major.

On the basis of this assessment, NZHP supports this application with the following recommendations:

1. **Authority Application:** As the proposed works described in Section 1.2 could affect unrecorded archaeological sites, an archaeological authority under Section 44 of the HNZPTA 2014 must be obtained from HNZPT prior to any modification of the site.
    a. The previously recorded sites (K31/11, K31/12) are destroyed so will not be impacted.
    b. If development plans are altered from those reviewed for this assessment , then HNZPT and NZHP must be alerted, as any changes may alter the assessment of effects or invalidate the authority.

2. **Protection of sites/features:** As a first principle, every practical effort must be made to avoid damage to any archaeological site, whether known, or discovered during any redevelopment of the site.
    a. **Drystone structure under Cargills Road -** To avoid damaging the structure the Cargill Road bund should not be built up against this structure. The use of heavy machinery should by limited or monitored in proximity to the structure, to limit the potential damage from vibrations. Dust and vibration plans, when finalised by the client, should be provided to NZHP to inform future protections for the structure as necessary.

3. **Site Instruction:** All works must be carried out in accordance with a site instruction. Any amendments to the site instruction will require prior written approval from HNZPT. The site instruction will include the points outlined in Section 10.2.2.

4. **Contractor Briefing:** All contractors working on the project must be briefed by the s45 approved person (or person nominated on their behalf) on the possibility of encountering archaeological evidence, how to identify possible archaeological sites/features during works, the archaeological work required by the conditions of the authority, and contractors' responsibilities with regard to notification of the discovery of archaeological evidence to ensure that the authority conditions are complied with. NZHP recommends that the briefing be undertaken in an office space to best enable the briefing to be presented digitally, thus maximising engagement.

5. **Archaeological Monitoring:** All earthworks that may affect an archaeological site must be monitored by the s45 approved person (or person nominated on their behalf) in accordance with the site instruction.
    a. Any archaeological features and material encountered shall be recorded, analysed, and interpreted in accordance with current archaeological practice and as outlined in the site instruction.

6. **Archaeology of Māori origin:** If archaeological material of Māori origin is discovered at any stage, all work must stop within 20m of the find. NZHP will assist the authority holder in contacting all relevant parties including tangata whenua via Ngāti Waewae and HNZPT in accordance with the site instruction.
    a. Any taonga tūturu are *prima facie* the property of the Crown who will be notified of the find. Taonga tūturu will be registered with the Ministry for Culture and Heritage. NZHP, in collaboration with manawhenua, shall notify the Ministry of Culture and Heritage and establish the most appropriate temporary storage, management and care for taonga tūturu, until such time as traditional or actual ownership is determined, with an appropriate institution or kaitiaki.

7. **Kōiwi (human remains):** Should kōiwi be encountered, all work must stop within 30m of the find. NZHP will assist the authority holder in contacting all affected parties as soon as practicable, including tangata whenua via Ngāti Waewae, HNZPT, and the police. The Ngāi Tahu policy for kōiwi tangata shall also be followed (Te Rūnanga o Ngāi Tahu, 2019).

8. **Reporting:**
    a. Within 20 working days of the completion of on-site archaeological work, the site record forms must be updated or submitted to ArchSite.
    b. Within 12 months of the completion of on-site archaeological work, a final report on any archaeological material that is found must be prepared in accordance with *ASG12 Archaeological Report Guideline* (HNZPT, 2023) and submitted to HNZPT for inclusion in the digital library, Ngāti Waewae and to the Grey District Council.

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Appendix A Additional Maps

Transect survey map and labelled land parcels within the consent area, from north to south.

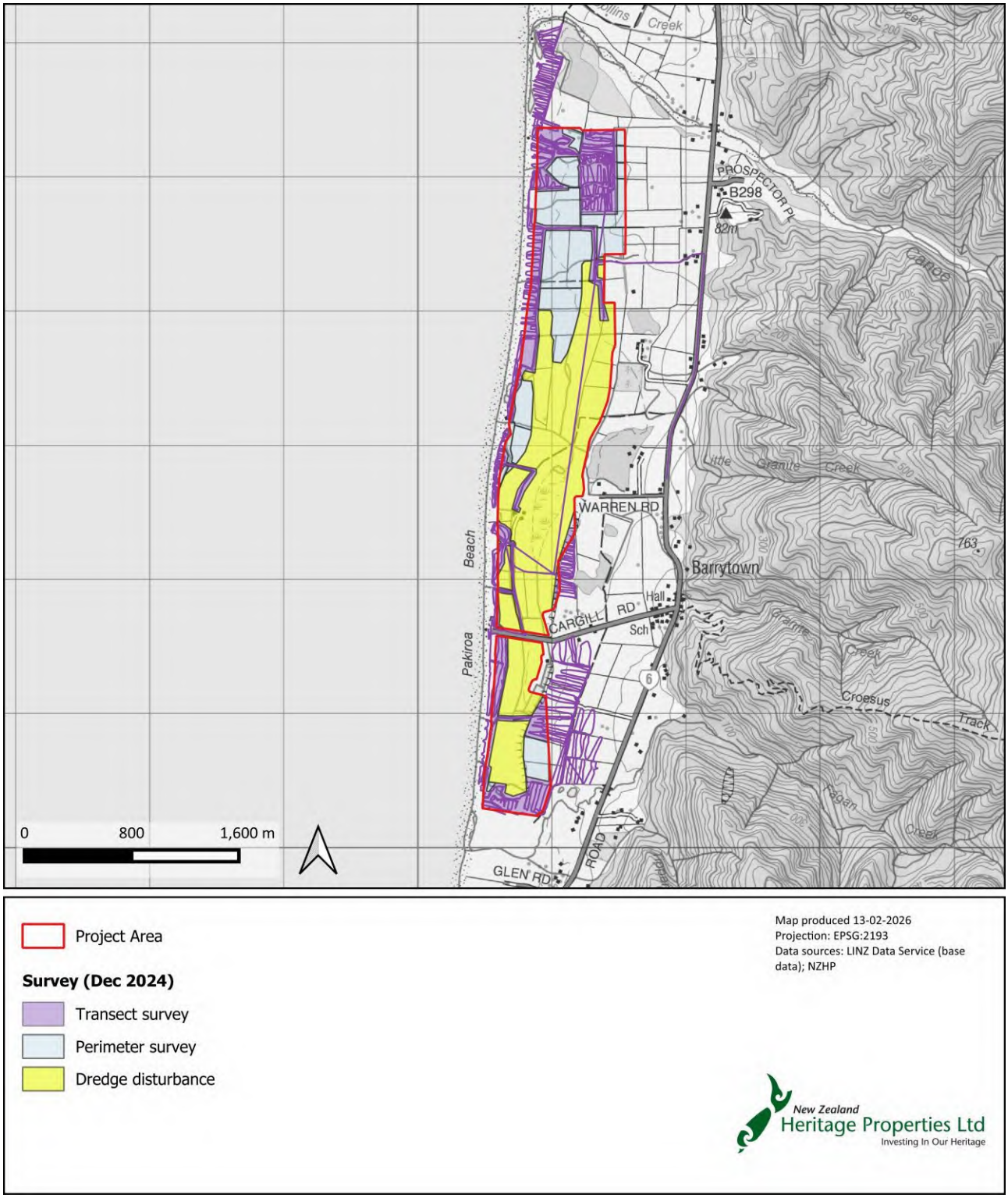

Figure 12-1. Survey map showing transects walked, Dec 2024. Note the survey covered the SRB beyond the scope of the current project area (mining disturbance zone).

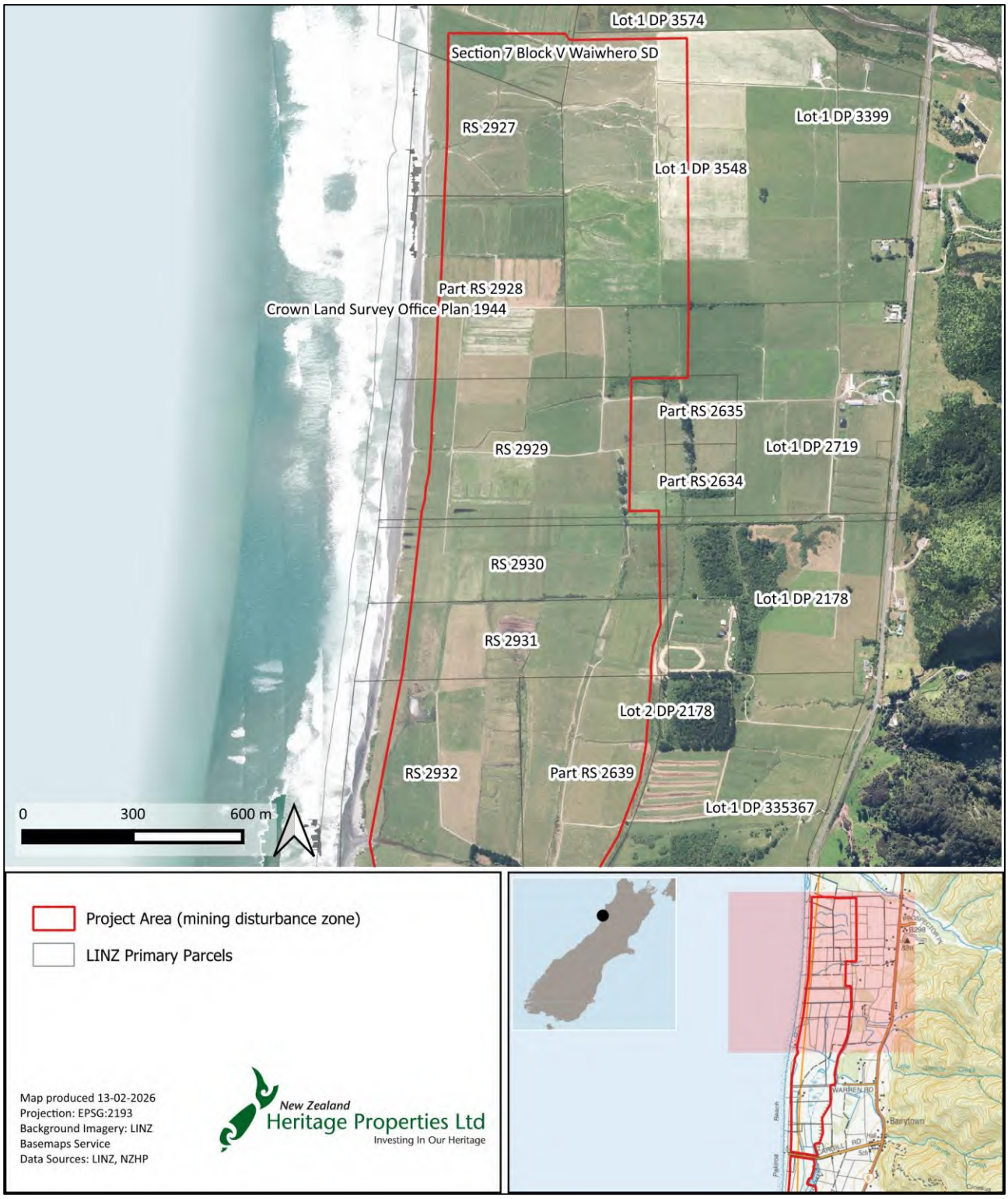

Figure 12-2. Land parcels in northern project area.

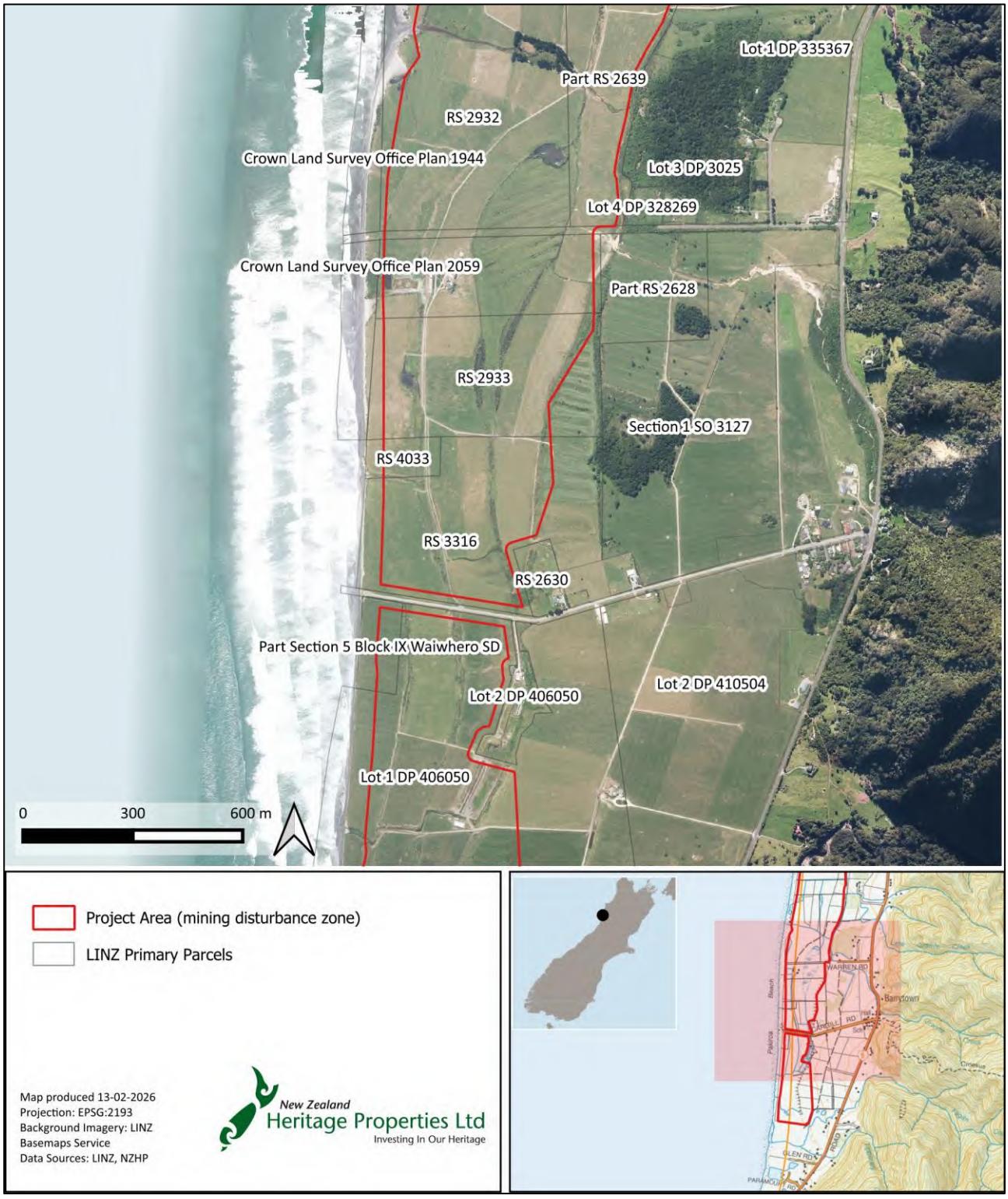

Figure 12-3. Land parcels in central project area.

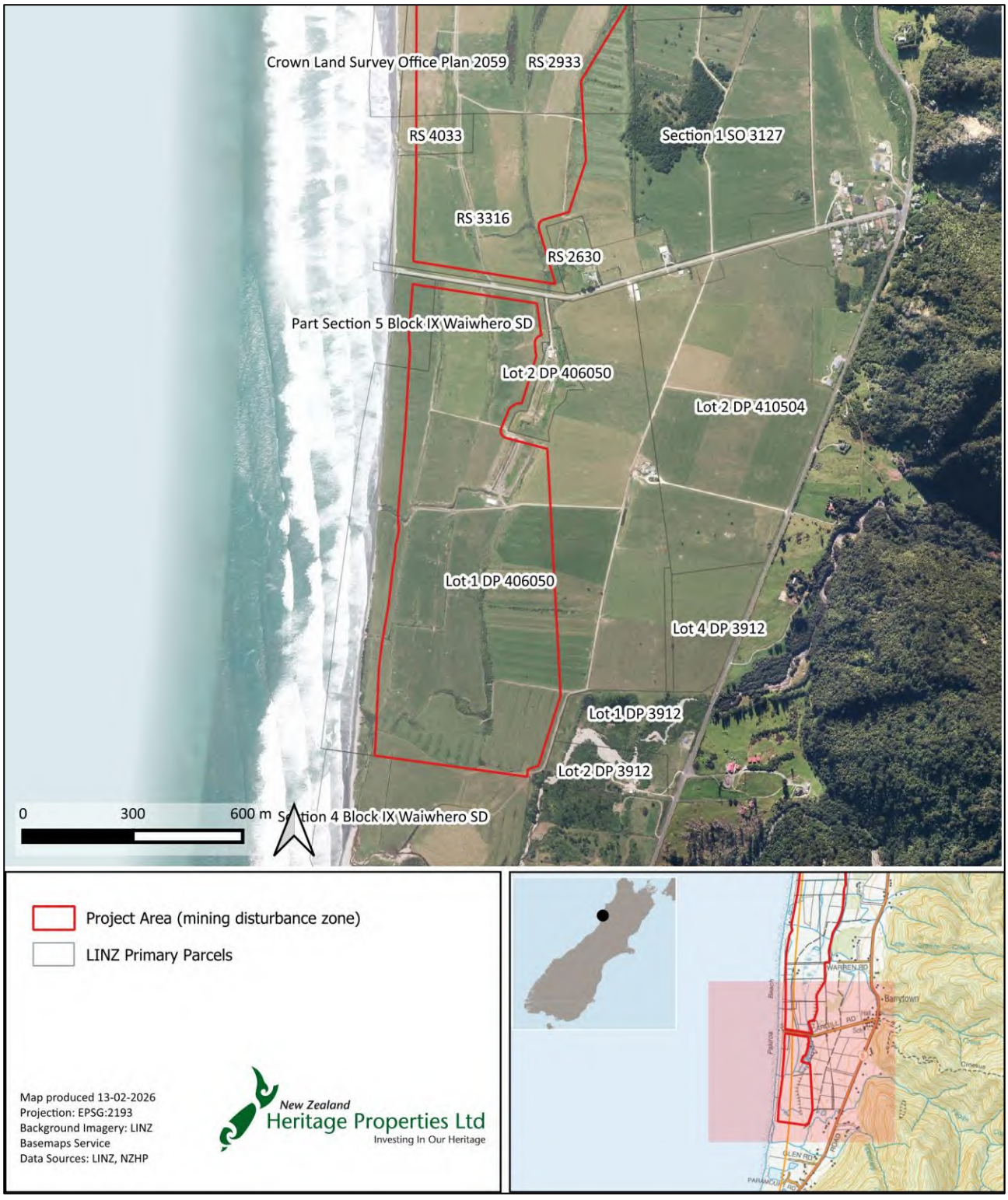

Figure 12-4. Land parcels in southern project area.

Appendix B Archaeological Site Record Forms

NEW ZEALAND ARCHEOLOGICAL ASSOCIATION INCORPORATED

Summary Site Record

ARCHSITE archaeological site recording scheme

NZAA Site Number:	K31/11	**Site Coordinates (NZTM)**	
Imperial Site Number:	S37/27	**Easting:**	1461246
Site Type:	Artefact find	**Northing:**	5324958
Site Name(s):		**Source:**	CINZAS

Finding Aids to the Location of the Site:

Brief Description:
FINDSPOT

Condition of Site when last visited:
No Recent Info

This report contains a summary of the information about this site held in ArchSite.

For a complete Site Record Form containing all the recorded information, please contact the ArchSite Coordinator.

For further information please contact:

ArchSite Coordinator, PO Box 6337, DUNEDIN

admin@archsite.org.nz

Summary Site Record

ARCHSITE archaeological site recording scheme

NZAA Site Number:	K31/12	**Site Coordinates (NZTM)**	
Imperial Site Number:	S37/28	**Easting:**	1460545
Site Type:	Artefact find	**Northing:**	5322359
Site Name(s):		**Source:**	CINZAS

Finding Aids to the Location of the Site:

Barrytown, along the sea beach about 0.8 km above the entrance road to the beach.

Brief Description:

Findspot for a shaped greenstone (brown trout) pendant (?), reported in 1980. Finder possesses some 30 pieces of greenstone pebbles found along the beach, among the greenstone is the patu piece and two greenstone chisels.

Condition of Site when last visited:

No Recent Info

This report contains a summary of the information about this site held in ArchSite.

For a complete Site Record Form containing all the recorded information, please contact the ArchSite Coordinator.

For further information please contact:

ArchSite Coordinator, PO Box 6337, DUNEDIN

admin@archsite.org.nz

Letter to Te Rūnanga o Ngāi Tahu

TĀIKO CRITICAL MINERALS
WEST COAST NEW ZEALAND

Mining with the environment
Working with the community
A world class, high grade critical minerals deposit

4 March 2026

Te Rūnanga o Ngāi Tahu
Iwi authority and Treaty settlement entity

By email: info@ngaitahu.iwi.nz

E te rangatira, tēnā koe

Tāiko Critical Minerals Limited – Barrytown Minerals Project – Fast-track Approvals Act 2024 application

1 Tāiko Critical Minerals Limited (**TCM**) is the authorised person with respect to the Barrytown Minerals Project (**Project**), which is a Schedule 2 listed project in the Fast Track Approvals Act 2024 (**FTAA**).

Consultation, notification and information requirements

2 Prior to the Fast Track Approvals Amendment Act 2025, the FTAA required TCM to consult with the relevant iwi authorities, hapū, and Treaty settlement entities, on a proposal to lodge a substantive application. The Fast Track Approvals Amendment Act 2025 will replace consultation requirements with the requirement to notify those parties on 31 March 2026, unless consultation has commenced before that date.

3 The purpose of this letter is to consult with Te Rūnanga o Ngāi Tahu (**TRoNT**) on an application that will be lodged after 31 March 2026 and seek any feedback TRoNT may have on TCM's fast track application.

4 TCM has engaged in extensive consultation with Ngāti Waewae on an ongoing basis over many years as the project has evolved from mineral resource testing work, to the resource consents granted for the Central Block (which were supported by Ngāti Waewae) through to the current fast track application. That consultation has included hui, site visits, sharing of information in relation to the project (including a draft hydrology assessment) and extensive discussion of consent conditions to ensure that the application meets the expectations of mana whenua, particularly in relation to proposed water management and environmental enhancement work. TCM has also invited Ngāti Waewae to provide an assessment of Māori archaeological values if they so wish.

5 The FTAA also requires that TCM include in its application information about any Treaty settlements that apply in the area covered by the consent application, including the relevant provisions in those Treaty settlements and a summary of any redress provided by the settlements that affects natural and physical resources relevant to the project or project area.

6 TCM also recognises that Ngāti Waewae and TRoNT have a Mana Whakahono ā Rohe with the West Coast Regional Council, which establishes resource management participation arrangements including in relation to resource consent applications.

Project summary

7 A comprehensive project description is attached at **Appendix A.**

8 By way of summary, the Project is to undertake mineral sand mining to obtain ilmenite, garnet and other minerals across an area of the Barrytown Flats, in the Grey District. Resource consent has already been granted to TCM for initial stages of the Project, including to undertake mineral sands mining to the north of the Project site (on the Central Block), to establish and operate a Mineral Separation Plant at Rapahoe (including transportation from Barrytown Flats to the MSP) and to establish and operate a Wet Concentrator Plant for processing on site. Mining of the Southern Block is likely to take place over approximately 14 years, followed by rehabilitation of the site.

9 The application will seek all approvals for mining and related activities within the Southern Block including (but not limited to):

(a) the extraction of sand using a floating dredge over approximately 280 hectares;

(b) remediation, rehabilitation and closure activities, including the establishment of a constructed wetland and reshaping of contours over 408 hectares.

10 Approvals sought include:

(a) Land use consents, water permits, and discharge permits related to mining activities normally required under the Resource Management Act 1991;

(b) Approvals normally required under the Wildlife Act 1953 for handling, salvage (including incidental killings) and relocation activities.

(c) Approvals normally required for under the Heritage New Zealand Pouhere Taonga Act 2014 to modify or destroy recorded and unrecorded archaeological sites.

11 This includes the taking of water from Canoe Creek for processing of mined material on the Southern Block, and discharge of that water into the mining void on the Southern Block, which TCM has previously discussed with Ngāti Waewae.

Technical advice and conditions

12 To assist with the design and assessment of actual and potential environmental effects associated with the Project, TCM has engaged a range of technical experts to assess effects in relation to landscape, transport, hydrology, water quality, ecology (freshwater and terrestrial), erosion and sediment control, noise, archaeology, coastal hazards, metallurgy and economics. The experts TCM has engaged have extensive experience in this area, including in the recent resource consent processes in the region.

13 Draft management plans have been prepared in relation to the management of water, erosion and sediment control, native freshwater fish, birds and lizards.

14 Please let us know if you would like a copy of any of those reports or draft management plans.

15 A copy of draft proposed conditions are attached at **Appendix B**. These have been developed based on expert advice, consultation to date and the previous publicly notified resource consent process for the Central Block. TCM will adjust and update these draft conditions with feedback received through further consultation and further expert review and advice.

16 Key conditions that may be relevant to Ngāti Waewae and TRoNT include requirements to:

(a) Manage wildlife, including relocating fish from creeks and drains prior to stream diversions, developing an avian management plan and light management plan to manage potential

effects on birds, erecting a penguin fence and undertaking annual penguin surveys of Pakiroa beach. You are to be consulted on the avian management plan (AMP) that will be prepared and will be consulted if any changes are made;

(b) Manage freshwater quality, including by:

i. directing all contaminated stormwater and other contaminated water for recirculation and use in the processing plant and imposing water quality compliance limits for when water and contaminants are to be discharged directly into the mining void;

ii. taking practicable measures to prevent uncontaminated stormwater entering the mining works and disturbed area to reduce the volume of water passing through the mining/settling pond system;

iii. a comprehensive monitoring programme including continuous monitoring of the Mine Water Facility, keeping a record of inspections and sampling water to ensure all discharges will not cause effects on any receiving waterbody as well as engaging experts to prepare an annual Hydrological and Water Quality Report and macroinvertebrate and fish surveys; and

iv. limiting exposed areas and implementing erosion and sediment control works;

(c) Reinstate existing creek and drainage patterns with riparian planting and construct a new wetland of approximately 50 hectares;

(d) Rehabilitate land in a manner that protects freshwater values associated with Canoe Creek, Clarke Creek, Granite Creek and Fagan Creek; and

(e) Manage any archaeological finds, including by adopting an accidental discovery protocol. You will immediately be advised if any findings and/or disturbance of Koiwi Tangata (human bones) or Taonga (artefacts, including pounamu).

Assessment of Treaty settlement implications

17 The Ngāi Tahi Claims Settlement Act 1998 recognises that Ngāi Tahu Whānui are the tāngata whenua of, and hold rangatiratanga within, the Takiwā of Ngāi Tahu Whānui. As set out above, TCM is involved in ongoing consultation with Ngāti Waewae.

18 Our understanding is that there are no specific provisions of the Ngāi Tahu Settlement or specific redress provided by the settlement that affects natural and physical resources relevant to the Project or Project area. In that regard, there are no nohoanga or statutory acknowledgement areas on or near the Project site, or that will be affected by the Project.

19 We would be grateful if you could confirm your agreement with this assessment or advise as to whether there are any further Treaty settlement implications that have not been identified above.

20 We would also appreciate confirmation that you have received this letter. If any further questions or matters arise that you would like to discuss, please do not hesitate to contact us. We are happy to make our experts available for any questions or further discussions you consider necessary. We would appreciate your response by 27 March 2026.

Nāku, nā

Mike Meehan

Project Director

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Appendix A

Project Description

Barrytown Critical Minerals Project
Southern Block

Project description – draft for consultation
4 March 2026

1. Overview

1.1 This section sets out a detailed description of the Project to inform the applications made for approvals under Schedules 5, 7, and 8 of the FTAA.

1.2 Tāiko Critical Minerals (formally TiGa Minerals and Metals, the **Applicant**) holds various resource consents from the Grey District Council and the West Coast Regional Council authorising the extraction, processing, and transportation of mined material in the form of Heavy Mineral Concentrate (**HMC**) from the Central Block (**CB**) at Barrytown, as part of its critical minerals project on the Barrytown Flats. Minerals sought to be obtained through the process are ilmenite, garnet, zircon and gold.

1.3 The initial resource consent for mining, HMC production, transportation and associated ancillary activities was subject to a publicly notified process. Through this extensive process, all aspects of the company's operations were assessed against the relevant District and Regional Plans, the Resource Management Act 1991, and applicable national direction. This enabled full participation by interested parties and agencies and resulted in a robust set of consent conditions, which have informed the company's Fast-track application, including the substantive environmental data set the company has produced and which is ongoing.

1.4 Following the granting of the substantive resource consent for the CB (north of Canoe Creek), an additional resource consents have been granted for a Mineral Separation Plant (**MSP**) at Rapahoe. Consent for the establishment, operation and maintenance of a centralised Wet Concentrator Plant (**WCP**) adjacent to the Southern Block (**SB**), associated water management infrastructure (known as the Mine Water Facility (**MWF**)) and access road, is currently being processed by the Grey District Council. Consent for the earthworks component of this activity was granted by the West Coast Regional Council in February 2026. The MSP and WCP will process material from the CB and the SB.

1.5 In adopting this approach, the company has undertaken extensive consultation with the local community, mana whenua, Councils, and relevant agencies throughout these community-facing processes. This engagement has contributed to the development and acceptance of comprehensive consent conditions and management provisions. It has also enabled the assessment and approval of high interest matters, such as trucking activities on State Highway 6. As a result, the Fast-track application is focused on seeking all necessary approvals for the mining activity within the SB. **Plan A** shows the three resource blocks of the Barrytown Critical Minerals Project.

1.6 The SB comprises approximately 408ha on the Barrytown Flats as shown in **Plan B**. All land subject to this application is privately owned with access to the site approved by the respective landowners. Mining activity is proposed to occur on approximately 280ha of the total area, which is known as the 'mining disturbance area' and shown in **Plan B**. Earthworks will be undertaken on parts of the SB outside the mining disturbance area to assist with recontouring and rehabilitation.

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1.7 Mining on the SB will be undertaken using a floating dredge of modern design. Mining will be undertaken in three sections as follows (shown on **Plan C**), although only one section will be mined at a time:

(a) Section 1: Granite Creek North;

(b) Section 2: Granite Creek South;

(c) Section 3: Cargill Road.

1.8 Mining of the SB is expected to commence in approximately 2034 - 2035 once the mineral resource on the CB has been exhausted. The WCP and MWF will be used to process material from both the CB and SB.

1.9 Various measures are proposed for the avoidance, minimisation and mitigation of ecological (terrestrial and freshwater), landscape, visual, noise and dust-related effects. The Project also includes significant ecological and landscape enhancements in the form of an extensive wetland, realignment of creeks into natural patterns, riparian planting and stock exclusion fencing.

1.10 Mining of the SB is expected to take approximately 14 years (excluding preparation and rehabilitation), based on the extraction rate of 2,000,000 tonnes per year (producing 400,000 tonnes of HMC per year). This will extend the overall mining component of the Barrytown Minerals Project to approximately 30-35 years. Taking into account pre-mining construction works and post-mining final rehabilitation and mine closure works, it is anticipated that the Project will be completed between 2055 and 2060. Approvals are sought for 35 years to provide sufficient time for mining activity to occur over stages, final rehabilitation and operational factors to take place.

1.11 The anticipated work programme for the Project is as follows:

(a) Bunding and initial mitigation planting – 1 year (2027);

(b) Mining of the Central Block (consented) – 6 years (2029 – 2034);

(c) Mining Section 1: Granite Creek North (Stage 1) – 7 years (2035 - 2042);

(d) Mining Section 2: Granite Creek South (Stage 2) – 4 years (2043 – 2047);

(e) Mining Section 3: Cargill Road (Stage 3) – 3 years (2047 - 2050);

(f) Final rehabilitation – 3 years (2050 – 2053); and

(g) An operational contingency period of 6 years (2050 – 2056 followed by the final rehabilitation proposed in (f)).

2. Consents sought and relevant land parcels

2.1 All resource consents necessary are being sought, including for the following activities:

Consent type	Activity	Rule breaches
Grey District Plan		
Land use consents	Clearance of indigenous vegetation	Rule 19.7.5(vii): Clearance of indigenous vegetation exceeds

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		permitted activity volumes outside of an SNA
Decisions Version Te Tai o Poutini Plan Rules under appeal are noted with an * e.g. ECO-R1*		
Land use consent	Clearance of indigenous vegetation	ECO-R9*: the clearance of indigenous vegetation in the coastal environment and riparian margins will exceed the permitted activity volumes
	Earthworks within riparian margins	NC-R4*: because the earthworks will be undertaken across the mining disturbance area including creeks and their riparian margins
	Structures within riparian margins	NC-R5*: existing farm bridges will be replaced post mining which are not permitted under this plan
	Structures in the coastal environment	CE-14*: existing farm bridges will be replaced post mining which are not permitted under this plan
	Mineral extraction	GRUZ-R25*: do not comply with permitted activity rule due to volume of material to be extracted, mining to be undertaken within the riparian margins of creeks and wetlands, will disturb two historic heritage sites; undertaken within 250m of a sensitive activity on an adjoining site; and operate outside permitted hours.
West Coast Regional Land and Water Plan		
Land use consent	Earthworks within riparian margins; Earthworks in the non-erosion prone area outside riparian margins; Vegetation disturbance in riparian margins	Rule 16 WCRLWP: do not comply with permitted activity rule as earthworks will exceed permitted volumes and vegetation clearance will take place in riparian margins with creeks to be mined across the site
Land use consent	Activities within the bed of a river outside of a wetland identified in Schedule 1 or 2	Rule 35 WCRLWP: Creek beds will be reconstructed in the same or similar locations and represent meandering

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		pathways, and water will be drained during diversions
Water permit	To take and use water for the purpose of mineral sand processing	Rule 55 WCRLWP: the take and use of water from Canoe Creek to operate the Wet Concentrator Plant is a restricted discretionary activity
Water permit	To take and use ground water for the purpose of mineral sand mining and processing	Rule 56 WCRLWP: to take and use groundwater intercepted during mining to pump run-of-mine material to the Wet Concentrator Plant.
Land use consent	Diversion of water	Rule 58 WCRLWP: five creeks across the SB will require diversion which is a discretionary activity
Discharge permit	To discharge water to the mining void	Rule 71 (discharge to water and land) WCRLWP: to discharge water to the mining void is a discretionary activity due to the augmentation of lime
Regional Air Quality Plan		
Discharge permit	To discharge dust to air from stockpiling and handling gravel, sand and soil	Rule 16: consent being sought as precautionary measure to authorise unanticipated dust emissions
Freshwater NES		
	Vegetation clearance within, or within a 10m setback from, a natural inland wetland	Section 45D(1)
	Earthworks within, or within a 10m setback from, a natural inland wetland	Section 45D(2)
	Earthworks outside a 10m, but within a 100m setback, from a natural inland wetland that will result in partial or complete drainage of the wetland	Section 45D(3)
	Diversion of water within, or within a 100m setback from, a natural inland wetland	Section 42D(4)

	Discharge of water into water within, or within 100m setback from, a natural inland wetland	Section 45D(5)
	Reclamation of bed of rivers	Section 57

^For completeness it is noted that the mining activity relies on a number of permitted activity rules in the district and regional plans.
*Rule under appeal.

2.2 The application relates to the following land parcels:

Legal description
Section 4-6 Block V Waiwhero Survey District contained in Record of Title WS2D/1085
Section 7-8 Block V Waiwhero Survey District contained in Record of Title WS2D/855
Lot 1 DP 3548 and Rural Section 2927 contained in Record of Title WS8C/143
Part Section 2928 Block V Waiwhero Survey District and Defined on DP 764 contained in Record of Title WS1A/1166
Lot 1 DP 2719 and Lot 2 DP 339364 contained in Record of Title 161879
Section 2929 and Part Section 2634 – 2635 Block V Waiwhero Survey District and defined on DP 764 contained in Record of Title WS2A/228
Rural Section 2930 contained in Record of Title WS1B/293
Rural Section 2931,2932,2933,3316 and Part Rural Section 2639 contained in Record of Title WS8B/528
Section 4033 Block V Waiwhero Survey District contained in Record of Title WS1A/892
Part Section 5 Block IX Waiwhero Survey District contained in Record of Title WS2B/591
Lot 1 DP 406050 contained in Record of Title 486401.

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3. Initial works

3.1 Initial works on the site will be undertaken prior to the commencement of any mining. These include:
(a) Bunding, planting (associated with noise bunds) and fencing; and
(b) Establishment of the mine starter pit.

3.2 A mine starter pit is required in each of the three sections to establish the initial dredge pond in which the floating dredge will operate. Separate starter pits are necessary because the sections are divided by physical features that will not be disturbed i.e. Granite Creek separates Sections 1 and 2, and Cargill Road separates Sections 2 and 3. These starter pits enable the dredge to begin operations independently within each section.

3.3 The floating dredge will be transported to each mine starter pit using conventional mining equipment transport methods in order to avoid adverse effects on the surrounding environment. This approach is consistent with the methodology proposed for transporting the dredge to the Application area and for its initial assembly.

3.4 The mine starter pit will be developed by excavating into the water table. An area of approximately 100m wide x 300m long, and up to 10m deep will be excavated using an excavator and trucks, removing approximately 270,000m^3 of material. This size allows for:

(a) A dredge pond (mine void) of approximately 100m x 100m;
(b) A 100m x 50m area behind the dredge for the deposition of tailings following processing; and
(c) A 100m x 100m area in front of the dredge pond at various stages of excavation, ready to be mined.

3.5 The first mine starter pit will be located in Section 1: Granite Creek North. Material extracted from the starter pit will be used for the construction of the noise control bunds adjacent to Lot 2 DP2178 and another near Warren Road, located along the eastern boundary. Both bunds will be approximately 3m high with a 4.8m crest. The Warren Road bund will extend approximately 280m. Constructing the bunds at this early stage enables associated planting to be carried out in advance and allows time for vegetation to establish. The location of the starter pit is shown in **Plan D**. The construction of both the starter pit and the Section 1: Granite Creek North bunds are anticipated to take approximately two months.

3.6 A similar approach will be taken for Sections 2 and 3, with a mine starter pit excavated prior to the commencement of mining in each section. For Section 2, material excavated from the starter pit will be used to construct an 'L-shaped' noise control bund on the northern side of Cargill Road. For Section 3, material excavated from the starter pit will be used to construct a noise control bund along the southern side of Cargill Road near 101 Cargill Road. Both bunds will be approximately 3m high with a 4.8m crest.

3.7 The location of the noise bunds are shown in **Plan E**. Any excess material not required for bund construction will be stockpiled for future processing and rehabilitation.

4. Indicative mining sequence and setbacks

4.1 Following construction of the mine starter pit, the dredge will extract ore in strips. The indicative mining sequence, showing the anticipated pattern and extent of mining over time, is shown in **Plan D**. Mining will generally progress in a north/ south direction, although there will be some mining in an east/west direction where the dredge turns to commence a new strip. **Plan D** also shows the location of each mine starter pit.

4.2 The indicative mine path is influenced by both ore grade distribution and the long-term rehabilitation of the site. Commencing mining in areas with higher ore grades provides an earlier return on investment for the company. Mining from the western (coastal) side and progressing eastward allows previously mined areas to be progressively rehabilitated back to existing ground levels while maintaining natural drainage gradients towards the coast. Land on the western side of the site will be rehabilitated to existing ground levels.

4.3 As mining advances inland, ground levels will be progressively lowered contributing to the formation of a constructed wetland as part of the final landform across Sections 1 and 2

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(Stages 1 and 2). To achieve the post-mining contours across all three Sections (Stages), material will be sourced from areas outside the mining disturbance area but within the wider application boundary. Approximately 110 hectares within the application area provide a readily accessible source of fill material. These areas will be selectively cut and regraded, with suitable material transferred over short haul distances, typically within approximately 100m, using bulldozer "cut and carry" methods. This material will be progressively redistributed into backfilled mining areas to recontour the landform, achieve stable final ground levels and integrate rehabilitated areas with the surrounding landscape.

4.4 Each mining strip will be approximately 100m wide and excavated to a depth of 10m below ground level noting that the depth of mining is dependent on the ore distribution. The coloured strips on **Plan D** represent the expected extent of mining for each year. The total disturbed land area at any one time will be 16ha. Disturbed land means the land within the application area that has been directly affected by mining or associated activities, including areas subject to vegetation disturbance, topsoil stripping, excavation and active mining in the mining void, tailings deposition, overburden placement, bund construction or areas undergoing progressive rehabilitation prior to the re-establishment of stable landform and 80% vegetative cover.

4.5 The dredge is expected to progress at an average rate of approximately 2,200 metres per year or approximately 166 metres per month or 6 metres per day (based on 26 working days in a month). This rate will yield 2,000,000 tonnes of raw material per year and is subject to variation depending on the depth of the ore body, the average grade of the ore encountered and the need to ensure that the total disturbed area for mining is no more than 16ha. Weather conditions can impact progressive rehabilitation, i.e., influencing the rate of growth of vegetative cover (see Section 7 for progressive rehabilitation and vegetation cover).

4.6 It is proposed to set mining back from key environmental features and boundaries as follows:

(a) 20m from the consent boundary;
(b) 20m from Granite Creek;
(c) 20m from Fagan Creek;
(d) 50m from Mean High Water Springs (MHWS);
(e) 20m from the proposed SNA PUN-049, which is adjacent to Section 2 (Granite Creek South);
(f) 20m from all private property boundaries not within the consent area; and
(g) 200m from dwellings other than where noise bunds are proposed.

4.7 These setbacks are shown on **Plan F**.

5. Mining methodology

5.1 Once the mine starter pit has been constructed, the following steps will be undertaken to enable the extraction of ore:

(a) Removal of pasture, small areas of farm vegetation and wildlife checks;
(b) Stripping of topsoil and overburden;
(c) Diversion of streams and drains;
(d) Extraction of run of mine material;
(e) Initial screening of run of mine material and deposit of waste material;
(f) Pumping of run of mine material to WCP.

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5.2 This process is illustrated by **Figures 1** and **2** below and discussed in detail in the following sections.

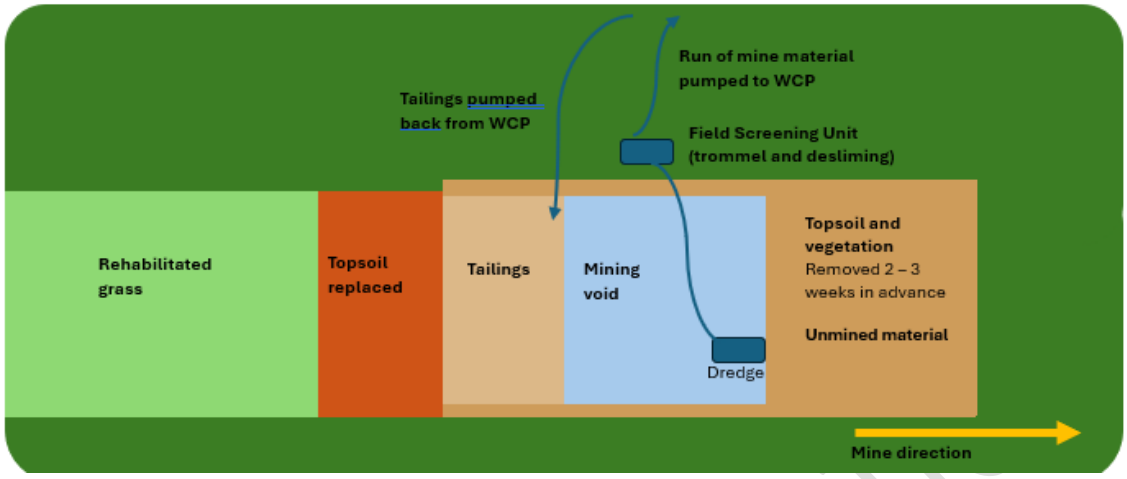

Figure 1: Schematic representation of the mining methodology in plan view

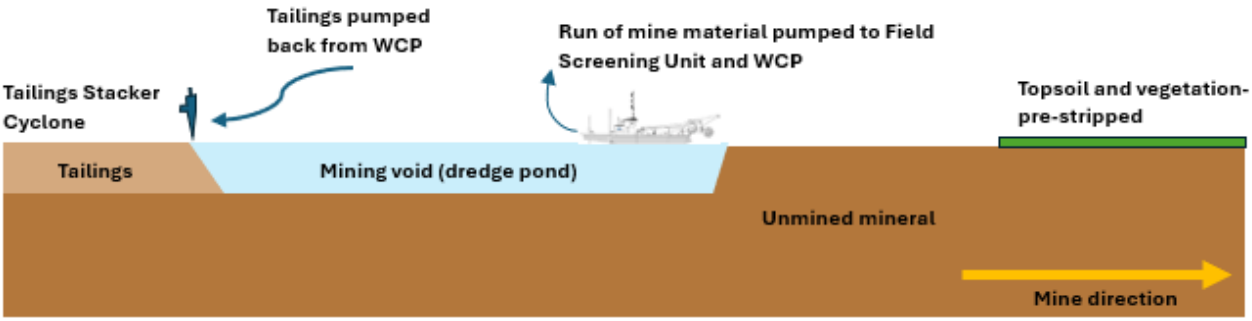

Figure 2: Schematic representation of the mining methodology in profile view

Archaeological Assessment

5.3 An archaeological assessment of the SB has been carried out. The SB was extensively dredged and modified in the 1930's and 1940's and then humped and hollowed for farming purposes. There are two recorded archaeological sites (find spots) within the mining disturbance area. The artefacts from both find spots have been removed and there is no evidence that further features or deposits relating to the site remain in situ. Earthworks on site will proceed under an archaeological authority.

Vegetation removal and wildlife checks

5.4 There are small areas of vegetation located around some creeks, drains and former dredge ponds, which will need to be removed at the same time as topsoil is removed (i.e., 2 – 3 weeks prior to mining). Some of that vegetation has been identified as potential habitat for lizards. In addition, open pasture can potentially be used by breeding birds. **Plan G** shows the waterbodies on site.

5.5 It is proposed to undertake regular surveys of areas scheduled for mining before and during the breeding season to identify any breeding behaviour in the area. Where those surveys identify that nesting is possible, birds will be discouraged from establishing nests through methods such as walkovers, visual cues, audible bird scarers and machinery placement. These actions will be undertaken more frequently and at a greater distance

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from the mining front than in traditional mining operations, reflecting the operational requirements and movement patterns of the floating dredge. Where monitoring identifies the presence of Kororā (little blue penguin), relocatable fencing will be erected around the active mining area (including stripped area, mining void, tailings deposition area and contoured land awaiting resowing) to prevent penguin access and minimise risk of harm.

5.6 Lizard monitoring will be undertaken by a suitably qualified ecologist prior to mining an area of potential lizard habitat. If lizards are confirmed to be present, it is proposed to capture and relocate the lizards to suitable habitat as close as practicable to the site, but outside the mining disturbance area.

5.7 Prior to the commencement of any stream diversion or streamworks activities, native freshwater fish present within affected watercourses or wetland habitats will be salvaged and relocated. Similar to any lizards found, salvaged fish will be relocated to suitable habitat as close as practicable to the site but outside the mining disturbance area.

5.8 Once wildlife (if any) has been appropriately managed, any vegetation useful for rehabilitation will be removed. Where it can be, vegetation will be transferred and used as part of the progressive rehabilitation in the planting around creek mouths, diverted creeks or the constructed wetland.

Topsoil and overburden stripping

5.9 Once vegetation has been removed, topsoil (to approximately 0.2 - 0.6m deep) and overburden will be removed 2 – 3 weeks prior to mining, using an 85-tonne excavator and 40 tonne articulated trucks. The area of topsoil and overburden stripping is shown in Figure 1 above.

5.10 Some of the removed material will be used to create small 1m high safety bunds (to prevent vehicles from driving into the mining void and provide stormwater control) along either side of the mining void. The mining void is the area comprising the dredge pond, the area behind the dredge pond for deposit of tailings after processing, and the area in front of the dredge pond from which run of mine material is being extracted. The remainder of the material will be used for rehabilitation. Initially, that material will be stockpiled for later use, but once mining commences fully, it will be trucked to the rear of the mining void to be used as part of the progressive rehabilitation. The safety bunds provide the separation between stormwater and mine water (mine water being water that is being discharged back into the mining void).

5.11 The total area stripped of topsoil and overburden in advance of mining will be approximately 100m x 100m.

Stream diversions/ removal of drains

5.1 Diversions to, and reconstruction of the existing creeks will be required to enable mining Drainage channels across the site will be diverted to enable mining, and will be reconstructed where required to maintain catchment drainage patterns.

5.12 The specific creeks requiring diversion are shown in **Plan G** and are:

(a) Northern Creek;
(b) Central Creek;
(c) Clarke Creek;
(d) Wasabi Creek; and

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(e) Southern Creek.

5.13 Productive farming practices have resulted in a network of drainage channels developed across the site. As mining progresses, these drains will be diverted to avoid the active mining area.

Little Granite Creek runs along the eastern boundary of the site before joining Granite Creek. These two creeks, Little Granite Creek and Granite Creek, will remain undisturbed and are not proposed to be diverted as part of the mining operation. Canoe Creek and Fagan Creek will also remain unaffected by the activity.

5.14 The diversion methodology differs for each creek or artificial drain depending on their orientation, sequence of mining activities and future purpose (in regards to artificial drains these may be retired or a new 'creek' constructed to manage drainage).

(a) North–south oriented creeks and drains will be diverted into a previously mined area before mining reaches the creek or drain (except where mining is adjacent to the coastal setback boundary). This may require adjustments (widening or narrowing) of the mine path to facilitate this. A permanent reconstructed channel will be built in advance as part of the rehabilitation of the mined land, and the flow will be redirected into it in a single 'livening' event. Refer **Figure 3** for further detail.

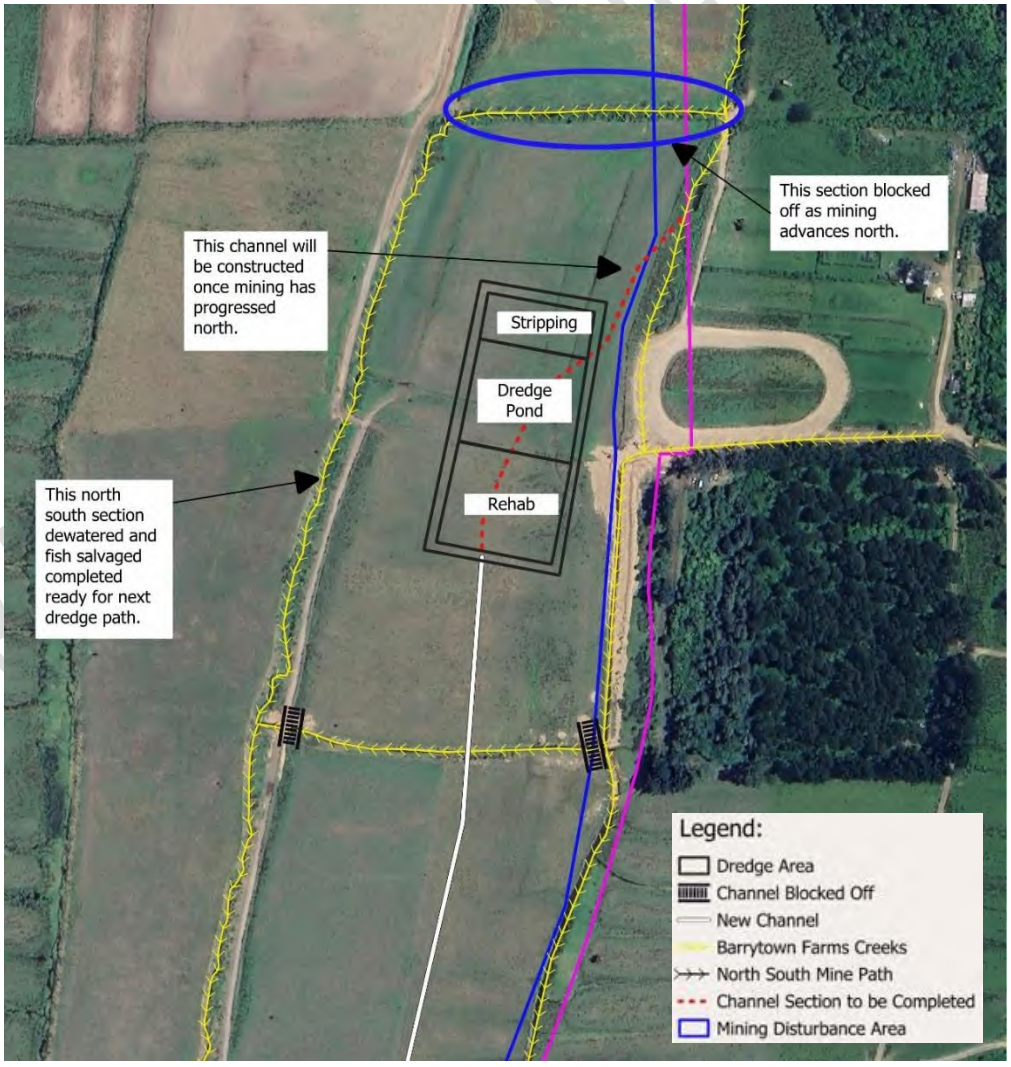
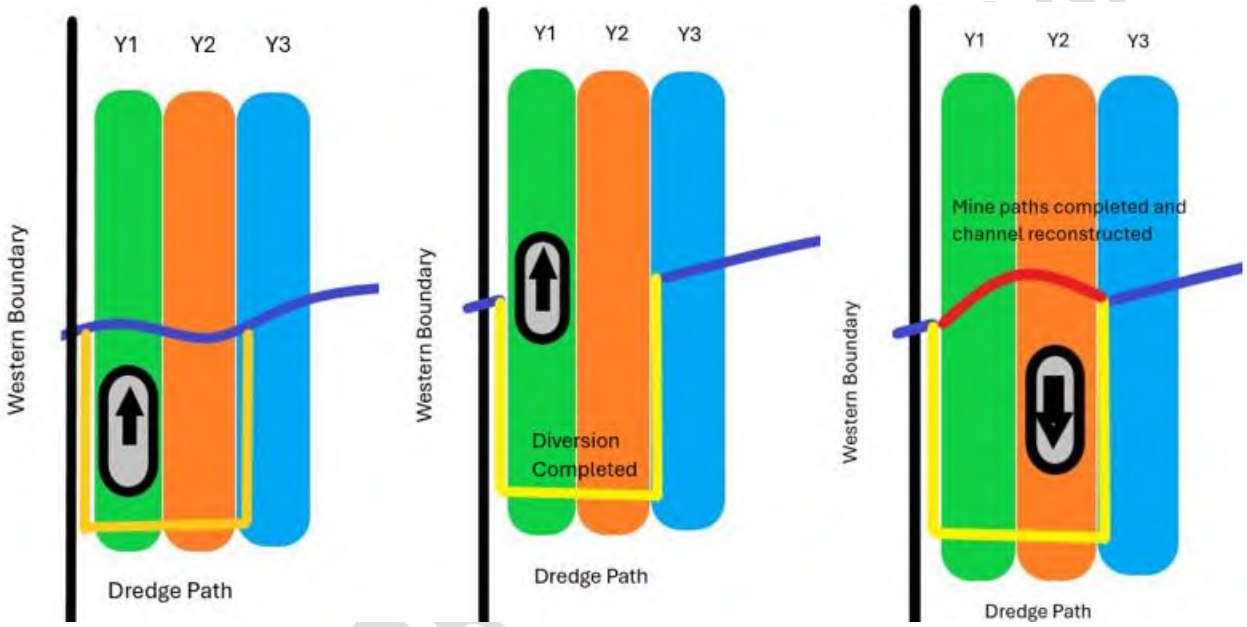


Figure 3: Diversion methodology for north south waterbodies

(b) East–west oriented creeks and drains will be diverted into previously mined areas (behind the mining void) and into the adjacent mine path (to the east as mining moves inland), prior to mining progressing through the creek or drain's existing alignment. This requires a temporary diversion of the creek or drain around the active mining area. Once mining has advanced beyond the alignment, a permanent reconstructed channel can be constructed and the creek, and where required drain, can be reinstated.

Creeks and drains will likely be disturbed several times, with temporary diversions occurring each time the active mining area intersects these waterbodies, potentially once per year for up to 3 months at a time per waterbody. Diverting the creek or drain around two sections of mine path at a time reduces the number of diversions required. Refer **Figure 4** for further detail.



As the dredge approaches the creek or drain, a temporary diversion (shown in yellow) is constructed behind the mining void.

The creek or drain is then diverted into this temporary channel, allowing the dredge to continue along its planned path.

Once the mining void has progressed beyond the proposed reconstructed alignment, the diversion is redirected into the newly rehabilitated channel (shown in red).

Figure 4: Diversion methodology for east west waterbodies

5.15 Fish relocation will be undertaken onsite as part of the diversion process as specified in 4.7.

5.16 The five creeks that will be diverted and mined are Northern Creek, Central Creek, Clarke Creek, Wasabi Creek and Southern Creek. Each of these creeks will be reinstated during progressive rehabilitation. **Table 1** identifies the creeks that are to be diverted, and their pre-mining and indicative post mining lengths. The diversion methodology to be applied has also been identified.

5.17 Some of the original artificial drainage channels may be reinstated, particularly if land contouring alone does not provide sufficient drainage. Creeks and drains will be connected to the constructed wetland area or re-established natural creek systems to support site hydrology and ecological function.

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Table 1: Creek extent pre and post mining

Creek	Length pre-mining (based on continually or intermittent flow extent)	Length post-mining (indicative but not less than the pre-ming length)	Diversion methodology to be applied
Northern Creek	1,088m	1,100m	East West
Central Creek	650m	700m	East West
Clarke Creek	680m	700m	North South
Wasabi Creek	727m	750m	North South / East West
Southern Creek	1,088m	1,100m	East West

Extraction of run of mine material

5.18 Following the removal of topsoil and overburden, the floating dredge can extract the run of mine material (**ROM**) from the newly stripped area from within the mine void without the use of other machinery.

5.19 The floating dredge will sit in a 1ha dredge pond, located in the mining void. The maximum depth of the mining void is 10m, which will maintain a natural water level approximating the ambient water table height. A picture of the type of floating dredge that will be used in the Project is shown in **Figure 5** below.

Figure 5: Floating dredge proposed to be used

5.20 The dredge has a suction cutter at the end of the dredge arm. The suction cutter will excavate the pit face by cutting into the bank and breaking down consolidated material. The loosened material will be drawn in through the suction head below water level, immediately mixed with water taken from the dredge pond to form a slurry and pumped to the field screening unit within the safety bund area.

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5.21 The dredge is capable of precise cutting and will cut slopes at approximately 1 vertical to 3 horizontal (1V:3H), which is consistent with industry standards for cutter suction dredging and provides for stable batters. The presence of water in the mining void provides sufficient pressure to ensure slope stability, as does the progressive tails deposition in the rear of the mining void. Safety bunds around the outside of the mining void will ensure that heavy machinery does not operate on the edge of the mining void, creating pressure on the slopes.

Initial screening of run of mine material and deposit of initial waste materials

5.22 The Field Screening Unit undertakes the initial screening of the ROM. Slurry passes through a trommel (a rotating cylindrical screen), which separates larger, coarser materials and debris (+2mm) from finer particles. Oversized material captured by the trommel is removed from the process stream to prevent damage or blockages in downstream equipment.

5.23 The slurry then enters the desliming circuit, which removes very fine silt and clay particles (referred to, when mixed with water, as "slimes"). By eliminating these particles, the desliming circuit improves the recovery of valuable heavy minerals and reduces the load on the WCP.

5.24 The large reject material from the trommel and the slimes will be returned to the rear of the mining void to be used in the progressive rehabilitation (see Section 7 for further discussion).

5.25 After screening and desliming, ROM is pumped as a slurry to the WCP for further processing.

6. Processing of run of mine material and transportation to market

6.1 Authorisations for further processing and transport are not being sought through this Fast-track application, as they have already been granted (or applications are being processed), as outlined in Sections 1.2 – 1.5. The resource consents and other permissions that have been obtained provide for a full mine to market process that results in finished product being exported to markets around the world. The following information is provided to explain the overall processing methodology and to place the proposed activities within the full operational context.

6.2 Following extraction, ROM will be processed in two stages. The first stage of processing will be undertaken on site at the WCP to extract Heavy Mineral Concentrate (HMC). The HMC will then be transported by truck to the MSP at Rapahoe to undergo the second stage of processing.

6.3 Consent for the MSP at Rapahoe was granted by the Grey District Council in October 2025.

6.4 Consent from the Grey District Council for the establishment, operation and maintenance of the WCP and access road is currently being processed and is expected to be granted prior to lodgment of this application. Consent for the earthworks component of this activity was granted by the West Coast Regional Council in February 2026.

Stage 1 processing - WCP

6.5 Mined ore will be pumped as a slurry from the mining void to the WCP, a fixed processing facility that receives material from mining activities across the resource area. At the WCP, valuable heavy minerals are separated from sand and silt using a water-based gravity

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separation process. This produces three material streams: HMC, middles and tails ('middles' and 'tails' are referred to generically as 'tailings' in this application).

6.6 Tailings are returned to the mining void as slurry, while clean water is managed and reused within the process. The HMC is dewatered to 10-15%, temporarily stored and transported off site by heavy vehicle for further processing at the MSP at Rapahoe.

Stage 2 processing - MSP

6.7 Processing at the MSP enables the extraction of concentrated garnet and ilmenite products.

6.8 The MSP has been strategically located at Rapahoe to ensure proximity to rail where product will be transported in containers to Lyttleton or Timaru Port for export to global markets. Waste material from the MSP (which has come from the SB) will be transported by heavy vehicle back to the WCP at the SB. That material will be deposited within a bunker at the WCP before it is pumped back to the mining void as a slurry to be used to backfill the mine pit for rehabilitation.

6.9 The MSP represents a critical component of the long-term viability and growth of the sand mining industry on the West Coast. The MSP provides significant value-add by enabling on-shore, and in-region, refinement of mineral products prior to export.

7. Management of processing water and stormwater

7.1 Water will be required for the processing of ROM at the WCP. Water used for processing, as well as stormwater captured on the WCP site, will be managed through a MWF located adjacent to the WCP.

7.2 The MWF will include lined treatment ponds and thickener tanks that enable sediment and fine particles to settle out of return water using biodegradable flocculants. Treated (clean) water will be recycled back into the processing system, while settled solids will be combined with tailings and returned to the mine pit as a slurry to support backfilling and rehabilitation.

7.3 The MWF is part of the ancillary infrastructure required to operate the WCP and will be authorised by the consent for the WCP.

Processing water

7.4 Processing water will be sourced from the existing water take location on the CB, unless further investigation identifies a practical alternative water source on the SB through future testing. Consent GDC-3154-23 / WCRC-2023-0046 authorises the abstraction of water for processing CB-mined material at the WCP for a 12 year duration. A new consent is being sought via this application to ensure the water take is available to the newly located WCP, and to support longer-term mining of the SB. It is proposed that the existing consent be surrendered as part of the grant of the new take. The approximate water take location on the CB is indicated on **Plan H**.

7.5 Water taken will be used to fill the ponds at the MWF, storing water for when it is required to be used for processing ROM at the WCP. The peak water take will occur when the WCP is restarted to process material from the SB or following maintenance or shutdowns. This is because the tanks and pipelines of the WCP must be filled with water prior to material being processed. During these periods, the full take of 63l/s will be required, likely over several days.

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7.6 Once processing is underway, water demand will significantly decrease. Water is recycled and reused throughout the plant, reducing the need for a continuous fresh supply. Only intermittent top-ups will be required to offset the water that remains in the HMC, and therefore lost from the site. It is estimated that approximately 10-15% of water drawn from the bore will be retained in HMC. This makes up the largest water loss within the system.

7.7 To compensate, make-up water will be drawn down at an average rate of 9.5l/s for the duration of processing. In practice, make-up water will be taken in short bursts of typically 15-20 minutes at a time, two to three times per day, at the peak rate of 63l/s.

7.8 Tailings will be mixed with water to form a slurry to be pumped back to the mine void. Tailings will be deposited at the rear of the pit by cyclone and the water will re-enter the mine void and rejoin the surrounding hydrological system.

7.9 The slurry circuit (the pumping of ROM to the WCP and tailings back to the mine void, all undertaken as a slurry) is considered to have a largely neutral effect on the water level in the mining void. The water that returns with the tailings help maintain, or even increase, water levels in the void, offsetting any lowering of the water table caused by the removal of the slurry from the mine void.

7.10 The MWF is designed to treat and temporarily hold process water before it is recycled for use in the WCP. After processing, excess water is treated via a thickener tank, which serves as the primary treatment stage. Fines and suspended sediment are separated from the water in the thickener tank. This water then flows into the forebay and ponds for further settling and storage. A flocculant may be added to enhance the settlement of fine particles. Fines and slimes collected in the thickener tank and forebay are pumped back to the mining void and mixed with coarse tailings for use in rehabilitation. Clean water is recycled back into the WCP for reuse in mineral separation processes or for transporting tailings as a slurry back to the mining void.

7.11 There is no discharge from the MWF treatment ponds to any surrounding water bodies. The only discharge is to the mining void.

7.12 If necessary to maintain capacity in the MWF excess water may be pumped back into the mining void to dissipate naturally.

7.13 It is possible that dissolved metals could be liberated and mobilised because of the mechanical processes of mineral separation and sand and slimes deposition during backfilling of the worked excavation. Lime augmentation (i.e. lime dosing) of tailings and slimes at the time of emplacement within the void, and the inclusion of lime boulders in creek reconstruction will mitigate these effects. Both groundwater and surface water quality and quantity monitoring will be undertaken across the site as set out in the Water Management, Monitoring and Mitigation Plan.

Stormwater

7.14 Stormwater captured within the mining disturbance area will be contained on site by the safety bunds constructed on either side of the mining void. It will either be allowed to infiltrate into the sandy subsoils, or directed to discharge into the mining void where there is sufficient capacity for the water to assimilate into the ground water.

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7.15 Stormwater generated in the WCP area, including runoff from roofs, hardstand areas, stockpiles, and processing surfaces, will be collected via a network of drains, bunds and sumps, and directed to the ponds at the MWF. To maintain operational capacity during high rainfall periods, treated stormwater may be pumped to the mining void to dissipate naturally.

8. Rehabilitation and mine closure

8.1 Rehabilitation of the SB will be undertaken in three stages:

(a) Mined land will be progressively rehabilitated as the mining void advances;

(b) Each section will be rehabilitated as it is completed and mining moves to the next section; and

(c) Final rehabilitation and mine closure will be undertaken once mining of the SB is fully completed.

Progressive rehabilitation of mining void

8.2 The total area of disturbed land is proposed to be limited to 16ha within the SB at any one time, for the purposes of mitigating potential effects relating to dust, landscape, visual and sedimentation/ water quality.

8.3 The 16ha limitation for the mining area means that the site will be progressively rehabilitated by filling the mining void with waste material as mining advances, replacing topsoil and re-grassing the mined area. The 16ha limitation is proposed to only apply to those disturbed areas with less than 80% vegetative cover and mined land will be removed from the disturbed area calculation once that level of vegetative cover has been reached. The disturbed area limits include contingency for any periods of slow growth that may occur (e.g. during winter or a cold wet spring).

8.4 Rehabilitation of the mining void will take place at the same time as mining occurs and is expected to be completed within 12 months of the conclusion of mining in that location. The waste material (known as "tailings") produced by the initial screening of raw material at the Field Screening Unit will be pumped back into the rear of the mining void immediately. Any tailings from the WCP will also be pumped back and deposited at the rear of the mining void. Waste material from the MSP that has been transported back to the SB will also be pumped from the WCP to the mining void and deposited with the tailings to assist with rehabilitating the landform.

8.5 The tailings will be deposited at the rear of the mining void using dewatering cyclones which assist in separating water from solids to create a more stable land surface suitable for rehabilitation. The water separated from the tailings as they are dispersed is discharged back into the mining void.

8.6 The material to be returned to the excavated area includes un-mineralised sand, clay slimes, and gravel and rock greater than 2mm. Tailings will be allowed to naturally beach (spread) out. The cyclone will be moved as required to distribute the tailings evenly across the area.

8.7 Tailings will then be levelled and contoured, as per a surveyed final landform design, with the use of excavators and bulldozers ready to receive the pre-stripped overburden and topsoil. This topsoil and overburden, as well as material from outside the mining disturbance area within the wider application area and the bunds as they are retired, will be spread out and used as a growing medium for rehabilitation of the site. Once overburden

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and topsoil are replaced, the land will be re-vegetated with grass and other vegetation that was removed prior to mining, where possible and appropriate.

8.8 Initial vegetative cover will be established as soon as practicable (potentially using hydroseeding) to minimise any erosion potential. This will be followed by the establishment of longer term, permanent pasture species.

Progressive rehabilitation of each section

8.9 As the mining of each section is completed, the section will be rehabilitated to its final landform which includes a proposed wetland of approximately 51.7ha on the eastern boundary of Sections 1 and 2, which will be constructed in stages (addressed in Section 7.17 below).

8.10 Approximately 5.6 million tonnes (equivalent to 2.6 million cubic metres at a bulk density of 2.2 g/cm^3) of HMC will be removed from the mining disturbance area over the life of the project for further processing and export., To achieve the proposed post-mining contours, material will be sourced from areas located outside the mining disturbance area, from the higher terrace, to be used as fill to reconstruct the final landform. When balanced against the available redistribution material, the final change in landform equates to an average reduction in land height of approximately 0.63m across the entire 408ha consent area.

8.11 The western boundary will be returned to its current ground level to minimise any effects from coastal hazards. Restoring this area to its natural elevation maintains the existing buffer between the active coastal environment and the inland mined area and future farmland. This helps to ensure that the rehabilitated land is not at increased risk from coastal hazards such as erosion or ponding from storm surge events.

8.12 The site is naturally wet and exhibits poor drainage, despite the presence of a humped and hollowed landform and an established network of creeks and drains throughout the area. Following mining activities, the site will be rehabilitated to improve drainage and soil conditions, enabling its return to more productive farmland use.

8.13 The final landform will be contoured to slope towards reestablished creeks to improve drainage and ensure the future productive use of the site. The five diverted creeks (Northern Creek, Central Creek, Clarke Creek, Wasabi Creek and Southern Creek – refer section 4.16 – 4.17) will be reconstructed along more natural, meandering paths, as opposed to their straight and rectified channels, to enhance ecological and hydrological values while maintaining current catchment drainage patterns. Post mining creek extent will ensure no loss of extent or value. Some existing drains may be reinstated if contouring alone is insufficient. Some modified humping and hollowing will be incorporated, though it is intended to be less pronounced than the existing humping and hollowing, and will include the raising of the low areas (hollows) above the water table to reduce sediment and nutrient runoff from future farming activity providing long-term ecological benefits and improved drainage across the site.

8.14 Fences, internal farm roads, bridges and culverts will be reinstated as required.

8.15 The anticipated final land contour is illustrated in **Plan I**.

8.16 A Work Programme will be submitted to the Grey District Council and West Coast Regional Council annually, which will specify rehabilitation works to be undertaken in each 12-month

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period. This will include a summary of the rehabilitation completed during the previous 12 months. This is standard practice for mining activities on the West Coast.

Proposed wetland

8.17 The proposed wetland will be constructed in two stages as follows:

(a) The first stage of the wetland will be constructed on Section 1: Granite Creek North, north of Granite Creek and south of the WCP, following completion of Section 1;

(b) The second stage of the wetland will be constructed on Section 2: Granite Creek South, north of Cargill Road and south of Granite Creek, following completion of Section 2.

8.18 The new wetland will be established along the eastern boundary, planted in native species and fenced from stock.

8.19 There will be an increase in the extent and integrity of wetland across the site due to the construction of the new wetland area. Indigenous biodiversity values are expected to increase at the site, including a net gain in wetland area and indigenous vegetation cover.

8.20 The proposed wetland is shown in **Plan J**.

Proposed planting

8.21 The Applicant has engaged Glasson Huxtable Landscape Architects to assess the potential landscape and visual amenity effects of the proposal. The Landscape Assessment identifies areas where current vegetation should be retained and additional planting, associated with the restoration of creeks and construction of the wetland area, is to be undertaken. These plantings have been designed both for ecological and landscape mitigation for the project and will have long term ecological benefits in terms of stream health and habitat for indigenous species.

8.22 Due to the distance of the mining activity from public viewpoints for the majority of its operation, bunding and planting works are restricted to managing the effects of noise. There are four noise bunds also proposed as set out in Section 7.23. Bunds will have an inward facing grassed slope with dense planting on the crest and outward facing slope.

8.23 Planting and bunding includes:

(a) Lot 2 DP2178 bund - 3m high with a 4.8m wide crest (24m width) approximately 500m long;

(b) Warren Road bund – 3m high with a 4.8m wide crest (24m width) approximately 900m long ;

(c) Cargill Road bund - at the eastern edge of the site stretching north – 3m high with a 4.8m crest (24m width) approximately 460m long;

(d) 101 Cargill Road bund – on the western boundary - 3m high with a 4.8m wide crest (24m width) approximately 440m long.

8.24 Retention of key vegetation has been identified at:

(a) Planting clusters near the WCP;

(b) Planting clusters along the eastern application area boundary north of Cargill Road;

(c) Planting patch adjacent to 101 Cargill Road; and

(d) Riparian vegetation adjacent to Granite Creek;

Closure sequence

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8.25 Final rehabilitation of Section 3 (Cargill Road) will occur following the completion of mining activities in this area.

8.26 As progressive rehabilitation will be undertaken across the SB there will be limited final contouring and blending required once mining is complete. Any final contouring/blending at the southern end of the mining disturbance area will use material from within the wider application area as required.

9. Plant and machinery

9.1 The following machinery listed in **Table 2** is likely to be required to undertake mining, pumping and rehabilitation of the site (although specific models may differ).

Table 2: Mining machinery list

Type	Supplier	Model	Number
Bucketwheel Cutter Suction Dredge	Neumann Contractors	Series 350	1
Dozer	Komatsu	D71PX-24	2
Grader	Komatsu	GD655-7	1
Integrated Tool Carrier	Hitachi	ZW220-5	3
Artic 6wd 45 Truck	Hitachi	B45E	3
Excavator (Long stick)	Hitachi	ZX890LCH	2
Excavator (30 or 40 tonne)	Hitachi	ZX345USLC	2
Field Screening Unit (trommel)	Bespoke		1

9.2 Additional mining equipment and vehicles will be used on site, including a variety of pumps (including land-based, floating and submersible) and light 4-wheel drive vehicles for the transport of mining personnel.

10. Site operation

10.1 This section describes how the site will be operated, in terms of hours of operation, site configuration, transport, lighting, dust management and hazardous substances use.

Hours of operation

10.2 Mining activities associated with the extraction of material will be undertaken during daylight hours only, consistent with the existing consent granted for the CB.

10.3 Hours of daylight are between 30 minutes before sunrise to 30 minutes after sunset[1].

10.4 Mining shall not occur between the hours of 0600 and 0700 within 500m of the dwellings located at:

(a) Lot 2 DP2178;
(b) 37, 41, 43 and 50 Warren Road;
(c) 64, 86 and 101 Cargill Road.

10.5 There will be no mining on Sundays.

[1] *Sunrise and sunset times can be found at* https://www.sunrise-and-sunset.com/en/sun/new-zealand/westport/2023/june

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Site configuration

10.6 Access tracks will be required within the mining area. These will be formed to provide light vehicle and machinery access for the preparation, mining and rehabilitation of various areas as mining progresses. These access tracks will move as mining progresses.

10.7 It is proposed to retain the existing access points for farming activities for the duration of the mining activity, to ensure that any ongoing farming traffic is kept separate from the mine traffic.

Vehicle movements

10.8 There are 57 full time staff proposed to be employed across the WCP and wider mine site at the SB. This includes 18 staff to be employed specifically for the mining activity.

10.9 Vehicle movements associated with mining activities are largely generated by the existence of the WCP adjacent to the SB. They will therefore be authorised by the WCP consent.

Lighting

10.10 Due to activities taking place during daylight hours only, only minimal lighting will be required on the mine site and at the mining void.

10.11 There will be limited fixed lighting in the mine area, which may include lighting around the pump to allow for the pump circuit to be checked overnight. Any fixed lighting in the mine area will be shrouded and adhere to the principles outlined below.

10.12 Lighting will not exceed 2.0 lux spill (horizontal and vertical) onto any adjoining property, measured at any point more than 2m inside the boundary of the adjoining property or the closest window on the adjoining property (whichever is the closest).

10.13 All lighting on site will adhere to the Australian Government's National Light Pollution Guidelines for Wildlife January 2023 (or subsequent revision), including but not limited to:

(a) Utilising the Seabird Light Mitigation Toolbox in Appendix G – Seabirds (Schedule 4);
(b) All fixed lighting shall be pointed downward and shielded to avoid light spill, with a lighting temperature of no more than 2000K, and be filtered to reduce blue and violet wavelengths;
(c) Lights shall only illuminate the object or area intended;
(d) Fixed lights shall be mounted as close to the ground as practicable;
(e) External lighting shall use the lowest intensity lighting as possible, while ensuring compliance with workplace health and safety requirements;
(f) External lighting shall be equipped with light minimising technology, including motion sensors or timers;
(g) Mobile lighting within the mine site will adhere to the above principles, including the dipping of headlights of vehicles operating on site.

10.14 Adherence to the above standards will minimise light spill, thereby preserving the natural character and dark night sky of the coastal environment. The measures proposed will also assist in avoiding the risk of adverse effects on the Westland Petrel Colony located approximately 5.5km north of the WCP location. These standards are consistent with the conditions of consent granted for the CB.

Noise

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10.15 Noise will be generated from the activities at the mining void including excavators and front end loaders to strip top soil and overburden, trucks to move material to the rear of the site, the dredge and field screening unit and the spreading of tails from the cyclone.

10.16 Noise generation has been taken into account in the design of the project. Hours of operation control the activity each day. Earthworks near dwellings will be minimised, and noise mitigation bunds will be constructed at four locations as outlined in Section 7.23.

10.17 The site will operate in accordance with a Noise Management Plan, which sets out the management techniques to be applied to ensure that the site operates in accordance with best practice and unnecessary noise generation is minimised by:

(a) Exhaust silencers fitted to all mobile plant;
(b) Power from the grid used in preference to diesel generators where possible;
(c) Vehicles and equipment maintained to avoid unnecessary noise and vibration;
(d) Trucking contractor behaviour expectations including following speed limit; restrictions, no unnecessary sounding of horns or revving of engines, avoidance of engine braking, vehicles to be properly maintained;
(e) Metal to metal contact avoided during the loading of trucks;
(f) No tonal reversing alarms;
(g) Site vehicles to follow speed limits and drive in consistent manner, no amplified music permitted inside vehicle cabs, horns to be used in emergency only;
(h) Access road and working surface maintained free from potholes and corrugations.

10.18 The following noise limits are proposed to apply at or within the notional boundary of any dwelling existing at the date consent is granted on any other site, except in relation to the four dwellings on Warren Road, three dwellings on Cargill Road and at Lot 2 DP2178:

(a) Daytime (0700-2200): 55 dB LAeq (15 min)
(b) Night-time (2200-0700): 45 dB LAeq (15 min) and 75 dB LAFmax
(c) when measured and assessed in accordance with the latest New Zealand noise standards: NZS 6801:2008 “Acoustics – Measurement of environmental sound” and NZS 6802:2008 “Acoustics -Environmental Noise”.

10.19 At some locations, extraction of ore can proceed between 0600 and 0700hrs (classified as night-time under the District Plan) while still complying with the 45 dB L_{Aeq} noise limit.

Dust Management

10.20 Some activities proposed to be undertaken have the potential to generate dust emissions. While the application site is within a high rainfall area, there are periods of dry weather.

10.21 As the mining activity is a wet process dust generating activities will be limited to times of overburden removal and rehabilitation and vehicle movements on site. These activities are intermittent (not always continuous) and can be managed with techniques outlined in the Dust Management Plan. Dust will be managed via visual inspections, use of water carts and other dust suppression techniques as required.

10.22 The Applicant has installed dust monitors on the perimeter of the mine site. These monitoring stations will remain in place for the duration of mining activities on site.

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Hazardous substances use, storage and management

10.23 The refuelling of machinery will be undertaken on site using a mobile fuel tanker with a centralised fuel store located at the WCP (40,000 litres). The proposed above ground tank will be authorised by the WCP consent.

10.24 Re-fuelling will be completed under direct supervision of the machine operator to minimise the risk of spills occurring. Refuelling will occur at least 20m away from waterbodies.

10.25 Mechanical repairs and servicing will occur at the WCP area. In the event of major mechanical break-down, machines may be taken to an off-site workshop. Spill kits and procedures will be available on site in the event of a fuel or oil spill occurring.

10.26 All waste oil and fuel containers will be removed from the site promptly.

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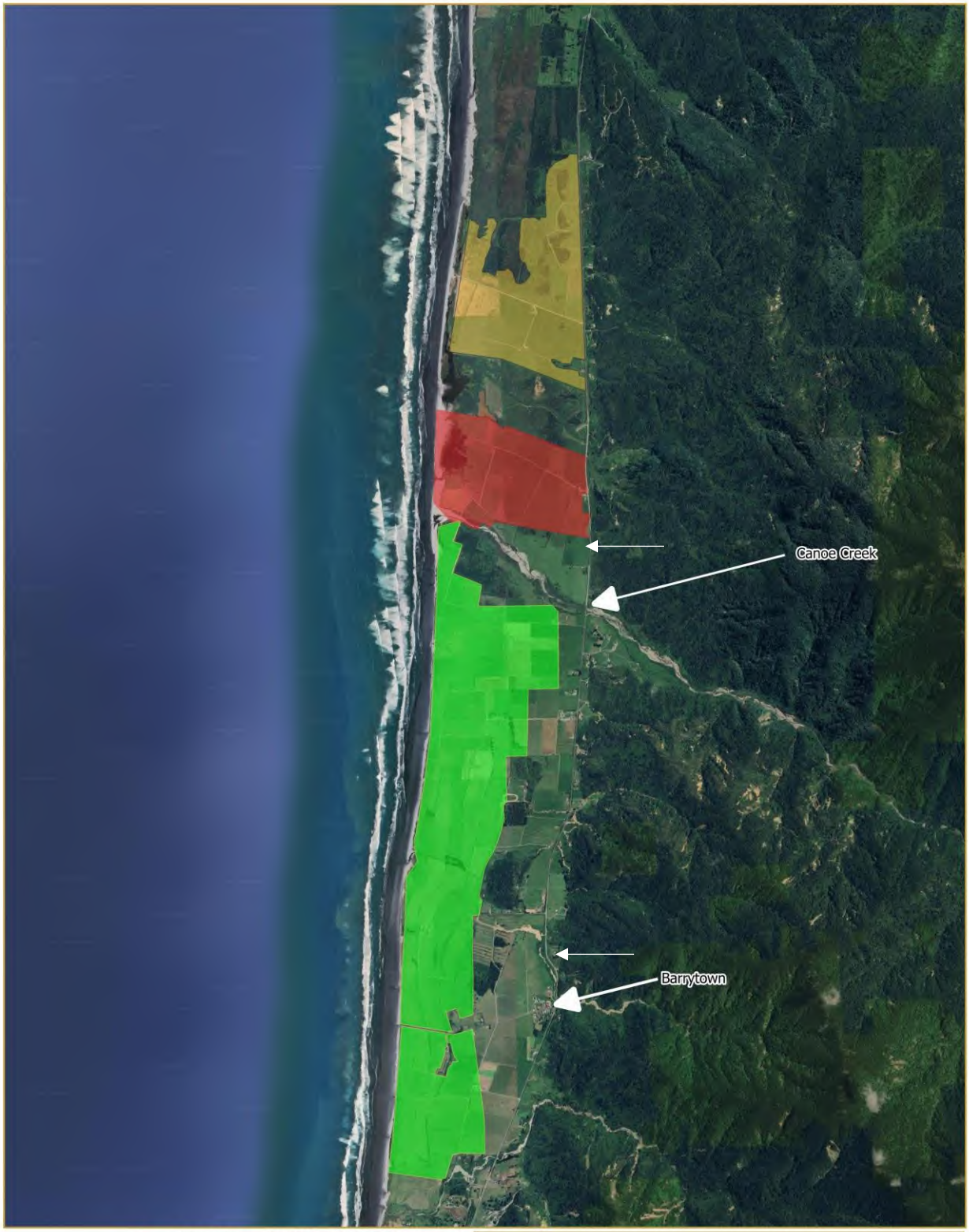
Plan A: Barrytown Critical Minerals Project – Resource Blocks



Plan A - Barrytown Critical Minerals Project - Resource Blocks

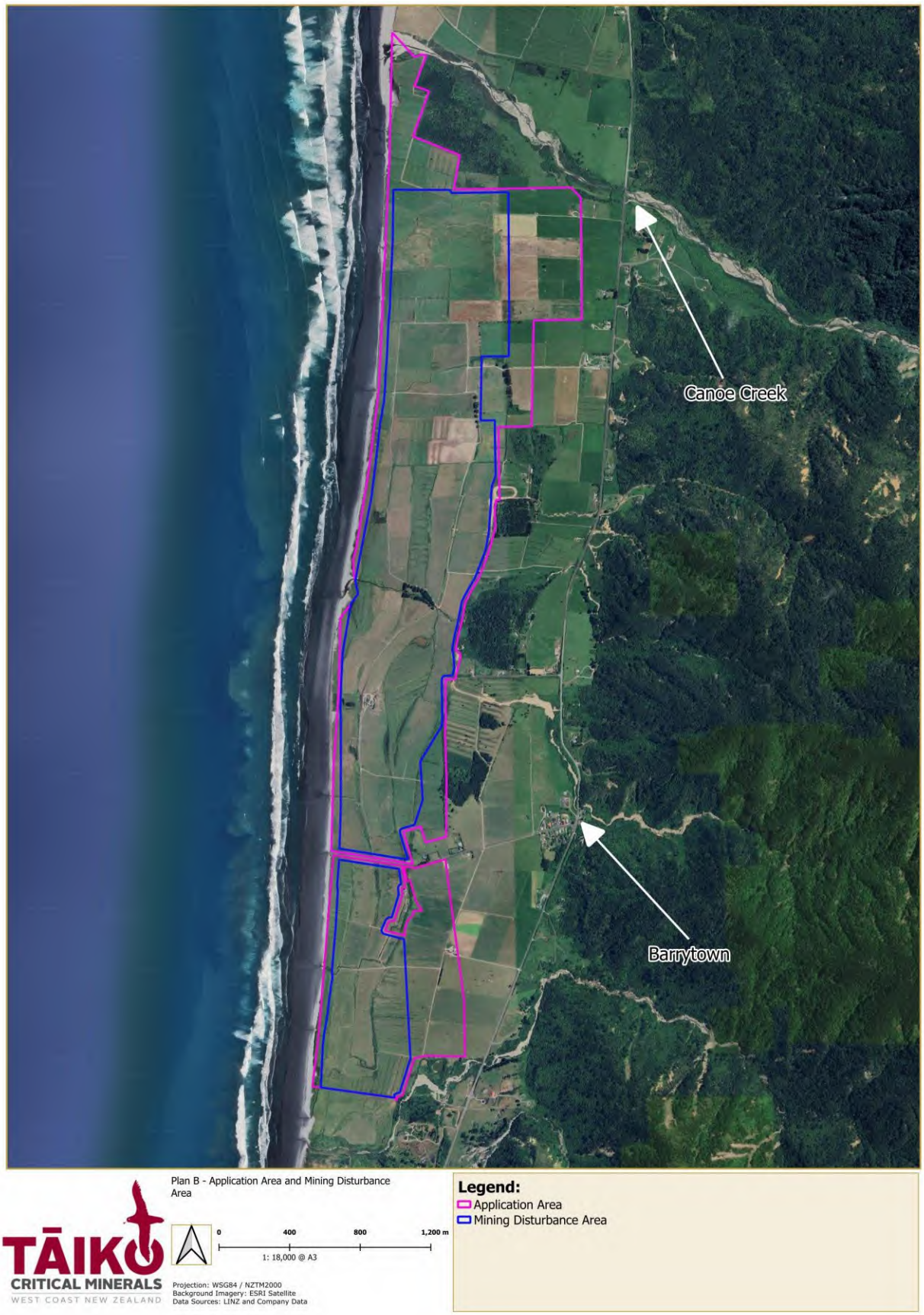
0 400 800 1,200 m

1:30,000 @ A3

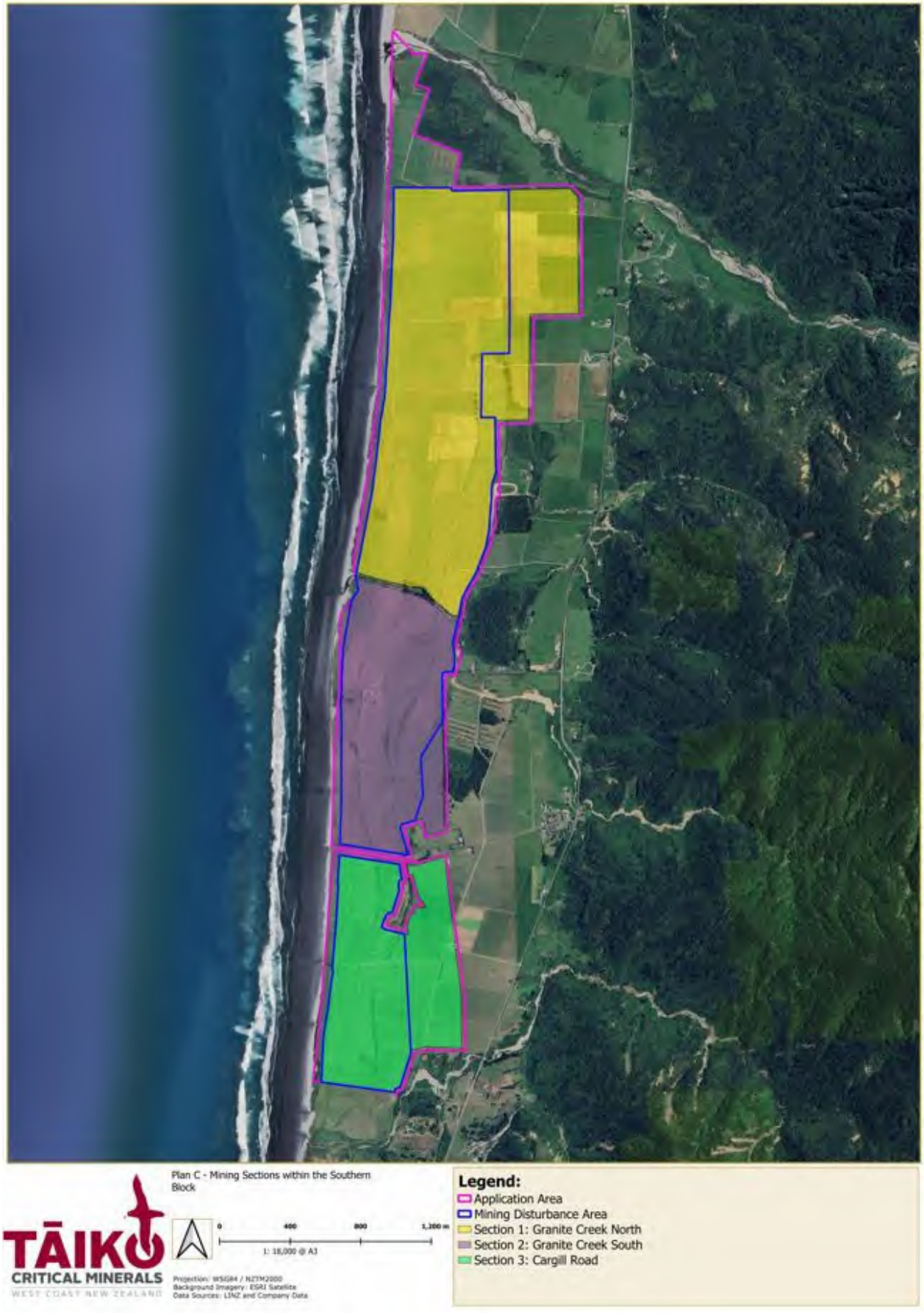
Projection: WSG84 / NZTM2000
Background Imagery: ESRI Satellite
Data Sources: LINZ, Client and/or TPRL Data

Legend:
- Northern Resource Block
- Central Resource Block
- Southern Resource Block

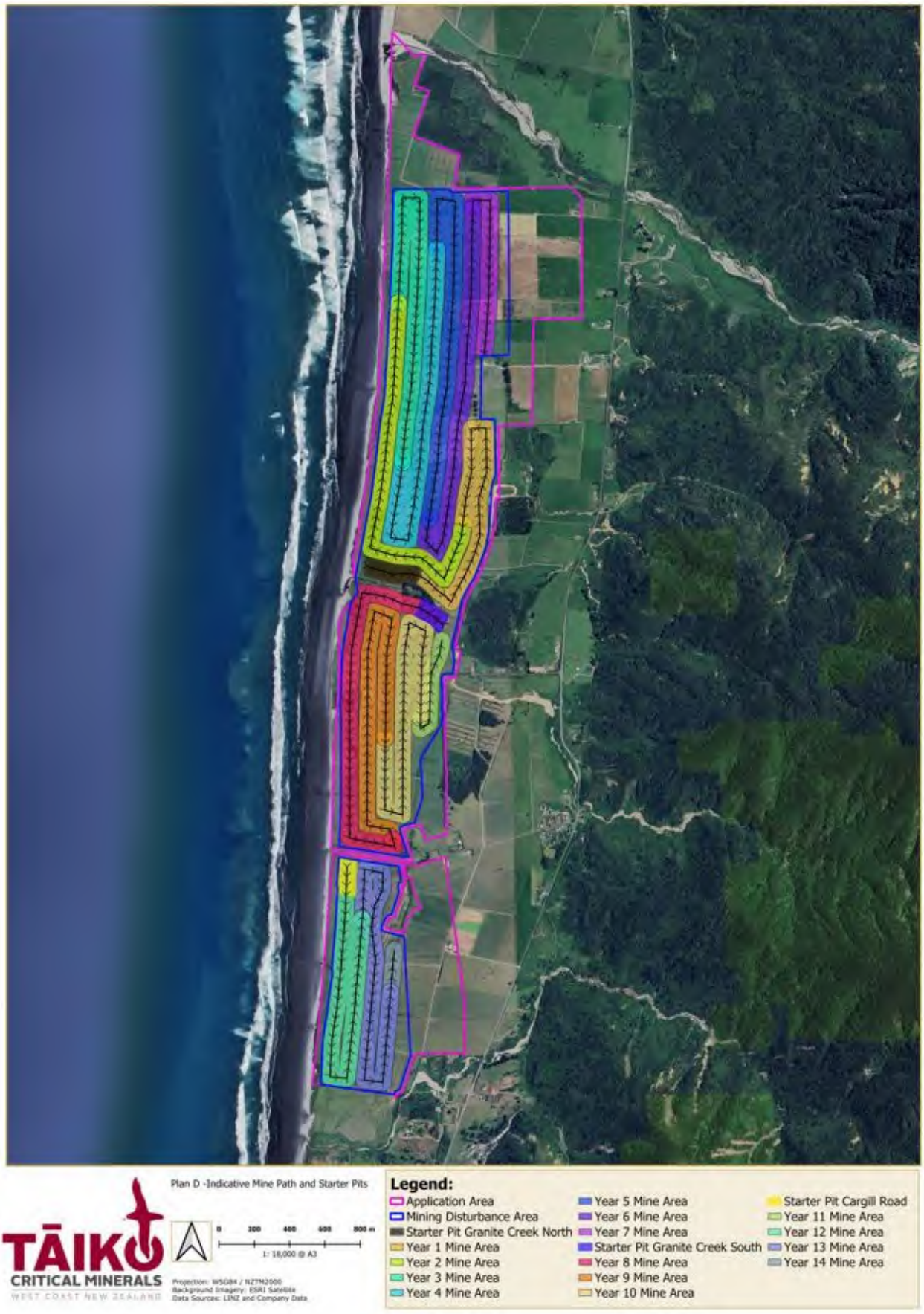
Plan B: Southern Block Application Area and Proposed Mining Disturbance Area



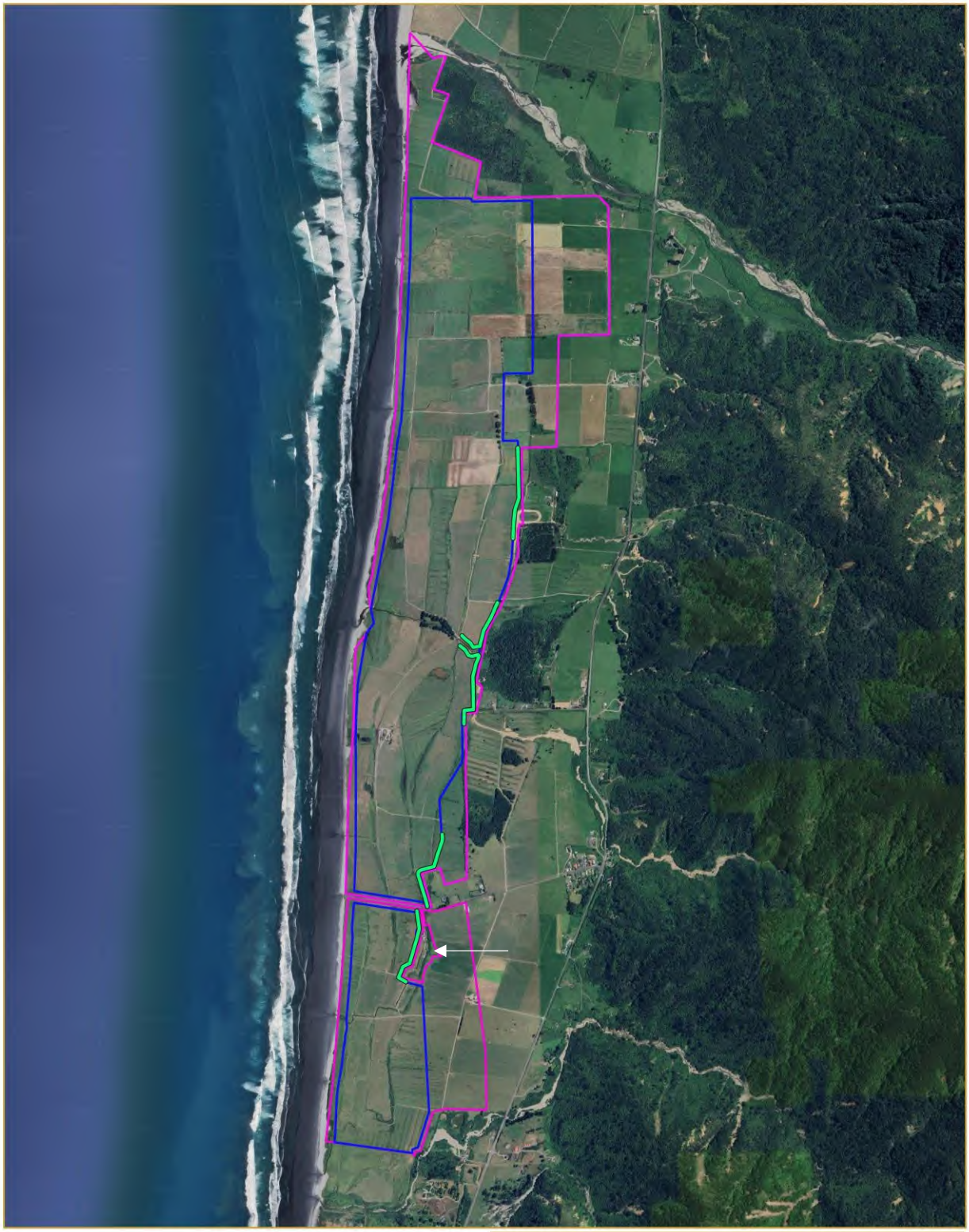
Plan C: Mining Sections within the Southern Block



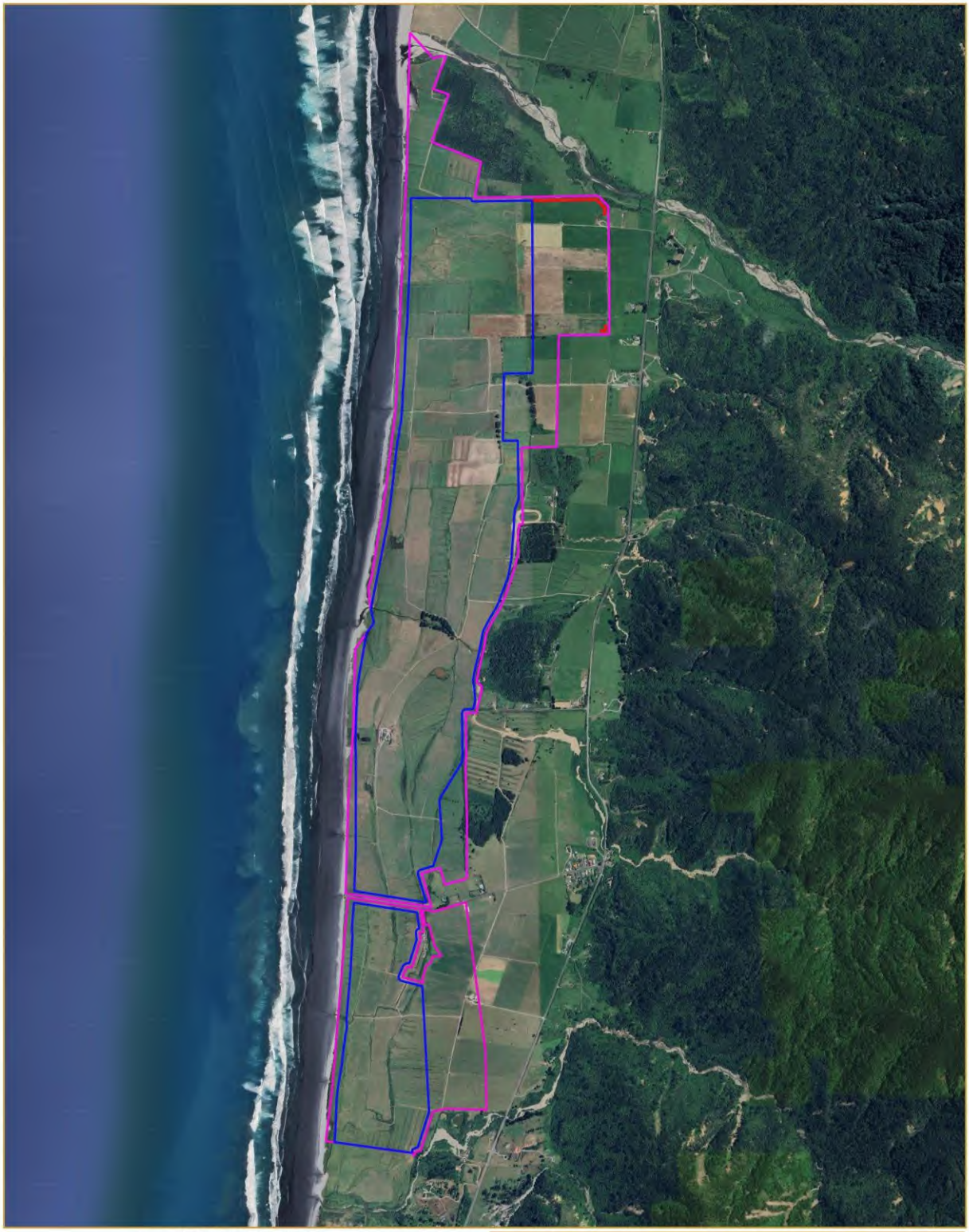
Plan D: Indicative Mine Path Including Mine Starter Pits



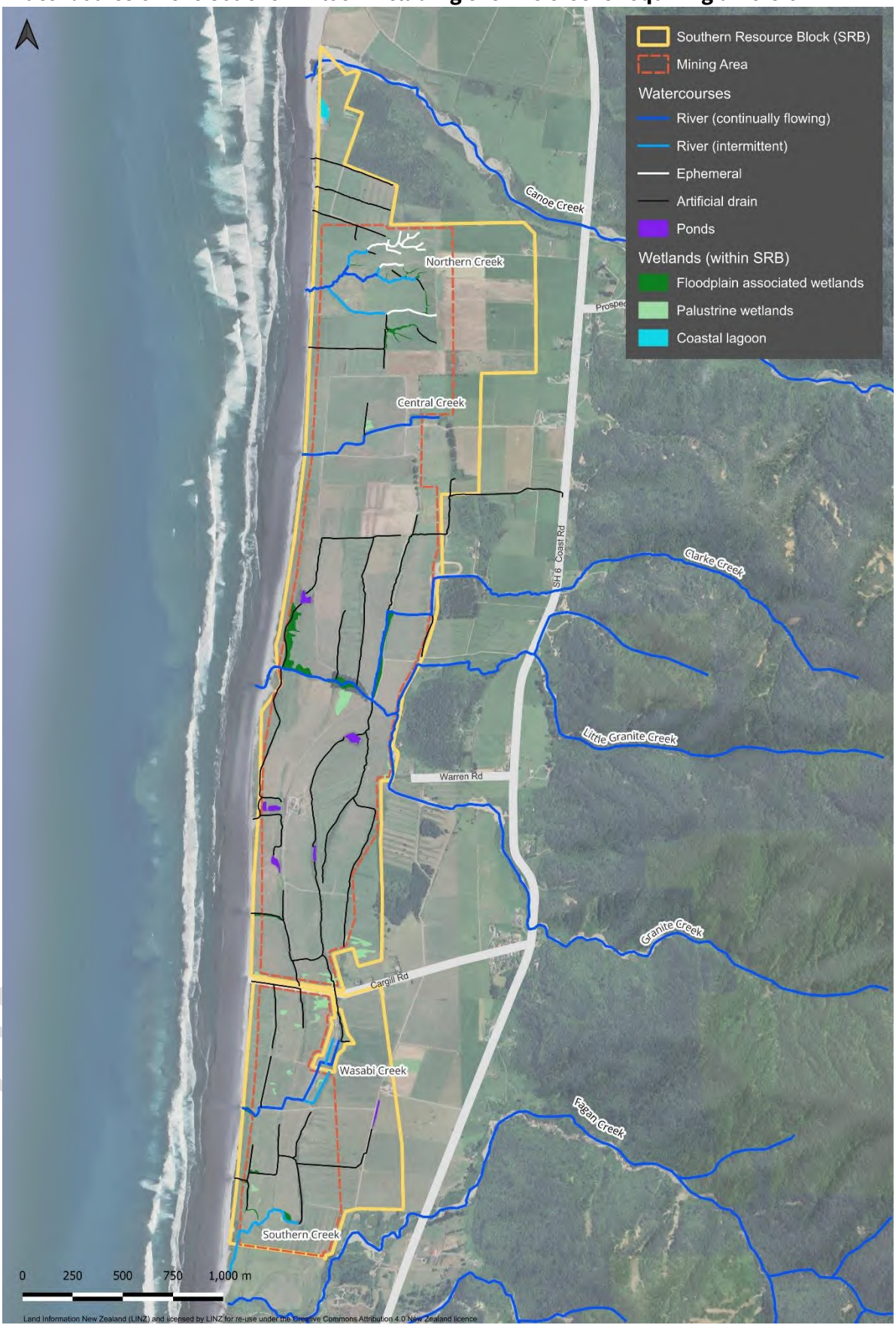
Plan E: Noise Bunds



Plan F: Setbacks From Key Environmental Features

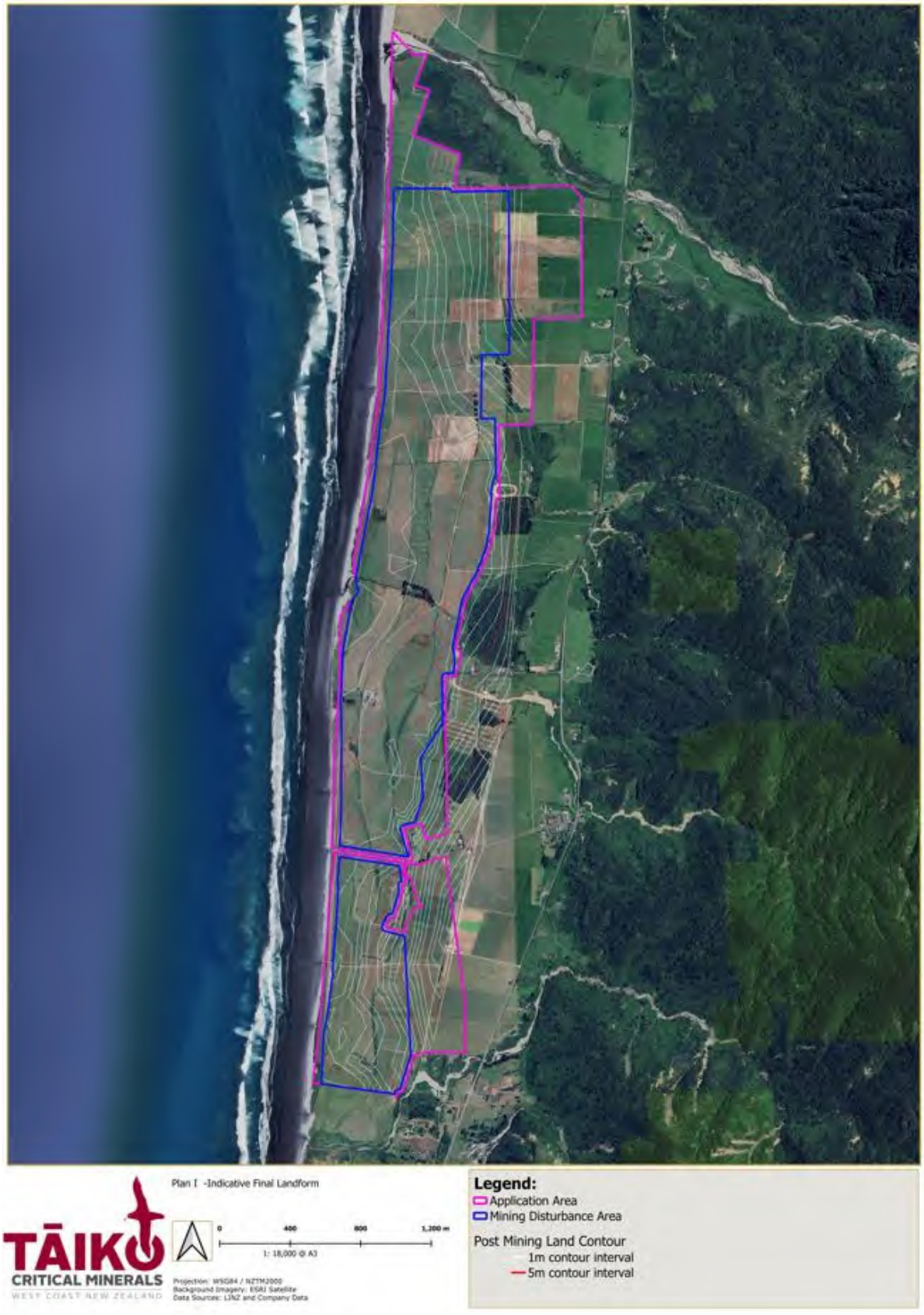


Plan G: Waterbodies on the Southern Block including the five creeks requiring diversion

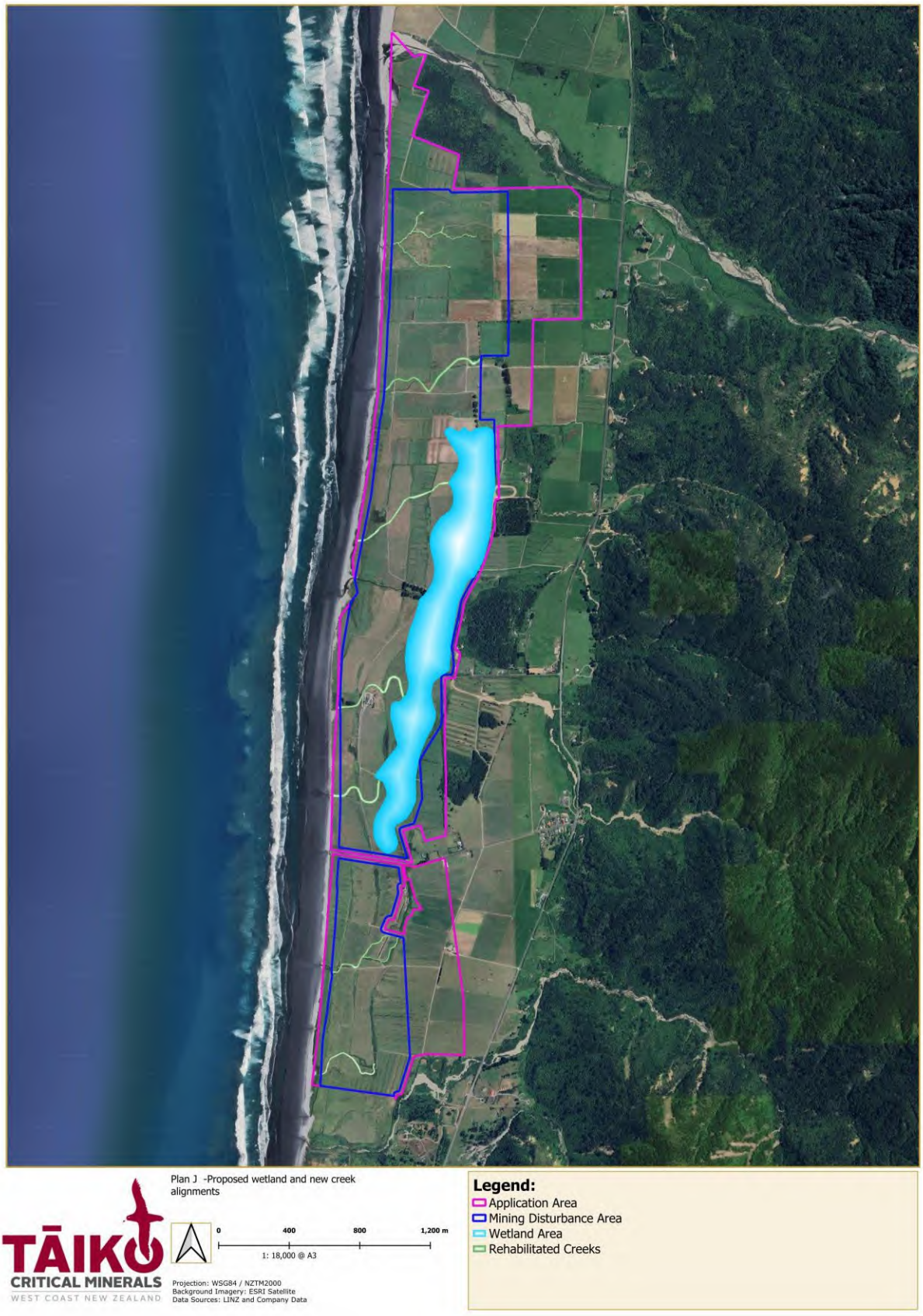


Plan H: Location of Water Take

Plan I: Indicative Final Land Contour



Plan J: Proposed Post-Mining Wetland and Watercourse Rehabilitation Layout



Appendix B

Proposed conditions

Barrytown Critical Minerals Project
Southern Block
Proposed Resource Consent Conditions

General Conditions for Grey District Council and West Coast Regional Council 2
1.0 General 2
2.0 Notification 2
3.0 Review of Conditions 2
4.0 Bond Conditions 3
5.0 Annual Work Programme 4
6.0 Management Plans 6
7.0 Method of Operations 7
8.0 Hazardous Substances 8
9.0 Rehabilitation and Rehabilitation Management Plan 9
10.0 Complaints and Non-Compliance 10

Grey District Council Conditions 11
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General Conditions for Grey District Council and West Coast Regional Council	
1.0 General	
1.1	The Consent Holder must carry out the mineral sand mining activities in general accordance with the application made through the Fast-track Approvals process, the Site Plan enclosed as Schedule 1 prepared by Tai Poutini Resources Ltd and the following management plans [to be inserted].
1.2	The Consent Holder must ensure all staff and contractors are made aware of, and have access to, the resource consent conditions prior to the commencement of mining. A copy of the resource consent conditions must also be readily available on-site.
1.3	All actual and reasonable costs incurred by the Consent Authorities in monitoring, enforcement and administration of this resource consent must be met by the Consent Holder.
1.4	a. Within 2 months of the commencement of these consents, the Consent Holder must appoint an Accountable Person to be responsible for ensuring compliance with all conditions of these consents. The Accountable Person must be based on-site for a minimum of 4 hours per day, for three days per week. The Accountable Person must: i. Review, submit and ensure compliance with all management plans listed in the conditions of these consents; ii. Ensure there is another person who can provide cover in the event they are sick or unavailable, and to provide for succession ('Nominated Cover Person'); iii. Be the point of contact between the Consent Holder, the Consent Authorities, the Community Liaison Group and the community generally, and pro-actively engage with these parties as required under these consents; iv. Deliver on reporting requirements required by the conditions of these consents. b. The Consent Authorities must be advised of the name and contact details of the Accountable Person and the Nominated Cover Person when they are appointed. In the event that the Accountable Person or Nominated Cover Person change, the Consent Authorities must be notified. A sign must be erected at the property boundary adjacent to the site access road, which provides the name and contact details of the Accountable Person and Nominated Cover Person required to be appointed under sub-clause a
2.0 Notification	
2.1	For monitoring purposes, the Consent Holder must notify the Consent Authorities of the following: a. The intended commencement date of works on-site at least 15 working days prior to commencement of works on-site; and b. The intended completion of final mine closure rehabilitation activities at least 15 working days prior to works ceasing on-site.
3.0 Review of Conditions	
3.1	Pursuant to Section 128(1) of the Resource Management Act 1991, the Consent Authorities may review any of the conditions of these consents by serving notice on the Consent Holder

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	within a period of 60 working days, commencing on each anniversary of the date of commencement of these consents for any of the following purposes: a. To deal with any unanticipated adverse effect on the environment which may arise from the exercise of the consents which is appropriate to deal with at a later stage. b. To assess the appropriateness of imposed monitoring parameters, monitoring regimes and monitoring frequencies and to alter these accordingly. c. To ensure that any management plan required by conditions gives effect to conditions of these consents. d. If the information made available to the Consent Authorities by the applicant for the purposes of applying for consent contained material inaccuracies and the effects of the exercise of the consent are such that it is necessary to apply more appropriate conditions.
4.0 Bond Conditions	
4.1	The Consent Holder must provide and maintain in favour of the Consent Authorities (the West Coast Regional Council and the Grey District Council [jointly for their respective interests]) a bond or bonds related to mine closure activities required by these consents.
4.2	The payment of the bond quantum by the Consent Holder, as required by Condition 4.5 must either be: a. A bond in favour of the Consent Authorities for the guarantee sum in a form and executed by a surety acceptable to the Consent Authorities; or b. A cash bond deposited with and held in a bank account by the Consent Authorities.
4.3	Where a bond is guaranteed in accordance with Condition 4.2 a., the guarantor must bind itself to pay up to the bond quantum for the carrying out and completion of all obligations of the Consent Holder under the bond.
4.4	The bond (as set at any time under Condition 4.1) must be held or remain in full force and effect throughout the term of these consents until all conditions under these consents have been performed unless otherwise agreed by the Consent Authorities.
4.5	a. The bond quantum must be $300,000. b. The method for arriving at the bond quantum does not limit the scope of the bond, which is set by Condition 4.1.
4.6	The provisions of Section 109 of the Resource Management Act 1991 must apply to any bond, or bonds, required pursuant to the above and must not be limited by the details of the bond instrument.
4.7	The amount of the bond may be inflation adjusted annually, if requested by the Consent Authorities, by the movement of the CPI relative to the CPI at the date when the bond is first provided.
4.8	The Consent Holder must not exercise these consents:

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	a. Until the bond required by Condition 4.1 has been fully executed by the Consent Holder and guarantor, or has been deposited with the Consent Authorities, or b. In respect of any inflation adjusted bond referred to in Condition 4.7, after 30 working days have expired from the date the Consent Holder was notified of the terms of the inflation adjusted bond by the Consent Authorities unless the inflation adjusted bond has been executed with the Consent Authorities by the Consent Holder and guarantor, or has been deposited with the Consent Authority; or c. In respect of any bond sum changed or reviewed pursuant to Sections 127 or 128 of the Act, after thirty 30 working days have expired from the date the Consent Holder was notified of the decision of the changed or reviewed bond by the Consent Authorities unless the changed or reviewed bond has been executed with the Consent Authorities by the Consent Holder and guarantor, or has been deposited with the Consent Authorities, or d. If, during the term of these consents, the whole or any part of the bond is required to be used for the carrying out and completion of all obligations of the Consent Holder under the bond, unless the full bond has been executed with the Consent Authorities by the Consent Holder and guarantor, or has been deposited with the Consent Authorities.
4.9	The Consent Holder must complete such work requested in respect of which any bond or deposit is held, within the time period nominated by the Consent Authorities' written request.
4.10	If the consents are transferred in part or whole to another party or person, the bond must continue until any outstanding work at the date of transfer is completed to ensure compliance with the conditions of these consents, unless the Consent Authorities are satisfied adequate provisions have been made to transfer the liability to the new Consent Holder.
4.11	In the event of any such transfer of the consents, the Consent Holder must ensure that the transfer provides a replacement bond to the Consent Authorities on the terms required by the Bond Conditions.
4.12	The Consent Holder must meet the costs of providing any bond, or bonds, including the costs of the bond and any substitute bond. ***Advice Note:*** • *The Consent Authority will release the bond upon the closure of the mine if all conditions of consent have been complied with to the satisfaction of the Consent Authorities.*
5.0 Annual Work Programme	
5.1	At least 20 working days prior to mining activities commencing and thereafter on or before the anniversary date of the mining activities commencing, the Consent Holder must submit a programme of work ("Annual Work Programme") for certification by the Consent Authorities detailing: a. The proposed works to be carried out over the next 12 months including: i. Equipment to be used; ii. Areas of topsoil and overburden stripping and stockpile locations; iii. New areas of land disturbance that will be mined; iv. Access tracks;

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	v. Drilling or prospecting sites and other tracks to be constructed; vi. Native freshwater fish capture and relocation plan and any other wildlife management required (lizards and birds); vii. Proposed location, and relocation, of the penguin fence; and viii. Any other site works within the consent area. b. The approximate open volume of the mining void at the start of the year including the depth of excavations and the area of the mining void. c. Extent of creek diversions and reclamations. d. The progressive rehabilitation works to be carried out over the next 12 months including: i. Areas of unrestored land (i.e. any land not finally topsoiled and revegetated) at the beginning of the 12-month period; ii. The area that will be fully rehabilitated during the forthcoming 12-months; iii. Maximum slope angles, bench heights and widths of recontoured ground, if applicable; iv. Rehabilitation methods and techniques including replacement of topsoil and vegetation cover with seed collection and plant procurement details; d. Description of measures to prevent adverse effects on natural waterbodies, including drainage works within the consent area, and the collection and treatment of site run-off; e. Measures to ensure soil conservation; f. A description and analysis of any unexpected adverse effects that have arisen as a result of activities within the last 12 months, the steps taken to address those adverse effects and measures implemented to avoid a repeat occurrence of them.
5.2	The following plans, reports and results of monitoring must also be submitted as part of the Annual Work Programme: a. A detailed plan or aerial photograph showing: i. The open working area at the start of the year; ii. Proposed mine path for the forthcoming year including haul and access roads; iii. Rehabilitated ground behind the mining void area; iv. Location of existing and intended topsoil or overburden dumps and their dimensions; v. Location of natural surface water bodies; vi. Proposed diversions of water bodies, location of fish diversions and reclamations of creeks; vii. Location of present and intended drainage works and settling ponds; and viii. Any other site works within the consent area. b. A Site Specific Erosion and Sediment Control Plan in accordance with Condition 18.2. c. Results of surface water quality, surface water flows, and groundwater level monitoring from the previous 12 months in the form of an Annual Hydrological and Water Quality Report required by Condition 24.5. d. Any proposed updates to management plans submitted in accordance with the respective conditions of consent.

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	e. Results of any previous dust monitoring required by Condition 26.3.
5.3	The Consent Holder must provide the Consent Authorities with any further information, which the Consent Authorities may reasonably request after considering any Annual Work Programme. This information must be provided within 5 working days of any request from the Consent Authorities.
6.0 Management Plans	
6.1	At least 20 working days prior to undertaking any activities authorised by these consents, the Consent Holder must submit the following management plans to the Consent Authorities for certification: a. Noise Management Plan b. Avian Management Plan c. Lizard Management Plan d. Native Freshwater Fish Capture and Relocation Plan e. Dust Management Plan f. Rehabilitation Management Plan g. Water Management Plan h. Erosion and Sediment Control Plan i. Landscape Planting Plan j. Lighting Management Plan Advice Notes: • These are collectively referred to as 'Management Plans'. • Where a plan requires the input of an appropriately qualified professional, the Consent Authorities may engage an appropriately qualified person to peer review the plan as part of the certification process.
6.2	a. The purpose of the Management Plans is to implement the relevant conditions of these consents. All Management Plans must include (where relevant): i. The purpose/objective of the plan; ii. Reference to the conditions of these consents that the management plan implements; iii. How each of the relevant conditions have been given effect to; iv. Procedures for implementing the relevant plan; v. Plan auditing check lists; vi. Monitoring programmes and/or monitoring protocols; vii. Feedback mechanisms for adaptive management, including circumstances in which a material change to the management plan would be required; viii. An organisational chart showing staff and contractor positions and responsibilities for plan implementation; ix. Relevant training and induction procedures and training schedules; and x. Reporting procedures and format for providing the results of any monitoring or surveys required by the plan. b. Where plans require the input of an appropriately qualified professional, the Consent Holder must engage an appropriately qualified person to prepare the Plan.
6.3	Site activities must not commence until the Management Plans listed in Condition 6.1 have been certified by the Consent Authorities.

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6.4	a. If the Consent Holder has not received a response from the Consent Authorities within 20 working days of the date of submission of a management plan under Condition 6.1, the management plan must be deemed certified. b. If the response from the Consent Authorities is that they are not able to certify the management plans, the Consent Holder must consider any reasons and recommendations provided by the Consent Authorities, amend the management plan accordingly, and resubmit the management plan to the Consent Authorities.
6.5	The Consent Holder may amend a management plan at any time to take into account: a. Any positive measure/s to ensure the stated objectives of the management plan are achieved; b. Any changes required to further reduce the potential for adverse effects as a result of actions identified in the Annual Work Programme; and c. Any required actions identified as a result of monitoring to address a. or b. Where the preparation of a management plan required the input of an appropriately qualified person, any amendment to that management plan must also be undertaken by an appropriately qualified person. Advice Note: • *Some management plans have ongoing annual review requirements which are required in order to manage effects. These specific review requirements are stipulated in the relevant conditions of this consent.*
6.6	Any amended management plan must be provided to the Consent Authorities within 20 working days of its review, for recertification in accordance with Condition 6.1. Advice Note: • *The Consent Authorities may engage an appropriately qualified person to peer review the amendments.*
6.7	A management plan may only be amended in a way that is consistent with, and does not contravene, the conditions of these resource consents.
6.8	A copy of the latest version of the certified Management Plans must be kept on site at all times and all personnel must be made aware of each Plan and their responsibilities under each Plan.
6.9	Subject to any other conditions of these consents, all activities must be undertaken in accordance with the latest version of the certified Management Plans.
7.0 Method of Operations	
7.1	a. The mine boundaries must be clearly marked on the ground as per Schedule 1 before any earthworks take place, with the following setbacks applied: i. 20m from the consent boundary; ii. 20m from Granite Creek iii. 20m from Fagan Creek;

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	iv. 50m from the mean high water spring v. 20m from the proposed SNA PUN-049; vi. 20 from all private property boundaries not within the consent area as shown on Schedule 1; vii. 200m from dwellings other than where noise bunds are proposed.
7.2	The maximum area of site disturbance must not exceed 16.0 hectares at any one time. Advice Note: • *The disturbed area includes the stripped area ahead of mining, mining void and active rehabilitation areas.*
7.3	a. The Consent Holder must strip soil material ahead of mining operations and stockpile it for progressive and final mine closure rehabilitation purposes. b. Stockpiled soil must be protected from erosion caused by water and wind as far as practicable.
7.4	The Consent Holder must not bury any topsoil or soil material suitable as a growing medium or remove it from the site.
8.0 Hazardous Substances	
8.1	a. Refuelling, lubrication and mechanical repairs of equipment and storage of hazardous substances and dangerous goods must be undertaken in such a manner that ensures spillages of hazardous substances or dangerous goods onto the land surface or into a waterbody do not occur, including that refuelling must not occur outside the mining area or within 20 metres of a water body. b. Any accidental discharge of greater than 20 litres of fuel, oil or hazardous substances must be reported immediately to the Consent Authorities along with details of the steps taken to remedy and/or mitigate the adverse effects of the discharge.
8.2	All contractors and/or operators transporting or storing more than 20 litres of fuel, oil or hazardous substances must carry spill kits to contain any fuel, oil or hazardous substances discharges on-site.
8.3	A list of all hazardous substances and dangerous goods stored or used on site must be maintained on site at all times showing the location of the storage and use.
8.4	The Consent Holder must undertake quarterly systematic testing of the heavy minerals concentrate from within the active mining area to confirm that the concentrate remains below the acceptable level of radioactivity concentration limits as specified in Schedule 2 of the Radiation Safety Act 2016. Copies of the independent test results must be submitted to the Consent Authority within 10 working days of receipt of the results. Advice Note: • *If material meets the criteria in Schedule 2 of the Radiation Safety Act 2016, the extraction, processing and transport of heavy minerals concentrate will require a Source Licence under this Act, and may possibly require a radiation safety plan as per section 18 of the Act.*

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8.5	In the absence of any extant and current New Zealand Code of Practice for handling naturally occurring radioactive materials, the Consent Holder must carry out all activities on site in accordance with the Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing Code of Practice and Safety Guide published by the Australian Radiation Protection and Nuclear Safety Agency. Advice Note: • *The Code of Practice within this consent condition requires that if radiation levels exceed 1Bq/g, the relevant authority must be notified, which differs from state to state. In the New Zealand context, the relevant body to notify is the Office of Radiation Safety.*
8.6	a. The Consent Holder must maintain radiation monitoring devices in the locations specified in the Dust Management Plan. Data from the radiation monitoring devices must be collected and analysed once every three months. Copies of the test results must be submitted to the Consent Authorities with 10 working days of receipt of the results. b. If the radiation monitoring devices record radiation levels exceeding the equivalent of 1 mSv (millisievert) above background levels over 12 months (i.e., the sum of results from the past four device readings at each location minus background levels established prior to the activity commencing), then the Radiation Safety Act 2016 applies, and the Consent Holder must: i. inform and consult the Office of Radiation Safety, New Zealand Ministry of Health; and ii. carry out all activities on site in accordance with the Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing Code of Practice and Safety Guide published by the Australian Radiation Protection and Nuclear Safety Agency (or any subsequent revision).
9.0 Rehabilitation and Rehabilitation Management Plan	
9.1	The Consent Holder must carry out progressive rehabilitation, to achieve the following requirements: a. Reinstatement of productive pasture; b. Reinstatement of existing creek and drainage patterns to reflect pre-mining catchment areas ensuring no loss of extent, with appropriate riparian planting, in accordance with the Rehabilitation Management Plan; c. Construction of wetland and riparian areas in accordance with the Rehabilitation Management Plan;
9.2	At the completion of mining (final mine closure), the mine area must be fully rehabilitated, by reinstating the productive pasture in general accordance with the Rehabilitation Management Plan. The objectives of the Rehabilitation Management Plan are: a. To create a final landform with a similar contour and profile at final mine closure as that which existed prior to mining but with improved drainage across the site; b. To establish vegetation cover on all areas disturbed by mining activity; c. To protect freshwater values associated with natural waterways in accordance with the Rehabilitation Plan; and

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	d. To construct and establish a permanent wetland area that contributes to ecological enhancement, hydrological function and landscape integration at final mine closure. Advice Notes: • *Final mine closure is the completion of all mining and progressive rehabilitation works.* • *All Management Plans are required to adhere to the requirements of Condition 6.0.*
9.3	The Rehabilitation Management Plan must include the following: a. A programme of progressive rehabilitation of the pre-mining landform, adhering to maximum disturbed area limits. b. The original and final mine closure land contours. c. Contouring of all post-mining landforms. d. Establishment of pasture cover over all disturbed land. e. Restoration of diversion discharge channels. f. Construction and planting details for the constructed wetland area. g. Erosion and sediment runoff control measures. h. Removal of equipment; and i. Post-mining weed and pest control requirements.
9.4	If for any reason active mining ceases for more than 6 months, operational stockpiles must be removed and the stockpiled material returned to the mining area, and all disturbed areas must be rehabilitated as required by the conditions of these consents within 12 months from the date of the last mining activity.
10.0 Complaints and Non-Compliance	
10.1	The Consent Holder must maintain a complaints register for all aspects of operations in relation to these consents. The register must be available to the Consent Authorities at all times and must detail: a. the date, time and type of any complaint; b. the cause of the complaint; and c. any action taken in response to the complaint.
10.2	Upon receipt of any complaint, the Consent Holder must promptly investigate the complaint, take action to remedy or mitigate the cause of the complaint and within 24 hours inform the Consent Authorities of the details of the complaint and any action taken.
10.3	Complaints which may infer non-compliance with the conditions of these consents, must be referred to the Consent Authorities within 48 hours of their receipt.

10.4	a. The Consent Holder must immediately notify the Consent Authorities upon becoming aware of any non-compliance with the conditions of these consents b. Within 5 working days thereafter the Consent Holder must provide written notification to the Consent Authorities which explains the cause of the non-compliance, and if the cause was within the control of the Consent Holder, steps which were taken to remedy the non-compliance and steps which will be taken to prevent any further occurrence of non-compliance with the conditions of these consents. Advice Note: • *This consent condition does not replace the compliance and enforcement responsibilities of the Consent Authorities.*
Grey District Council Conditions	
11.0 Hours of Operation	
11.1	a. Mining, overburden and topsoil stripping, bund development and any related activities must not operate during the hours of darkness. For the purpose of this condition, hours of darkness are between 30 minutes after sunset to 30 minutes before sunrise. b. Mining shall not occur between the hours of 0600 and 0700 within 500m of the dwellings located at Lot 2 DP2178, 23, 37, 41, 43 and 50 Warren Road, and 64, 67, 86 and 101 Cargill Road. c. Mining shall not be undertaken on Sunday. Advice Notes: • *Sunrise and sunset times can be found at https://www.sunrise-and-sunset.com/en/sun/new-zealand/greymouth* • *In addition to Condition 12.1, further restrictions on noise are contained in Conditions 13.1 – 13.4 Noise.*
11.2	Mining shifts must operate only during the hours of daylight.
12.0 Noise	
12.1	The consent holder shall ensure that all operational mining activities on site do not exceed the following noise limits at or within the notional boundary of any dwelling: a. Daytime 0700 to 2200 55 dB L_{Aeq}(15 min) b. Night-time 2200 to 0700 45 dB L_{Aeq}(15 min) and 75 dB L_{AFmax} when measured and assessed in accordance with the latest New Zealand noise standards: NZS 6801:2008 "Acoustics – Measurement of environmental sound" and NZS 6802:2008 "Acoustics -Environmental Noise". Advice Note: • *'Notional boundary' is defined as a line 20 metres from any side of a dwelling or the legal boundary where this is closer to the dwelling.*

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12.2	Construction activities must be conducted in accordance with NZS 6803: 1999 "Acoustics - Construction Noise" and must comply with the "typical duration" noise limits contained within Table 2 of that Standard. Advice Note: • *Construction activities include the formation of access roads, bunds, land contouring and planting. For the avoidance of doubt, overburden stripping and topsoil removal associated with mining operations must not be considered construction activities.*
12.3	The Consent Holder must prepare a Noise Management Plan (NMP) to control day-to-day noise emissions from the site. This NMP must be submitted to the Consent Authority for certification 10 working days prior to commencement of the commencement of on-site works. As a minimum, the NMP must include: a. The person responsible for implementing the NMP b. Applicable noise conditions relating to noise c. Training of staff relating to how to minimise noise and vibration d. Mining risk analysis for noise generation e. Method for handling noise complaints f. Noise monitoring methodology, including frequency, duration, and location. Advice Note: • *All Management Plans are required to adhere to the requirements of Condition 6.0.*
12.4	a. The Consent Holder must engage a suitability qualified and experienced acoustic consultant to undertake compliance noise monitoring within 30 days of mining or processing operations occurring and thereafter at 3 monthly intervals for the first 12 months of the mining operation. Thereafter, compliance noise monitoring must be undertaken on an annual basis. b. All noise monitoring must be submitted to the Consent Authority within two weeks of completion of each monitoring event. c. If compliance with Condition 13.1 is not achieved, the Consent Holder must: i. investigate the reasons for non-compliance and within 20 working days implement additional mitigation measures to achieve compliance with those noise limits. ii. submit a report to the Consent Authority within 30 working days of the relevant monitoring event detailing the additional mitigation measures that were implemented. d. If additional mitigation measures are implemented, the Consent Holder must engage a suitability qualified and experienced acoustic consultant to undertake further compliance noise monitoring within 10 working days of any mitigation measure being implemented to determine the effectiveness of that mitigation.

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	e. If compliance with Condition 13.1 is still not achieved the Consent Holder must repeat the requirements of c. and d. until compliance is achieved.
12.5	Mining operations must utilise the best practicable option to minimise noise at all times. This includes: a. Replacement of worn machinery parts, maintenance of mufflers, lubrication of moving machinery to avoid squeaks and squeals, and appropriate operation of all equipment. b. Vehicles or equipment must not be fitted with tonal reversing alarms. c. Where reversing alarms are required, broadband reversing alarms must be used.
13.0 Avian Management	
13.1	a. Prior to and during each breeding season, the Consent Holder shall undertake regular surveys of all areas scheduled for mining to identify any bird breeding or nesting activity. Where surveys indicate that nesting is likely to occur, the Consent Holder shall implement appropriate deterrence measures, including walkovers, visual cues, audio bird scarers, and strategic placement of machinery, to discourage birds from establishing nests. Advice Note: • *Conditions relating to the Avian Management Plan are Conditions 13.7 – 13.9.*
13.2	Staff, contractors and visitors associated with the mining activity must not be permitted to bring dogs to the site at any time, except for conservation purposes.
13.3	a. The Consent Holder must deploy wildlife cameras at low spots and creek mouths along the coastal edge of the mine disturbance area as required to monitor for Kororā at locations likely to experience activity as determined by a suitably qualified ecologist and set to record for at least 10 nights every month. b. The cameras must be equipped with motion sensors and be installed by a suitably qualified ecologist. c. Imagery must be reviewed for wildlife interactions at least weekly by a suitably qualified ecologist, retained for a minimum of 6 months, and be made available to the Consent Authority or the Department of Conservation on request.
13.4	a. Any interactions with wildlife recorded as a result of the monitoring requirements in the Avian Management Plan including the wildlife cameras required by Condition 13.3, must be reported to the Consent Authority and the Department of Conservation on a weekly basis from 1 November to 31 January each year, and on a monthly basis from 1 February to 31 October. b. Footage must be made available to the Department of Conservation and the consenting authority as set out in Condition 13.3.
13.5	a. The Consent Holder must engage a suitably qualified expert to carry out annual penguin surveys of Pakiroa beach and the mine area using a certified conservation dog within 500m of the mining disturbance area to detect the presence of Kororā.

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	b. The first survey must be conducted within the first 12 months of the commencement date of the resource consent, and at least two annual surveys must be completed before mining commences. c. If penguins or burrows are detected the location must be mapped and the Consent Holder must undertake the following management actions: i. If penguins are detected using the mining area to access other habitats, any existing access ways must be maintained and/or works affecting that accessway must be completed in the period April – June (outside the breeding and moult period). ii. Any potential penguin burrows identified must be investigated, including use of a burrowscope, to determine whether Kororā are using them. iii. Where any penguin burrows are compromised by mining (i.e. there are direct effects), replacement artificial burrows or nest boxes must be installed at a rate of 2:1. Any additional nest boxes provided must be located within the vegetated coastal foreshore habitat associated with any identified accessways. iv. If penguins are found within the application site, a specific Penguin Management Plan must be developed by a suitably qualified and experienced ecologist on behalf of the applicant in consultation with the West Coast Penguin Trust. The West Coast Penguin Trust must be reimbursed for reasonable time and expenses associated with consultation on the Penguin Management Plan. v. Any deceased penguins found on or near the mine site must be provided to the Department of Conservation for necropsy. ***Advice Note:*** • *If a certified conservation dog is unavailable or unable to complete the survey, human surveys and increased camera monitoring will be undertaken in accordance with the advice of a suitably qualified ecologist.*
13.6	a. The Consent Holder must erect and maintain a moveable penguin fence around the perimeter of the mining areas identified in the current Annual Work Plan to deter Kororā from entering hazardous areas. b. The penguin fence must be comprised of geosynthetic mesh to a height of at least 900mm above ground and buried at least 300mm below the ground and with posts no greater than 4m apart. c. The fence installation must be certified by a suitably qualified ecologist as preventing the ingress of Korora to the active mine disturbance area. d. The certification must be supplied to the Consent Authority prior to mining commencing. e. Upon completion of all mining activities and associated site rehabilitation, all penguin fencing must be removed. Advice Note: • *The requirement to erect a penguin fence only applies if Kororā are detected within 500m proximity of the active mining disturbance area. If no Kororā are detected within 500m of the active mine disturbance area a penguin fence is deemed unnecessary.*

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13.7	The Consent Holder must conduct activities on site in general accordance with an Avian Management Plan (AMP) prepared by a suitably qualified ecologist or ornithologist. The objectives of the AMP are: a. To ensure adverse effects on the threatened and at risk birds present in the vicinity of the site and any other threatened and at risk species detected by subsequent monitoring are avoided. b. To ensure significant adverse effects on important bird habitats adjoining the mining site and the coastal margin are avoided. c. To ensure safe ongoing use of the site and its environs by the birds which currently occur in the area. Advice Note: • *All Management Plans are required to adhere to the requirements of Condition 6.0.* • *Threatened or at-risk bird species refers to the Conservation Status according to the Department of Conservation's Threatened Classification System.*
13.8	The AMP must detail: a. A description of the site and surrounding avian habitats b. A description of the threatened and at risk indigenous birds likely to be present in these habitats and which species require specific mitigation measures c. A description of the mitigation measures that are required to be implemented to avoid effects on threatened and at risk indigenous birds . d. A procedure for managing and responding to Westland Petrel or other wildlife being found on the mine site; e. Details of the penguin fence described in condition 13.6. f. A description of the monitoring requirements to assess the effectiveness of the AMP.
13.9	The AMP must be reviewed annually by the Consent Holder. Any proposed amendments to the AMP must be submitted to Council for certification and must: a. Achieve the AMP's objectives including avoiding effects on any threatened or at-risk indigenous bird species; b. Comply with the conditions of this resource consent; c. Have been reviewed by an appropriately qualified and experienced ecologist or ornithologist; d. Have been provided in advance to Te Rūnanga o Ngāti Waewae and the Buller/Kawatiri (for Tāiko) and the Greymouth (for other wildlife) office of the Department of Conservation for comment (and feedback received collated and submitted with the amendments to be provided to Council); and

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	e. Follow the certification process set out in Condition 6.1. Advice Note: • *Any disturbance or relocation of avifauna may require a permit from the Department of Conservation under the Wildlife Act (1953).*
13.10	a. The Consent Holder must engage a suitably qualified expert(s) to undertake all monitoring of avian species from the commencement of consent until at least one year following the cessation of mining activities on this site. b. The monitoring must be carried out in accordance with the monitoring requirements in the AMP.
13.11	An annual bird management report must be provided to the Consent Authority, Te Rūnanga o Ngāti Waewae, the Buller/Kawatiri and Greymouth offices of the Department of Conservation in Westport, the West Coast Penguin Trust, Paparoa Wildlife Trust, the Community Liaison Group and Waka Kotahi NZ Transport Agency Environment and Sustainability Team (via: environment@nzta.govt.nz), no later than 30 June each year. The report must include the following matters: a. The timing and duration of any mining within 100m of the proposed SNA Site PUN-049; b. Results of seasonal bird surveys at the site; c. Timing of nest detection surveys and observations relating to nesting or other behaviours observed within the area to be mined; d. Efforts to deter any attempts at nesting within the area to be mined and the outcome of those efforts; e. Species attempting to nest within the area to be mined (including threatened and at risk species); f. Date of first nesting attempts (if any) for threatened and at risk species within the area to be mined; g. Number and location of nesting attempts by threatened and at risk species within the area to be mined; h. Outcome of individual nesting attempts by threatened and at risk species within the area to be mined; i. Results of annual kororā surveys on Pakiroa Beach, the implications for mine operations and any management actions undertaken; j. Number, dates and location of any mining operation vehicle strikes or near misses involving the Westland Petrel or Korora; k. Autopsy outcomes for any dead Westland Petrel or Kororā collected; l. The findings of any lighting audits undertaken during the year and steps taken to resolve any issues identified;

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	m. A summary of any revisions made to the AMP and the reasons for the changes; n. The date and duration of any operational shut-downs; and o. The results of the quarterly walk-through surveys of birds using the lagoon area.
14.0 Lizard Management	
14.1	The Consent Holder must conduct activities on site in general accordance with a Lizard Management Plan (LMP) prepared by a suitably qualified ecologist. The objective of the LMP is to avoid, remedy or mitigate adverse effects on indigenous lizards present within the project area.
14.2	The LMP must include (but is not limited to): a. Survey of lizard species and habitats within the site; b. Methods for lizard capture, salvage, and relocation; c. Identification of release sites and habitat enhancement measures; d. Timing of works to minimise impacts on lizards; e. Monitoring and reporting requirements; f. Contingency procedures if lizards are discovered during works.
14.3	Site works must not commence until the Consent Authority has certified the LMP.
15.0 Native Freshwater Fish Management	
15.1	The Consent Holder must conduct activities on site in general accordance with a Native Freshwater Fish Capture and Relocation Plan (NFFCRP) prepared by a suitably qualified freshwater ecologist. The objective of the NFFCRP is to avoid, remedy or mitigate adverse effects on native fish present within the project area.
15.2	This NFFCRP must detail how native fish will be salvaged and relocated prior to streamworks commencing and must include but not be limited to: a. Methodologies to capture fish within the impact streams and wetland habitats, or justification there is no habitat for native fish present at the time of earthworks; b. Fishing effort; c. Details of the relocation site; d. Storage and transport measures including prevention of predation and death during capture; e. Euthanasia methods for diseased or pest species,
15.3	Streamworks must not commence until the Consent Authority has certified the NFFCRP.

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16.0 Landscape Mitigation and Rehabilitation	
16.1	a. As soon as practicable following the commencement date of this consent, and prior to the commencement of mining, the Consent Holder must construct bunds and complete planting and fencing in accordance with the "Landscape Mitigation Package" prepared by Glasson Huxtable Landscape Architects dated February 2026, REV C (Schedule 2).
16.2	New bunds are to be constructed 3.0 metres high and 24 metres wide with an inward facing grassed slope and dense planting on the crest and outward facing slopes. While primarily required for noise mitigation, the bunds will also provide visual screening. Bunds are to be located: a. On the western boundary of Lot 2 DP2178. b. Near the bottom of Warren Road (with a separation at Granite Creek). c. On the northern side of Cargill Road at the eastern boundary. d. On the southern side of Cargill Road, alongside the western boundary of 114 Cargill Road. The above areas are illustrated within the "Landscape Mitigation Package" prepared by Glasson Huxtable Landscape Architects dated February 2026, REV C (Schedule 2).
16.4	Vegetation to be retained includes: a. The stand of Old Man Pines and the large cluster of vegetation near the consented WCP. b. Clusters of vegetation along the eastern application area boundary north of Cargill Road. c. The patch of vegetation adjacent to 101 Cargill Road. d. The stand of Old Man Pine and other riparian vegetation adjacent to Granite Creek. The above areas are illustrated within the "Landscape Mitigation Package" prepared by Glasson Huxtable Landscape Architects dated February 2026, REV C (Schedule 5).
16.5	Plant species selection, grades, spacing, densities and quantities, along with the planting methodology must adhere to the guidance provided in the Landscape Planting Plan to be prepared under condition 6.0.
16.6	The Consent Holder must source plants required for mitigation and rehabilitation planting from within the Punakaiki Ecological District or North Westland Ecological Region in order of preference. Where this is unable to be achieved, the Consent Holder must notify the Consent Authority and work with the Consent Authority and a suitably qualified Landscape Architect or Ecologist to determine an appropriate alternative plant source.
16.7	The wetland construction, Granite Creek riparian planting, and creek and drainage riparian planting must be undertaken and managed in accordance with the Landscape Mitigation Package" prepared by Glasson Huxtable Landscape Architects dated February 2026, REV C (Schedule 2) and the further details to be provided in the Landscape Management Plan and Rehabilitation Plan to be prepared under condition 6.0.
16.8	The Rehabilitation Management Plan must include:

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	a. A description of the site; b. A description of the riparian planting required by Conditions 16.5; c. A final wetland design that, when the planting required in Condition 16.6 achieves an area of at least 50ha with the following habitats: i. At least 5.2ha of shallow marsh with an average depth of 0.4m ii. At least 2.8ha of mid-depth water with an average depth of 1m iii. At least 5.3ha of deep open water with an average depth of 2m iv. At least 15.3ha of flaxland and dry edge vegetation v. At least 5.3ha of Carex Rushlands vi. At least 15.6ha of Raupo vii. At least 4.1ha of raised islands d. Wetland construction methodology, including details of the pre-mining and post-mining areas of the constructed wetland; e. Site preparation requirements for the wetland and riparian planting; f. Planting methodology for planting and establishment of the wetland and riparian areas; g. Monitoring and maintenance requirements to ensure the survival and ecological functioning of the constructed wetland, including pest and weed control; h. A timeline for the planting which aligns with conditions 16.1 to 16.7.
16.9	The Landscape Management Plan must include: a. Detailed planting areas (m2 amounts) for areas such as bunds and screening planting not covered by the Rehabilitation Plan. b. Plant species (common name and botanical name), grades, spacing/densities and quantities. c. Planting specifications (with a particular focus on planting methodology and maintenance). d. Staging of planting (pre-mining, during mining and post mining). e. Typical planting and fencing details.
16.10	Each plant shall be of nursey stock and be of good form that is true to species. Plants shall be healthy, vigorous and free of disease, injury, parasites or insects and not root bound.
16.11	All new planting areas required by this consent including wetlands and riparian areas shall be fenced off with stock proof post and wire fencing immediately following planting.
16.12	All planting must be maintained for the duration of the consent. Maintenance includes weeding, spraying, staking, watering, fertilising, trimming, pest removal and plant replacement. The aim is to have plants which are vigorous and thriving, thereby providing effective screening and rehabilitation.
16.13	Any plants that are dead, diseased, fail to thrive or are damaged must be replaced with the same or similar plant species within the following planting season.

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16.14	The existing mature flax and raupo located within the site will be utilised where possible for direct vegetation transfer associated with the constructed wetland.
17.0 Lighting	
17.1	Fixed lighting must not exceed 2.0 lux spill (horizontal and vertical) of light onto any adjoining property, measured at any point more than 2m inside the boundary of the adjoining property or the closest window on the adjoining property whichever is the closest.
17.2	Lighting must be designed in a manner which adheres to the Australian Government's National Light Pollution Guidelines for Wildlife January 2023 (or subsequent revision); including but not limited to: a. All fixed lighting must be directed downward, shielded to avoid light spill outside of permitted limits, operate primarily in the yellow orange spectrum, and be filtered to reduce blue and violet wavelengths; b. Lights must only illuminate the object or area intended; c. Fixed lights must be mounted as close to the ground as practicable while still achieving site lighting requirements; d. External lighting must be minimised on the seaward side of buildings to minimise light spill toward the coast; and e. External lighting must use the lowest intensity lighting possible, while ensuring compliance with workplace health and safety requirements.
18.0 Accidental Discovery Protocol	
18.1	Immediately following the discovery of material suspected to be a taonga, kōiwi or archaeological site the following steps shall be taken: a. All works on the site will cease immediately at that place and within 20m around the site. b. Immediate steps will be taken to secure the site to ensure the archaeological material is not further disturbed. c. The contractor/works supervisor/owner will notify the Rūnanga, Council and the Area Archaeologist of Heritage New Zealand. In the case of kōiwi (human remains), the New Zealand Police must be notified. d. The Rūnanga and Heritage New Zealand will jointly appoint/advise a qualified archaeologist who will confirm the nature of the accidentally discovered material. e. The contractor/works supervisor/owner will also consult the Rūnanga on any matters of tikanga (protocol) that are required in relation to the discovery and prior to the commencement of any investigation. f. If kōiwi (human remains) are uncovered, in addition to the steps above, the area must be treated with utmost discretion and respect, and the kōiwi dealt with according to both law and tikanga, as guided by the Rūnanga. Remains are not to be moved until such time as Rūnanga, NZ Police and Heritage New Zealand have responded.

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	g. Works in the site shall not recommence until authorised by the Rūnanga, Heritage New Zealand (and the NZ Police in the case of kōiwi). h. All parties will work towards work recommencing in the shortest possible timeframe while ensuring that any archaeological sites discovered are protected until as much information as practicable is gained and a decision regarding their appropriate management is made, including obtaining an archaeological authority under the Heritage New Zealand Pouhere Taonga Act 2014 if necessary. Appropriate management may include recording or removal of archaeological material. i. Although bound to uphold the requirements of the Protected Objects Act 1975, the contractor/works supervisor/owner recognises the relationship between Ngāi Tahu whānui, including its Rūnanga, and any taonga (Māori artefacts) that may be discovered. Where Rūnanga so request, any information recorded as a result of the find such as a description of location and content, is to be provided for their records.
General Conditions to Apply to all West Coast Regional Council Consents	
20.0 Method of Mining	
20.1	The consent holder must only carry out mining activities within the mining area shown on the attached map titled "Tāiko Fast-track Application" prepared by Tai Poutini Professional Services Ltd dated [*insert date here*] attached as Schedule 1.
20.2	The maximum combined surface area of un-rehabilitated disturbed land in the application area must not exceed 16.0 hectares at any one time.
20.3	The mining and associated activities under this consent must not cause or induce erosion or slope instability outside the mining area (during operations), or the application area as part of final rehabilitation.
21.0 Erosion and Sediment Control Plan	
21.1	The Consent Holder must operate in general accordance with the Erosion and Sediment Control Plan labelled 'Barrytown Mineral Sand Operation Erosion and Sediment Control Plan and Water Management' (ESCP) prepared by Ridley Dunphy Environmental Ltd, dated [*insert date here*]. The objectives of the ESCP are: a. To use established guidelines and practices to minimise sedimentation of waterbodies adjacent to the mining area; b. To assist with compliance with the water quality parameters in Condition 24.
21.2	A Site Specific Erosion and Sediment Control Plan (SSESCP) must be prepared and reviewed annually and submitted to the Consent Authority with the Annual Work Programme, reflecting the water management measures proposed for construction and mining for the following 12 months, and adhering to principles of the Erosion and Sediment Control Plan in Condition 21.1 above. The SSESCP must include: a. Location of the work; b. Contour information; c. Erosion and Sediment Controls (ESCs);

	d. Chemical treatment requirements, design and details; e. Internal catchment boundaries; f. Details of earthworks and ESC construction methods; g. Contingency measures; h. ESC design details; i. A programme for managing non-stabilised areas; j. The identification staff who will manage ESCs; k. The identification of staff who monitor compliance with consent conditions; l. A chain of responsibility for managing erosion and sediment control issues; and m. Methods and procedures for decommissioning ESCs (if applicable).
22.0 Water Management Plan	
22.1	The Consent Holder must operate the mine in general accordance with a Water Management Plan (WMP) prepared by a suitably qualified hydrologist. The objectives of the Water Management Plan are: a. The rate of take of water from Canoe Creek gallery is not greater than 10% of Canoe Creek's MALF. b. The groundwater level in the mining void will not be manipulated to materially lower or raise pond water levels beyond 20% of baseline dredge pond water depth. c. Pumping of groundwater will be minimised by avoiding dewatering and associated water table lowering while excavating saturated material within the void down to the economic mineral grade limit or maximum reach depth of the dredge. d. Water pumped from the void will be conveyed to the WCP. Water will be ordinarily pumped back to the dredge pond tailings zone to achieve the hydrological effect management goals and the objective in ii above. e. The quality of any groundwater that could enter surface water or coastal water or Wasabi Springs will be monitored to confirm that it meets standards which are consistent with Hydrological effects goal III in 6.1 of the Water Management Plan. f. Detailed design information for the water management system shall be issued to WCRC for review and comment at least 16 weeks prior to the start of mining operations. Design information will include design drawings of the infiltration trenches and basin. g. The rate of take of water will be monitored in accordance with the Resource Management (Measurement and Reporting of Water Takes) Regulations and the pumping rate will be restricted to 63 L/s instantaneous rate, and 5,400 m^3/d or 62.5 L/s on a daily basis. The maximum rate of take is anticipated to be required for infrequent periods of up to 7 days. It is also anticipated that the long-term abstraction rate would be less at 9.5 L/s.

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	h. The rehabilitated mine area will provide for the establishment of a large wetland complex in the east of the former mining area. Advice Note: • *All Management Plans are required to adhere to the requirements of Condition 6.0.*
22.2	The WMP must include a description of the water management methods for the site, including: a. A description of the baseline monitoring and the receiving environment; b. The proposed mine disturbance area; c. A description of all site activities with the potential to cause hydrological impacts; d. The water management actions that will be implemented to avoid hydrological effects, including: i. The water treatment train, including settling infrastructure; ii. The return of limed water to the mining void; e. Operational water level and water quality monitoring requirements for the duration of the activity; f. Groundwater level thresholds and actions to be taken should these thresholds be exceeded; g. Surface water body flow threshold for Canoe Creek and actions to be taken should that threshold be exceeded; h. Actions to be taken if water quality thresholds are exceeded; i. Final Rehabilitation requirements to avoid adverse hydrological impacts on waterbodies post-mining; j. Audit checklists; k. An organisational chart showing staff and contractor positions and responsibilities for plan implementation; and l. Relevant training and induction procedures and schedules.
22.3	The WMP must be updated on an annual basis and must be submitted to the Consent Authority for certification in accordance with condition 6.0. The annual update is required to: a. reflect the proposed mining operations for the following 12 months; and b. provide any additional or amended monitoring and mitigation requirements in order to reduce the potential for adverse hydrological and/or water quality effects.
Conditions to Apply to WCRC Discharge Permit	

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23.0 Method of Discharge during mining activity

23.1

During mining, treated mine water is only permitted to be discharged directly to the mining void, and from the Mine Water Facility, if:

a. metal and metalloid water quality parameters in Table A below are complied with at the sites shown in Schedule 3; and
b. the non-metal water quality parameters in Table B below are complied with at the sites shown in Schedule 3 (as required by Condition 23.2) and the locations defined in Table B.

Table A - metals and metalloids

Parameter	Threshold mg/L	Dependency
Aluminium	0.62[B]	Hardness, pH, Dissolved Organic Carbon
Arsenic	0.013	As arsenic (V)
Boron	0.94	NA
Cadmium	0.0002[D]	Hardness
Chromium	0.0033[D]	Hardness, as chromium (III)
Copper	0.0039[E]	Hardness, pH, Dissolved Organic Carbon
Iron	1.0	As total fraction
Lead	0.0034[D]	Hardness
Manganese	1.9	NA
Nickel	0.011[D]	Hardness
Zinc	0.008[D]	Hardness

[A] dissolved fraction, unless stated

[B] at hardness = 25 g/m^3, pH = 7.0, Dissolved Organic Carbon = 1.0 g/m^3

[C] 95%-ile trigger value

[D] at hardness = 30 g/m^3

[E] at hardness = 25 g/m^3, pH = 7.0, Dissolved Organic Carbon = 2.0 g/m^3

Table B – Non-metals

Parameter	Threshold	Notes/Monitoring Location
Turbidity	20 NTU	Applies to discharges to Northern Creek, Central Creek, Granite Creek downstream, Unnamed Creek north of

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			Cargill Road, Wasabi Creek and Southern Creek, shown in Schedule 3.
	Visual clarity	Conspicuous visual change	In the receiving water bodies of Northern Creek, Central Creek, Granite Creek downstream, Unnamed Creek north of Cargill Road, Wasabi Creek and Southern Creek as shown in in Schedule 3.
		Relevant NPS-FM (2020) attribute state for visual clarity	No change in the attribute states of the receiving surface water bodies, as an annual median and a 95%-ile, versus the baseline states. See advice note b below. Monitoring locations are Northern Creek, Central Creek, Granite Creek downstream, Unnamed Creek north of Cargill Road, Wasabi Creek and Southern Creek shown in Schedule 3.
	Dissolved Reactive Phosphorus (DRP)	Relevant NPS-FM (2020) attribute state	No change in the attribute states of the receiving surface water bodies, as an annual median and a 95%-ile, versus the baseline states. See advice note b below. Monitoring locations are Northern Creek, Central Creek, Granite Creek downstream, Unnamed Creek north of Cargill Road, Wasabi Creek and Southern Creek shown in Schedule 3.

Advice Notes:

- *Water quality monitoring conditions to establish the ability to discharge under this condition are contained in Condition 24.0 below.*
- *The attribute state for visual clarity and DRP must be either*
  - *a) defined via at least 12 months of baseline monitoring in Northern Creek, Central Creek, Granite Creek downstream, Unnamed Creek north of Cargill Road, Wasabi Creek and Southern Creek; or*
  - *b) assumed to be of pristine water quality (A Band).*
- *In the case of a), the monitoring data and attribute state assessment must be submitted to WCRC for approval at least 4 weeks prior to the start of mining operations.*

23.2	The Consent Holder must ensure that discharges to surface and groundwater do not contain any contaminants other than suspended sediments, naturally occurring elements and metals, and water treatment chemicals in accordance with Conditions below: a. The use of any water treatment chemical(s) is/are permitted provided they are used in accordance with its Material Safety Data Sheet(s) (MSDS). b. The Consent Holder must notify the Consent Authority in writing and provide the respective MSDS of any water treatment chemical(s) used in accordance with the above condition before it is used.
23.3	The Consent Holder must take all practicable measures to prevent uncontaminated stormwater entering the mine workings and disturbed areas to reduce the volume of water

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	passing through the mining pond/settling pond system, and to improve the efficiency of the water reticulating system.
24.0 Water Monitoring	
24.1	The Consent Holder must carry out water monitoring at the locations shown in the ESCP and Water Management Plan, and as listed in the table below:

Location	**Parameter(s)**	**Frequency**
Canoe Creek @ State Highway 6	Flow	Hourly
Canoe Creek Gallery	Flow Level	Hourly 6 Hourly
Discharges to mining void @ Mine Water Facility near Wet Concentrator Plant	Flow	Continuous, Automated
Northern Creek	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others)
Central Creek (WCP)	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others)
Clarke Creek upstream	Monitoring Suite A* Visual clarity Flow	Quarterly (metals) Monthly (Others) Hourly
Little Granite Creek upstream	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others)
Granite Creek upstream	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others)
Granite Creek downstream of mining	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others) Hourly
Unnamed creek north of Cargill Road	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others)
Wasabi Creek	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others)
Wasabi Springs	Monitoring Suite A* Visual clarity Flow	Quarterly (metals) Monthly (Others) Hourly
Southern Creek	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others)

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	PZ 1	Water level and Monitoring Suite A*	6 hourly Quarterly (metals)
	PZ 2	Water level and Monitoring Suite A*	6 hourly Quarterly (metals)
	PZ 3	Water level and Monitoring Suite A*	6 Hourly Quarterly (metals)
	PZ 4	Water level and Monitoring Suite A*	6 Hourly Quarterly Metals

*Monitoring Suite A includes the following water quality indicators:

Dissolved metals	***Others***
Aluminium (Q)	EC (M)
Arsenic (Q)	pH (M)
Boron (Q)	Turbidity (M)
Cadmium (Q)	TSS (M)
Chromium (Q)	Hardness (Q)
Copper (Q)	Sulphate (Q)
Iron (Q)	Amm-N (M)
Nickel (Q)	NO_3-N (M)
Lead (Q)	Dissolved Reactive Phosphorus (M)
Manganese (Q)	
Zinc (Q)	

The Clarke Creek, Little Granite Creek and Granite Creek upstream observation locations must be upstream of the mining disturbance area.

Downstream monitoring sites will be located within the 50m buffer between MHWS and the mining disturbance area.

24.2	Notwithstanding Condition 24.1, all discharges associated with the mining operations authorised under these consents must not cause any of the following effects within any receiving waterbody measured at the downstream water quality monitoring sites in Condition 24.1: a. Any conspicuous oil or grease films, scums or foams, or floatable or suspended materials,

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	b. Any conspicuous change in the colour or visual clarity, c. Any emission of an objectionable odour, d. Any significant adverse effects on aquatic life, or e. The rendering of fresh water unsuitable for consumption by farm animals.
24.3	Sampling required under the conditions of this consent must be undertaken and analysed by suitably qualified personnel and the results supplied to the Consent Authority annually as part of the annual works programme.
24.4	An Annual Hydrological and Water Quality Report must be submitted to the Consent Authority with the Annual Work Programme in accordance with Condition 5.2 for review and evaluation of compliance. The report must be prepared by a suitably qualified and experienced person and include the following information: a. A summary of the monitoring undertaken over the preceding 12 months. The summary must: i. Reference the specific consent conditions under which the monitoring has been undertaken to show how the conditions have been complied with; ii. Provide tables of the water quality data collected in accordance with Condition 24.1. b. Discussion and evaluation of the monitoring data in relation to the relevant conditions including a summary of compliance with conditions; c. A summary of the actions that have been undertaken in response to any exceedance(s) of water quality limits; d. Records of the visual inspections that have been undertaken in accordance with Condition 24.1, 24.2 and condition 24.3.
24.5	a. The Consent Holder must engage a suitably qualified aquatic ecologist to carry out annual macroinvertebrate and fish surveys in Northern Creek, Central Creek, Clarke Creek, Granite Creek, Wasabi Creek and Southern Creek. b. The proposed survey methodology, including the locations where macroinvertebrate (taxa number and composition) and fish sampling will be undertaken, the timing of the sampling, the methods that will be used to undertake the sampling, the name of the authorised person who will undertake the monitoring and reporting methods must be submitted to the Consent Authority 20 working days prior to the survey being undertaken, for the Consent Authority to certify the survey methodology. Advice Note: • *If the Consent Authority refuses to certify the survey methodology, it is expected to give reasons in writing.* • *If the Consent Holder refuses certification the Consent Holder must resubmit the survey methodology for certification addressing any concerns of the Consent Authority.* • *Surveys must not be undertaken until certification is achieved.*

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	• *The results of the survey must be submitted to the Consent Authority within 10 working days of the results being received.* • *The surveys required by this condition are to inform baseline information about aquatic biota present within the waterbodies around the consent area and monitor long term trends in species diversity and prevalence.*
24.6	a. Macroinvertebrate monitoring required by Condition 24.5 must be conducted using Protocol P2 and C1 from the Ministry for the Environment Macroinvertebrate Guidelines and the samples must be analysed by an aquatic ecologist experienced in macroinvertebrate sampling and identification. b. Monitoring must be undertaken on a day on which there has been no major flood event in the preceding week. Whenever practicable, sites that have been sampled in the past must be used.
Conditions to Apply to West Coast Regional Council Air Discharge Permit	
25.0 Dust Management Plan	
25.1	The Consent Holder must operate the site in general accordance with a Dust Management Plan. The objective of the Dust Management Plan is to detail the best practicable option to avoid dust nuisance being caused by mining works and to mitigate any such effects should they occur.
25.2	The Dust Management Plan must include: a. Potential sources of dust that may be created during the mining project. b. Sensitive receptors in the vicinity of identified potential sources of dust for targeted dust management. c. Dust management and mitigation methods. d. Dust monitoring methods. e. Training of staff in relation to dust management; and f. Methods for managing complaints regarding discharges of dust g. Keeping of compliance records.
25.3	Vehicles travelling within the site on unsealed roads must not exceed 15 km/hr on site at all times.
25.4	If wind measured at the meteorological station on the Central Block site exceeds 20km/hr, the Consent Holder must: a. Limit activities that generate dust downwind of sensitive receptors identified in the Dust Management Plan; b. Conduct frequent visual inspections of exposed earthwork areas; and

	c. Assess the need for additional controls such as increased water application rates.
26.0 Air Quality Management and Monitoring	
26.1	There must be no offensive or objectionable discharge of dust into air from the minerals extraction, processing and loading operations that result in an adverse effect beyond the legal boundary of the site. Advice Note: • *For the purpose of Condition 28.1 the Consent Authority will consider an effect that is offensive or objectionable to have occurred if an Enforcement Officer of the Consent Authority deems it so having regard to:* *a. The frequency, intensity, duration, amount, effect and location of the suspended or particulate matter; and/or* *b. Receipt of complaints from neighbours or the public: or* *c. Relevant written advice or a report from an Environmental Health Officer of a territorial authority or health authority.*
26.2	a. The Consent Holder must install, operate and maintain [X] Dust Deposition Gauges in the locations shown in the Dust Management Plan. b. Dust recorded in the gauges must not exceed a value of 4g/m^2/30 days above background levels. c. Dust deposition gauges will operate as follows: i. Commissioned and run to collect 1 year of baseline data prior to mining commencing in respective block ii. Decommissioned 1 year after rehabilitation has been completed. iii. Gauges in the vicinity of Warren Road will be operational throughout the activity. Advice Note: • *Background levels are to be determined by data collected prior to the commencement date of this consent.*
26.3	a. If a breach of Condition 26.3.b is detected, the Consent Holder must notify the Consent Authority within two working days of the breach being detected. b. The Consent Holder must investigate possible reasons for the breach and take all necessary steps to achieve compliance in the following 30-day period.
Conditions to Apply to WCRC Water Take Permit	
27.0 Groundwater abstraction outcomes	
27.1	Mine void and water table exposure and associated mitigation measures must achieve the following outcomes: a. The hydrological responses to mining activity ensure that quality of water discharged to receiving waters will not cause adverse impacts on stream ecology or visual clarity; b. The pre-mining surface drainage patterns are restored such that the catchment areas for Clarke Creek, Granite Creek and other smaller creeks are not changed significantly;

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	c. The contouring and surface drainage installed during mine rehabilitation does not increase the rate of groundwater drainage at the site.
28.0 Diversions	
28.1	The consent holder must not commence any streamworks activity until it has obtained certification from the West Coast Regional Council for the Rehabilitation Management Plan. Advice Note: • *The Rehabilitation Management Plan is to include information on the finalised streamworks for the site. The Native Freshwater Fish Capture & Relocation Plan is to provide information on native fish relocation.*
28.2	The Rehabilitation Management Plan must include, but is not limited to, including the following streamworks information: a. Specific erosion and sediment control works for the streamworks; b. Details of construction methods (such as reclamation, diversion, channel clearance removal and construction of structures); c. Monitoring and maintenance requirements; d. Details relating to the management of exposed areas.
28.3	The Rehabilitation Management Plan must include, but is not limited to, including the following native fish relocation information: a. The timing, duration and methodologies used for fish capture and transportation; b. Specific measures for ensuring fish elsewhere in the catchment do not enter the works area; c. A description and assessment of the quantum and availability of suitable aquatic quality habitat at the relocation site; and d. The names, experience and qualifications (including any necessary permits) of those involved in undertaking the fish relocations.
28.4	The sediment and erosion controls at the site of the works must be inspected on a regular basis and within 24 hours of each rainstorm event that is likely to impair the function or performance of the erosion and sediment controls. A record must be maintained of the date, time and any maintenance undertaken in association with this condition which must be forwarded to the Consent Authority on request.
28.5	Creek and drainage construction and riparian planting must be undertaken onsite and in accordance with the approved Rehabilitation Management Plan to ensure: a. New creek and drainage channels will be constructed to: i. Ensure no loss of extent; ii. Have a meandering pattern; iii. Be formed to include run and pool habitat, and instream features including riffles and woody debris; iv. A mix of rocky and silt bottomed beds;

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	b. Riparian planting will be undertaken to: i. 5m for Granite Creek ii. Minimum of 3m for all other reconstructed creeks as shown in the Rehabilitation Management Plan; iii. Stock proof fencing erected on the outside of all riparian planting areas; iv. The Consent Holder shall ensure the on-going maintenance of any riparian planting for a period of no less than two years. This shall include on-going monitoring and eradication of woody weed species which may establish including blackberry and gorse.
28.6	a. Upon two years following permanent diversion of creek or drain flow to the new channel and completion of riparian planting, fish and macroinvertebrate surveys will be undertaken to confirm recolonisation. b. Where monitoring concludes recolonisation has not occurred, a Further Offset Works Plan shall be prepared and submitted to the Consent Authority within 2 months following the monitoring undertaken. c. The Consent Holder must implement any additional works required by the Further Offset Works Plan within 6 months following the approval by the Consent Authority or during the next planting season (whichever is appropriate to the measure adopted).
29.0 Canoe Creek water take	
29.1	The instantaneous surface water take from Canoe Creek must not exceed 63 litres per second.
29.2	The Consent Holder must undertake monitoring of the surface water take from Canoe Creek at 15 minute intervals and supply this information electronically to the Consent Authority every day, or at the interval instructed in writing by the Consent Authority. **Advice Note:** *The resource Management (Measurement and Reporting of Water Takes) Amendment Regulations 2020 applies to this water take.*
29.3	The Consent Holder must maintain auditable records and provide data in the format of date, time and rate that is suitable for electronic storage.
29.4	a. The Consent Holder must maintain the measurement device(s) in good working order so as to maintain a measurement accuracy of within ± 5% for a fully pressurised pipe or ± 10% for a partially pressurised pipe. b. The Consent Holder must provide the Consent Auhtority within initial written verification of accuracy from a suitably qualified person that the measurement device measures the volume of water to within ± 5% for a fully pressurised pipe or ± 10% for a partially pressurised pipe, and thereafter every five years for the term of the consent.
29.5	The Consent Holder must provide the following information to the Consent Authority no later than the ten working days prior to the water being taken under this consent: a. The type of measurement device(s) used to undertake the continuous monitoring together with the manufacturer's statement for that device; and b. The location of the measurement device(s) in relation to the water take point(s).

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29.6	Upon notice to the Consent Holder the Consent Authority may require the Consent Holder to cease water abstraction for a period not exceeding 48 hours, in order to undertake monitoring of natural water flows.
29.7	A fish screen on any direct surface water take must be maintained to ensure, as far as practicable, that eels, fish and fry are prevented from passing through the intake or being trapped against the screen.
29.8	The 12-year water take consent under WCRC-2023-0046 is to be offered for surrender upon commencement of this consent.

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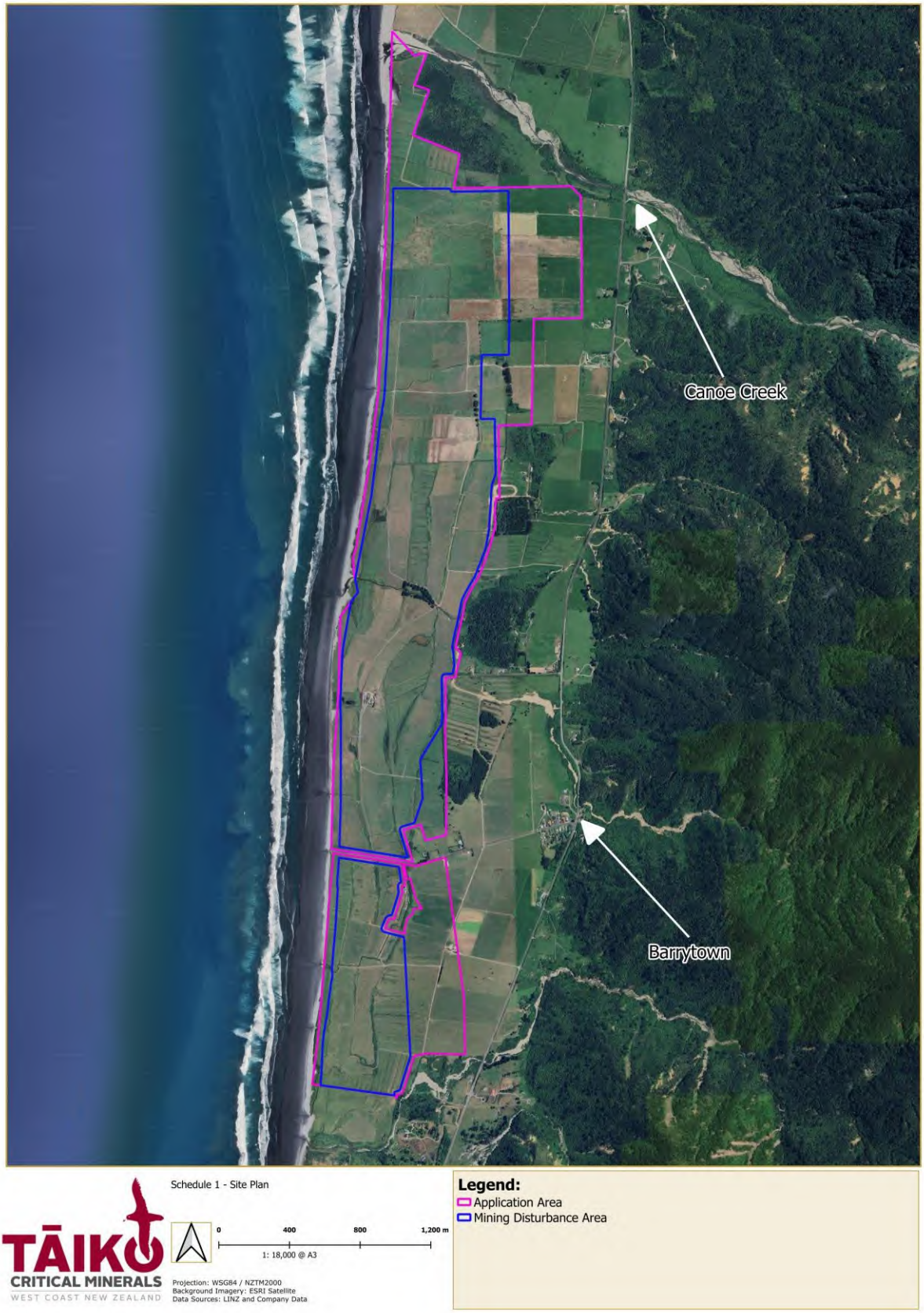
Schedule 1 – Site Plan



Schedule 2 – Landscape Mitigation Package

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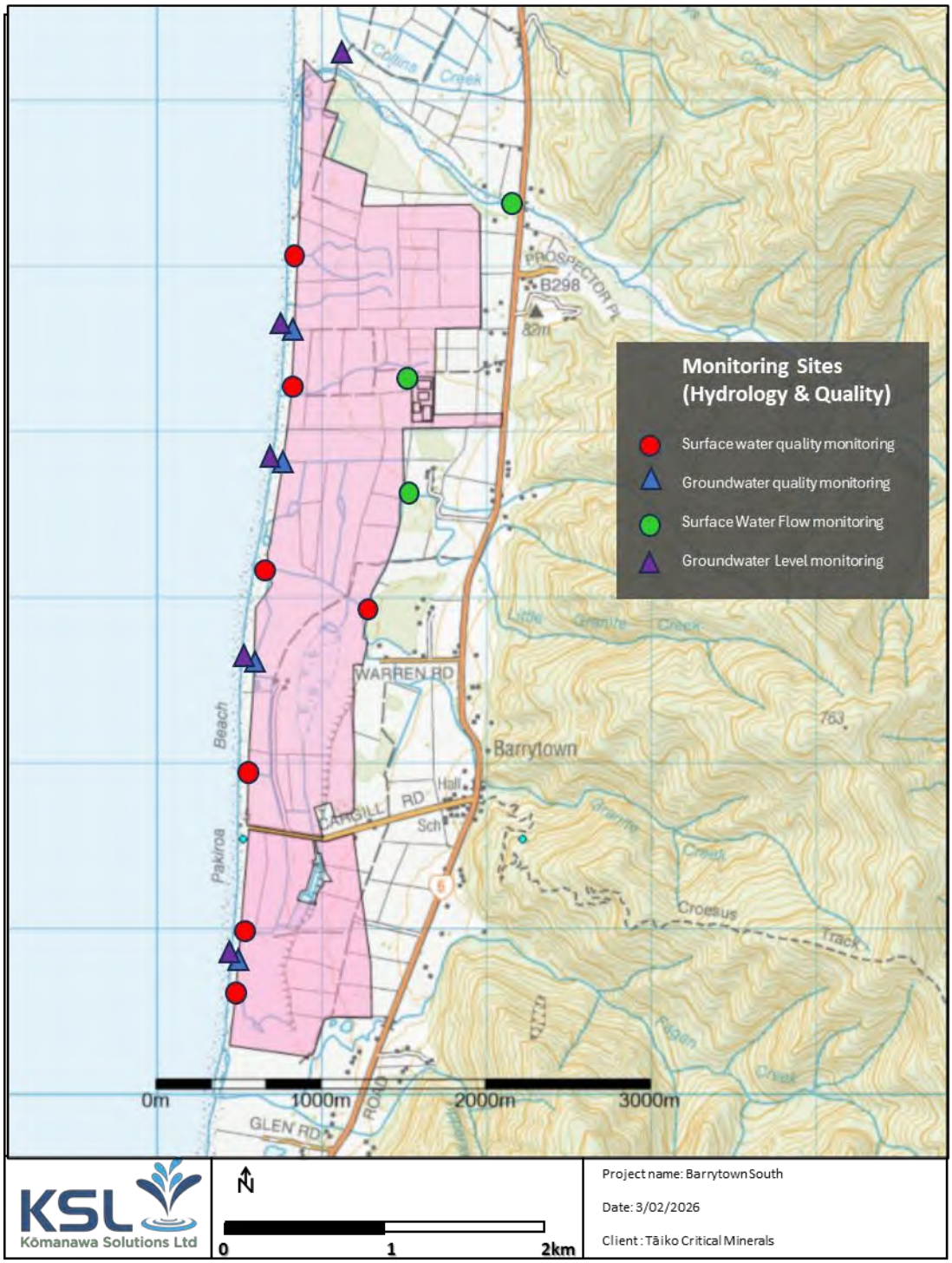
Schedule 3 – Monitoring Sites



Barrytown Critical Minerals Project
Southern Block
Proposed Conditions of Archaeological Authority

1.	The authority holder must ensure that all contractors working on the project are briefed by the s45 approved person , who may appoint a person to carry out the briefing on their behalf, prior to any works commencing on: a. The possibility of encountering archaeological evidence; b. How to identify possible archaeological sites during works; c. The archaeological work required by the conditions of this authority; and d. Contractors' responsibilities with regard to notification of the discovery of archaeological evidence to ensure that the authority conditions are complied with.
2.	Prior to the start of any on-site archaeological work, the authority holder must ensure that Heritage New Zealand Pouhere Taonga is advised of the date when work will begin. This advice must be provided at least 2 working days before work starts. The authority holder must also ensure that Heritage New Zealand Pouhere Taonga is advised of the completion of the on-site archaeological work, within 5 working days of completion.
3.	Any earthworks that may affect any High Archaeological Potential sites (attached as Figure 8-1) must be monitored by the s45-approved person who may appoint a person to carry out the monitoring on their behalf. Topsoil stripping of these sites must be undertaken by a hydraulic excavator and occur over consecutive days at the beginning of each stage of works and prior to any other earthworks in this stage.Any archaeological evidence encountered during the exercise of this authority must be investigated, recorded and analysed in accordance with current archaeological practice.
4.	Immediately following the discovery of material suspected to be a taonga, kōiwi or archaeological site the following steps shall be taken: a. All works on the site will cease immediately at that place and within 20m around the site; b. Immediate steps will be taken to secure the site to ensure the archaeological material is not further disturbed; c. The contractor/works supervisor/owner will notify the Rūnanga, Council and the Area Archaeologist of Heritage New Zealand. In the case of kōiwi (human remains), the New Zealand Police must be notified;

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	d. The Rūnanga and Heritage New Zealand will jointly appoint/advise a qualified archaeologist who will confirm the nature of the accidentally discovered material; e. The contractor/works supervisor/owner will also consult the Rūnanga on any matters of tikanga (protocol) that are required in relation to the discovery and prior to the commencement of any investigation and enable access to Rūnanga in accordance with any site safety requirements; f. If kōiwi (human remains) are uncovered, in addition to the steps above, the area must be treated with utmost discretion and respect, and the kōiwi dealt with according to both law and tikanga, as guided by the Rūnanga. Remains are not to be moved until such time as Rūnanga, NZ Police and Heritage New Zealand have responded; g. Works in the site shall not recommence until authorised by the Rūnanga, Heritage New Zealand (and the NZ Police in the case of kōiwi) and any other authority with statutory responsibility, to ensure that all statutory and cultural requirements have been met; h. All parties will work towards recommencing activities in the shortest possible timeframe while ensuring that any archaeological sites discovered are protected until a decision is made on whether the archaeological material is to be recorded and/or removed.
5.	Any taonga tūturu are prima facie the property of the Crown who will be notified of the find. Taonga tūturu will be registered with the Ministry for Culture and Heritage. Heritage New Zealand, in collaboration with manawhenua, shall notify the Ministry of Culture and Heritage and establish the most appropriate temporary storage, management and care for taonga tūturu, until such time as traditional or actual ownership is determined, with an appropriate institution or kaitiaki.
6.	Although bound to uphold the requirements of the Protected Objects Act 1975, the contractor/works supervisor/owner recognises the relationship between Ngāi Tahu whānui, including its Rūnanga, and any taonga (Māori artefacts) that may be discovered. Where Rūnanga so request, any information recorded as a result of the find such as a description of location and content, is to be provided for their records.
7.	That within 20 working days of the completion of the on-site archaeological work associated with this authority, the authority holder shall ensure that site record forms are updated or submitted to the NZAA Site Recording Scheme.

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8.	That within 12 months of the completion of the on-site archaeological work, the authority holder shall ensure that a final report, completed following the Archaeological Report Guideline (AGS12 2023), is submitted to the Heritage New Zealand Pouhere Taonga Senior Archaeologist for inclusion in the Heritage New Zealand Pouhere Taonga Archaeological Reports Digital Library, to tangata whenua via Ngāti Waewae, the Grey District Museum, and the NZAA Central Filekeeper. a. One hard copy and one digital copy of the final report are to be sent to the Heritage New Zealand Pouhere Taonga Senior Archaeologist. b. Digital copies of the final report must also be sent to to tangata whenua via Ngāti Waewae, the Grey District Museum, and the NZAA Central Filekeeper.
9.	Protection of sites / features: As a first principle, every practical effort must be made to avoid damage to any heritage site, whether known, or discovered during any redevelopment of the site, including: a. Drystone structure under Cargills Road - To avoid damaging the structure the Cargill Road bund should not be built up against this structure. The use of heavy machinery should by limited or monitored in proximity to the structure, to limit the potential damage from vibrations.

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Letter to Grey District Council

TĀIKO CRITICAL MINERALS
WEST COAST NEW ZEALAND

Mining with the environment
Working with the community
A world class, high grade critical minerals deposit

4 March 2026

Joanne Soderlund
Chief Executive
Grey District Council

By email: joanne.soderlund@greydc.govt.nz

Dear Joanne

Tāiko Critical Minerals Limited – Barrytown Minerals Project – Fast-track Approvals Act 2024 application

1. As you are aware, Tāiko Critical Minerals Limited (**TCM**) is the authorised person with respect to the Barrytown Minerals Project (**Project**), which is a Schedule 2 listed project in the Fast Track Approvals Act 2024 (**FTAA**).

2. We are writing to Grey District Council (**Council**) in its capacity as a relevant local authority in terms of Section 11 of the FTAA to confirm that TCM will be applying for all approvals necessary under the FTAA to mine the Southern Block of the Barrytown Minerals Project.

Consultation

3. The Fast Track Approvals Amendment Act 2025 will replace consultation requirements with the requirement to notify relevant local authorities on 31 March 2026. As TCM commenced consultation with the Council prior to that date, it is required to finish consultation with the Council and is not required to notify the Council under the new provisions (see FTAA, Schedule 1, clause 10).

4. By way of summary, the Project is to undertake mineral sand mining to obtain ilmenite, garnet and other minerals across an area of the Barrytown Flats, in the Grey District. Resource consent has already been granted to TCM to for initial stages of the Project, including to undertake mineral sands mining to the north of the Project site (on the Central Block), establish and operate a Mineral Separation Plant (MSP) at Rapahoe (including transportation from Barrytown Flats to the MSP) and to establish and operate a Wet Concentrator Plant for processing on site.

5. The application will seek all approvals for mining and related activities within the Southern Block including (but not limited to):

   (a) the extraction of sand using a floating dredge over approximately 280 hectares;

   (b) remediation, rehabilitation and closure activities, including the establishment of a constructed wetland and reshaping of contours over 408 hectares.

6. Mining of the Southern Block is likely to take place over approximately 14 years followed by rehabilitation of the site, including construction of the wetland.

7. A project description, proposed conditions and a draft landscape and mitigation package are attached at **Appendices A to C**. These have been developed based on expert advice, consultation to date and the previous publicly notified resource consent process for the Central Block. TCM will adjust and update the draft conditions with feedback received through further consultation and further expert review and advice.

8. Approvals sought include:

   (a) Land use consents, water permits, and discharge permits related to mining and processing activities normally required under the Resource Management Act 1991;

   (b) Approvals normally required under the Wildlife Act 1953 for handling, salvage (including incidental killings) and relocation activities; and

   (c) Approvals normally required for under the Heritage New Zealand Pouhere Taonga Act 2014 to modify or destroy recorded and unrecorded archaeological sites.

9. To assist with the design and assessment of actual and potential environmental effects associated with the Project, TCM has engaged a range of technical experts to assess effects in relation to landscape, transport, hydrology, water quality, ecology (freshwater and terrestrial), erosion and sediment control, noise, archaeology, coastal hazards, metallurgy and economics. The experts TCM has engaged have extensive experience in this area, including in recent resource consent processes in the region.

10. During the publicly notified resource consent process for the Central Block, TCM listened to expert advice, matters raised during the consultation and submissions process and in appeals (which were resolved by consent order). It made key changes to the proposal where it was feasible to do so to address issues raised. This included offering conditions that restricted the truck movements during pick up and drop off times at Barrytown School, lighting restrictions, removing the option to truck material to the North, driving safety conditions and other operational changes.

11. TCM has undertaken extensive consultation with your team that has included several in person meetings, site visits, sharing of information as well as keeping you and the Grey District Mayor informed of the project at a high level. In addition, TCM has undertaken:

    (a) extensive consultation with Te Rūnanga o Ngāti Waewae during the development of the project;

    (b) community engagement via drop-in sessions at the Barrytown Hall on 16/17 July 2025;

    (c) one on one engagement with individual property owners; and

    (d) consultation with the Barrytown School, which has seen the school develop a future focussed plan that the company is supporting moving forward.

12. This engagement on the back of years of consultation in relation to the Project as a whole has led to the development of the comprehensive application TCM has compiled.

Section 30 notice

13. Section 30(3) requires the Council to confirm by written notice whether there are any existing resource consents to which section 124C(1)(c) or 165ZI of the Resource Management Act 1991 (RMA) would apply if the approval were to be applied for as a resource consent under the RMA. The Council has previously provided a notice (dated 8 April 2025) that there are no such existing resource consents, however that notice has now expired pursuant to section 30(6)(b).

14. Tāiko therefore requests that the Council again provide notice under section 30(3). For your convenience, we attach a template at **Appendix D** (which reflects our understanding that there are no relevant existing resource consents) to facilitate issuing this notice.

15. We would be grateful if you could confirm that you have received this letter. If any further questions or matters arise that you would like to discuss, please do not hesitate to contact us. We would be grateful for your response by 27 March 2026. We are happy to make our experts available for any questions or further discussions you consider necessary.

16. We thank the Grey District Council for its meaningful contribution to date.

Yours sincerely

Mike Meehan

Project Director

E: mike.meehan@tigamm.co.nz

Ph: 021-289-8636

Appendix A

Project description

Barrytown Critical Minerals Project
Southern Block

Project description – draft for consultation
4 March 2026

1. Overview

1.1 This section sets out a detailed description of the Project to inform the applications made for approvals under Schedules 5, 7, and 8 of the FTAA.

1.2 Tāiko Critical Minerals (formally TiGa Minerals and Metals, the **Applicant**) holds various resource consents from the Grey District Council and the West Coast Regional Council authorising the extraction, processing, and transportation of mined material in the form of Heavy Mineral Concentrate (**HMC**) from the Central Block (**CB**) at Barrytown, as part of its critical minerals project on the Barrytown Flats. Minerals sought to be obtained through the process are ilmenite, garnet, zircon and gold.

1.3 The initial resource consent for mining, HMC production, transportation and associated ancillary activities was subject to a publicly notified process. Through this extensive process, all aspects of the company's operations were assessed against the relevant District and Regional Plans, the Resource Management Act 1991, and applicable national direction. This enabled full participation by interested parties and agencies and resulted in a robust set of consent conditions, which have informed the company's Fast-track application, including the substantive environmental data set the company has produced and which is ongoing.

1.4 Following the granting of the substantive resource consent for the CB (north of Canoe Creek), an additional resource consents have been granted for a Mineral Separation Plant (**MSP**) at Rapahoe. Consent for the establishment, operation and maintenance of a centralised Wet Concentrator Plant (**WCP**) adjacent to the Southern Block (**SB**), associated water management infrastructure (known as the Mine Water Facility (**MWF**)) and access road, is currently being processed by the Grey District Council. Consent for the earthworks component of this activity was granted by the West Coast Regional Council in February 2026. The MSP and WCP will process material from the CB and the SB.

1.5 In adopting this approach, the company has undertaken extensive consultation with the local community, mana whenua, Councils, and relevant agencies throughout these community-facing processes. This engagement has contributed to the development and acceptance of comprehensive consent conditions and management provisions. It has also enabled the assessment and approval of high interest matters, such as trucking activities on State Highway 6. As a result, the Fast-track application is focused on seeking all necessary approvals for the mining activity within the SB. **Plan A** shows the three resource blocks of the Barrytown Critical Minerals Project.

1.6 The SB comprises approximately 408ha on the Barrytown Flats as shown in **Plan B**. All land subject to this application is privately owned with access to the site approved by the respective landowners. Mining activity is proposed to occur on approximately 280ha of the total area, which is known as the 'mining disturbance area' and shown in **Plan B**. Earthworks will be undertaken on parts of the SB outside the mining disturbance area to assist with recontouring and rehabilitation.

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1.7 Mining on the SB will be undertaken using a floating dredge of modern design. Mining will be undertaken in three sections as follows (shown on **Plan C**), although only one section will be mined at a time:

(a) Section 1: Granite Creek North;

(b) Section 2: Granite Creek South;

(c) Section 3: Cargill Road.

1.8 Mining of the SB is expected to commence in approximately 2034 - 2035 once the mineral resource on the CB has been exhausted. The WCP and MWF will be used to process material from both the CB and SB.

1.9 Various measures are proposed for the avoidance, minimisation and mitigation of ecological (terrestrial and freshwater), landscape, visual, noise and dust-related effects. The Project also includes significant ecological and landscape enhancements in the form of an extensive wetland, realignment of creeks into natural patterns, riparian planting and stock exclusion fencing.

1.10 Mining of the SB is expected to take approximately 14 years (excluding preparation and rehabilitation), based on the extraction rate of 2,000,000 tonnes per year (producing 400,000 tonnes of HMC per year). This will extend the overall mining component of the Barrytown Minerals Project to approximately 30-35 years. Taking into account pre-mining construction works and post-mining final rehabilitation and mine closure works, it is anticipated that the Project will be completed between 2055 and 2060. Approvals are sought for 35 years to provide sufficient time for mining activity to occur over stages, final rehabilitation and operational factors to take place.

1.11 The anticipated work programme for the Project is as follows:

(a) Bunding and initial mitigation planting – 1 year (2027);

(b) Mining of the Central Block (consented) – 6 years (2029 – 2034);

(c) Mining Section 1: Granite Creek North (Stage 1) – 7 years (2035 - 2042);

(d) Mining Section 2: Granite Creek South (Stage 2) – 4 years (2043 – 2047);

(e) Mining Section 3: Cargill Road (Stage 3) – 3 years (2047 - 2050);

(f) Final rehabilitation – 3 years (2050 – 2053); and

(g) An operational contingency period of 6 years (2050 – 2056 followed by the final rehabilitation proposed in (f)).

2. Consents sought and relevant land parcels

2.1 All resource consents necessary are being sought, including for the following activities:

Consent type	Activity	Rule breaches
Grey District Plan		
Land use consents	Clearance of indigenous vegetation	Rule 19.7.5(vii): Clearance of indigenous vegetation exceeds

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		permitted activity volumes outside of an SNA
Decisions Version Te Tai o Poutini Plan Rules under appeal are noted with an * e.g. ECO-R1*		
Land use consent	Clearance of indigenous vegetation	ECO-R9*: the clearance of indigenous vegetation in the coastal environment and riparian margins will exceed the permitted activity volumes
	Earthworks within riparian margins	NC-R4*: because the earthworks will be undertaken across the mining disturbance area including creeks and their riparian margins
	Structures within riparian margins	NC-R5*: existing farm bridges will be replaced post mining which are not permitted under this plan
	Structures in the coastal environment	CE-14*: existing farm bridges will be replaced post mining which are not permitted under this plan
	Mineral extraction	GRUZ-R25*: do not comply with permitted activity rule due to volume of material to be extracted, mining to be undertaken within the riparian margins of creeks and wetlands, will disturb two historic heritage sites; undertaken within 250m of a sensitive activity on an adjoining site; and operate outside permitted hours.
West Coast Regional Land and Water Plan		
Land use consent	Earthworks within riparian margins; Earthworks in the non-erosion prone area outside riparian margins; Vegetation disturbance in riparian margins	Rule 16 WCRLWP: do not comply with permitted activity rule as earthworks will exceed permitted volumes and vegetation clearance will take place in riparian margins with creeks to be mined across the site
Land use consent	Activities within the bed of a river outside of a wetland identified in Schedule 1 or 2	Rule 35 WCRLWP: Creek beds will be reconstructed in the same or similar locations and represent meandering

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		pathways, and water will be drained during diversions
Water permit	To take and use water for the purpose of mineral sand processing	Rule 55 WCRLWP: the take and use of water from Canoe Creek to operate the Wet Concentrator Plant is a restricted discretionary activity
Water permit	To take and use ground water for the purpose of mineral sand mining and processing	Rule 56 WCRLWP: to take and use groundwater intercepted during mining to pump run-of-mine material to the Wet Concentrator Plant.
Land use consent	Diversion of water	Rule 58 WCRLWP: five creeks across the SB will require diversion which is a discretionary activity
Discharge permit	To discharge water to the mining void	Rule 71 (discharge to water and land) WCRLWP: to discharge water to the mining void is a discretionary activity due to the augmentation of lime
Regional Air Quality Plan		
Discharge permit	To discharge dust to air from stockpiling and handling gravel, sand and soil	Rule 16: consent being sought as precautionary measure to authorise unanticipated dust emissions
Freshwater NES		
	Vegetation clearance within, or within a 10m setback from, a natural inland wetland	Section 45D(1)
	Earthworks within, or within a 10m setback from, a natural inland wetland	Section 45D(2)
	Earthworks outside a 10m, but within a 100m setback, from a natural inland wetland that will result in partial or complete drainage of the wetland	Section 45D(3)
	Diversion of water within, or within a 100m setback from, a natural inland wetland	Section 42D(4)

	Discharge of water into water within, or within 100m setback from, a natural inland wetland	Section 45D(5)
	Reclamation of bed of rivers	Section 57

^For completeness it is noted that the mining activity relies on a number of permitted activity rules in the district and regional plans.
*Rule under appeal.

2.2 The application relates to the following land parcels:

Legal description
Section 4-6 Block V Waiwhero Survey District contained in Record of Title WS2D/1085
Section 7-8 Block V Waiwhero Survey District contained in Record of Title WS2D/855
Lot 1 DP 3548 and Rural Section 2927 contained in Record of Title WS8C/143
Part Section 2928 Block V Waiwhero Survey District and Defined on DP 764 contained in Record of Title WS1A/1166
Lot 1 DP 2719 and Lot 2 DP 339364 contained in Record of Title 161879
Section 2929 and Part Section 2634 – 2635 Block V Waiwhero Survey District and defined on DP 764 contained in Record of Title WS2A/228
Rural Section 2930 contained in Record of Title WS1B/293
Rural Section 2931,2932,2933,3316 and Part Rural Section 2639 contained in Record of Title WS8B/528
Section 4033 Block V Waiwhero Survey District contained in Record of Title WS1A/892
Part Section 5 Block IX Waiwhero Survey District contained in Record of Title WS2B/591
Lot 1 DP 406050 contained in Record of Title 486401.

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3. Initial works

3.1 Initial works on the site will be undertaken prior to the commencement of any mining. These include:
(a) Bunding, planting (associated with noise bunds) and fencing; and
(b) Establishment of the mine starter pit.

3.2 A mine starter pit is required in each of the three sections to establish the initial dredge pond in which the floating dredge will operate. Separate starter pits are necessary because the sections are divided by physical features that will not be disturbed i.e. Granite Creek separates Sections 1 and 2, and Cargill Road separates Sections 2 and 3. These starter pits enable the dredge to begin operations independently within each section.

3.3 The floating dredge will be transported to each mine starter pit using conventional mining equipment transport methods in order to avoid adverse effects on the surrounding environment. This approach is consistent with the methodology proposed for transporting the dredge to the Application area and for its initial assembly.

3.4 The mine starter pit will be developed by excavating into the water table. An area of approximately 100m wide x 300m long, and up to 10m deep will be excavated using an excavator and trucks, removing approximately 270,000m^3 of material. This size allows for:

(a) A dredge pond (mine void) of approximately 100m x 100m;
(b) A 100m x 50m area behind the dredge for the deposition of tailings following processing; and
(c) A 100m x 100m area in front of the dredge pond at various stages of excavation, ready to be mined.

3.5 The first mine starter pit will be located in Section 1: Granite Creek North. Material extracted from the starter pit will be used for the construction of the noise control bunds adjacent to Lot 2 DP2178 and another near Warren Road, located along the eastern boundary. Both bunds will be approximately 3m high with a 4.8m crest. The Warren Road bund will extend approximately 280m. Constructing the bunds at this early stage enables associated planting to be carried out in advance and allows time for vegetation to establish. The location of the starter pit is shown in **Plan D**. The construction of both the starter pit and the Section 1: Granite Creek North bunds are anticipated to take approximately two months.

3.6 A similar approach will be taken for Sections 2 and 3, with a mine starter pit excavated prior to the commencement of mining in each section. For Section 2, material excavated from the starter pit will be used to construct an 'L-shaped' noise control bund on the northern side of Cargill Road. For Section 3, material excavated from the starter pit will be used to construct a noise control bund along the southern side of Cargill Road near 101 Cargill Road. Both bunds will be approximately 3m high with a 4.8m crest.

3.7 The location of the noise bunds are shown in **Plan E**. Any excess material not required for bund construction will be stockpiled for future processing and rehabilitation.

4. Indicative mining sequence and setbacks

4.1 Following construction of the mine starter pit, the dredge will extract ore in strips. The indicative mining sequence, showing the anticipated pattern and extent of mining over time, is shown in **Plan D**. Mining will generally progress in a north/ south direction, although there will be some mining in an east/west direction where the dredge turns to commence a new strip. **Plan D** also shows the location of each mine starter pit.

4.2 The indicative mine path is influenced by both ore grade distribution and the long-term rehabilitation of the site. Commencing mining in areas with higher ore grades provides an earlier return on investment for the company. Mining from the western (coastal) side and progressing eastward allows previously mined areas to be progressively rehabilitated back to existing ground levels while maintaining natural drainage gradients towards the coast. Land on the western side of the site will be rehabilitated to existing ground levels.

4.3 As mining advances inland, ground levels will be progressively lowered contributing to the formation of a constructed wetland as part of the final landform across Sections 1 and 2

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(Stages 1 and 2). To achieve the post-mining contours across all three Sections (Stages), material will be sourced from areas outside the mining disturbance area but within the wider application boundary. Approximately 110 hectares within the application area provide a readily accessible source of fill material. These areas will be selectively cut and regraded, with suitable material transferred over short haul distances, typically within approximately 100m, using bulldozer "cut and carry" methods. This material will be progressively redistributed into backfilled mining areas to recontour the landform, achieve stable final ground levels and integrate rehabilitated areas with the surrounding landscape.

4.4 Each mining strip will be approximately 100m wide and excavated to a depth of 10m below ground level noting that the depth of mining is dependent on the ore distribution. The coloured strips on **Plan D** represent the expected extent of mining for each year. The total disturbed land area at any one time will be 16ha. Disturbed land means the land within the application area that has been directly affected by mining or associated activities, including areas subject to vegetation disturbance, topsoil stripping, excavation and active mining in the mining void, tailings deposition, overburden placement, bund construction or areas undergoing progressive rehabilitation prior to the re-establishment of stable landform and 80% vegetative cover.

4.5 The dredge is expected to progress at an average rate of approximately 2,200 metres per year or approximately 166 metres per month or 6 metres per day (based on 26 working days in a month). This rate will yield 2,000,000 tonnes of raw material per year and is subject to variation depending on the depth of the ore body, the average grade of the ore encountered and the need to ensure that the total disturbed area for mining is no more than 16ha. Weather conditions can impact progressive rehabilitation, i.e., influencing the rate of growth of vegetative cover (see Section 7 for progressive rehabilitation and vegetation cover).

4.6 It is proposed to set mining back from key environmental features and boundaries as follows:

(a) 20m from the consent boundary;
(b) 20m from Granite Creek;
(c) 20m from Fagan Creek;
(d) 50m from Mean High Water Springs (MHWS);
(e) 20m from the proposed SNA PUN-049, which is adjacent to Section 2 (Granite Creek South);
(f) 20m from all private property boundaries not within the consent area; and
(g) 200m from dwellings other than where noise bunds are proposed.

4.7 These setbacks are shown on **Plan F**.

5. Mining methodology

5.1 Once the mine starter pit has been constructed, the following steps will be undertaken to enable the extraction of ore:

(a) Removal of pasture, small areas of farm vegetation and wildlife checks;
(b) Stripping of topsoil and overburden;
(c) Diversion of streams and drains;
(d) Extraction of run of mine material;
(e) Initial screening of run of mine material and deposit of waste material;
(f) Pumping of run of mine material to WCP.

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5.2 This process is illustrated by **Figures 1** and **2** below and discussed in detail in the following sections.

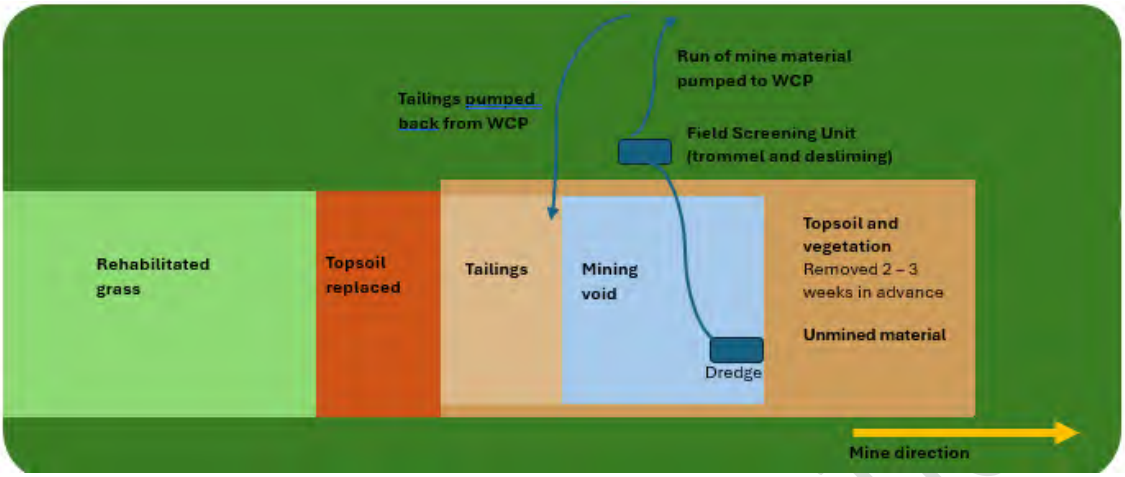

Figure 1: Schematic representation of the mining methodology in plan view

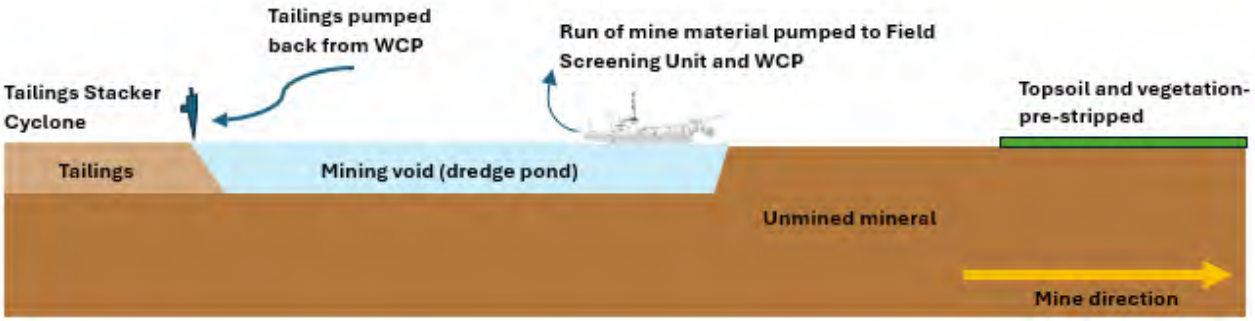

Figure 2: Schematic representation of the mining methodology in profile view

Archaeological Assessment

5.3 An archaeological assessment of the SB has been carried out. The SB was extensively dredged and modified in the 1930's and 1940's and then humped and hollowed for farming purposes. There are two recorded archaeological sites (find spots) within the mining disturbance area. The artefacts from both find spots have been removed and there is no evidence that further features or deposits relating to the site remain in situ. Earthworks on site will proceed under an archaeological authority.

Vegetation removal and wildlife checks

5.4 There are small areas of vegetation located around some creeks, drains and former dredge ponds, which will need to be removed at the same time as topsoil is removed (i.e., 2 – 3 weeks prior to mining). Some of that vegetation has been identified as potential habitat for lizards. In addition, open pasture can potentially be used by breeding birds. **Plan G** shows the waterbodies on site.

5.5 It is proposed to undertake regular surveys of areas scheduled for mining before and during the breeding season to identify any breeding behaviour in the area. Where those surveys identify that nesting is possible, birds will be discouraged from establishing nests through methods such as walkovers, visual cues, audible bird scarers and machinery placement. These actions will be undertaken more frequently and at a greater distance

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from the mining front than in traditional mining operations, reflecting the operational requirements and movement patterns of the floating dredge. Where monitoring identifies the presence of Kororā (little blue penguin), relocatable fencing will be erected around the active mining area (including stripped area, mining void, tailings deposition area and contoured land awaiting resowing) to prevent penguin access and minimise risk of harm.

5.6 Lizard monitoring will be undertaken by a suitably qualified ecologist prior to mining an area of potential lizard habitat. If lizards are confirmed to be present, it is proposed to capture and relocate the lizards to suitable habitat as close as practicable to the site, but outside the mining disturbance area.

5.7 Prior to the commencement of any stream diversion or streamworks activities, native freshwater fish present within affected watercourses or wetland habitats will be salvaged and relocated. Similar to any lizards found, salvaged fish will be relocated to suitable habitat as close as practicable to the site but outside the mining disturbance area.

5.8 Once wildlife (if any) has been appropriately managed, any vegetation useful for rehabilitation will be removed. Where it can be, vegetation will be transferred and used as part of the progressive rehabilitation in the planting around creek mouths, diverted creeks or the constructed wetland.

Topsoil and overburden stripping

5.9 Once vegetation has been removed, topsoil (to approximately 0.2 - 0.6m deep) and overburden will be removed 2 – 3 weeks prior to mining, using an 85-tonne excavator and 40 tonne articulated trucks. The area of topsoil and overburden stripping is shown in Figure 1 above.

5.10 Some of the removed material will be used to create small 1m high safety bunds (to prevent vehicles from driving into the mining void and provide stormwater control) along either side of the mining void. The mining void is the area comprising the dredge pond, the area behind the dredge pond for deposit of tailings after processing, and the area in front of the dredge pond from which run of mine material is being extracted. The remainder of the material will be used for rehabilitation. Initially, that material will be stockpiled for later use, but once mining commences fully, it will be trucked to the rear of the mining void to be used as part of the progressive rehabilitation. The safety bunds provide the separation between stormwater and mine water (mine water being water that is being discharged back into the mining void).

5.11 The total area stripped of topsoil and overburden in advance of mining will be approximately 100m x 100m.

Stream diversions/ removal of drains

5.1 Diversions to, and reconstruction of the existing creeks will be required to enable mining Drainage channels across the site will be diverted to enable mining, and will be reconstructed where required to maintain catchment drainage patterns.

5.12 The specific creeks requiring diversion are shown in **Plan G** and are:

(a) Northern Creek;
(b) Central Creek;
(c) Clarke Creek;
(d) Wasabi Creek; and

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(e) Southern Creek.

5.13 Productive farming practices have resulted in a network of drainage channels developed across the site. As mining progresses, these drains will be diverted to avoid the active mining area.

Little Granite Creek runs along the eastern boundary of the site before joining Granite Creek. These two creeks, Little Granite Creek and Granite Creek, will remain undisturbed and are not proposed to be diverted as part of the mining operation. Canoe Creek and Fagan Creek will also remain unaffected by the activity.

5.14 The diversion methodology differs for each creek or artificial drain depending on their orientation, sequence of mining activities and future purpose (in regards to artificial drains these may be retired or a new 'creek' constructed to manage drainage).

(a) North–south oriented creeks and drains will be diverted into a previously mined area before mining reaches the creek or drain (except where mining is adjacent to the coastal setback boundary). This may require adjustments (widening or narrowing) of the mine path to facilitate this. A permanent reconstructed channel will be built in advance as part of the rehabilitation of the mined land, and the flow will be redirected into it in a single 'livening' event. Refer **Figure 3** for further detail.

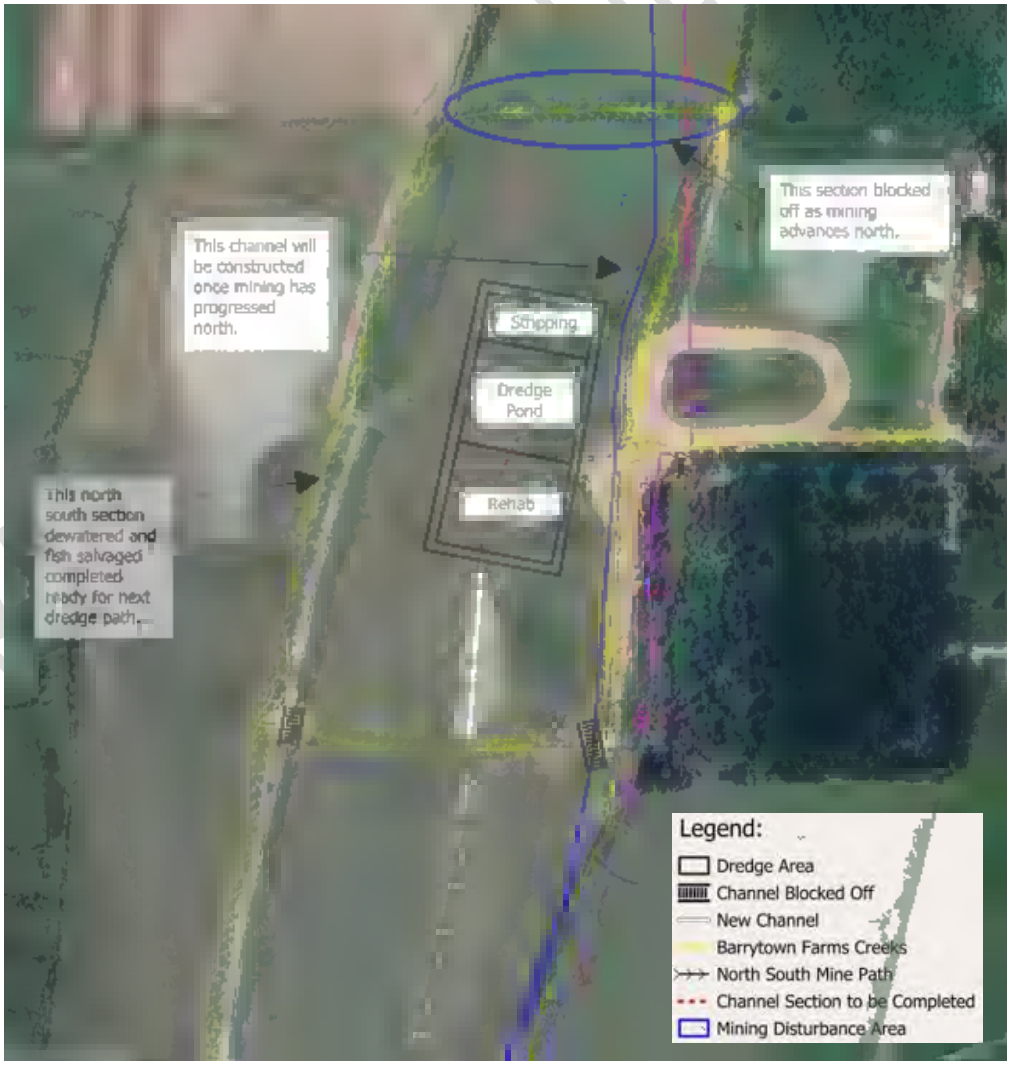

Figure 3: Diversion methodology for north south waterbodies

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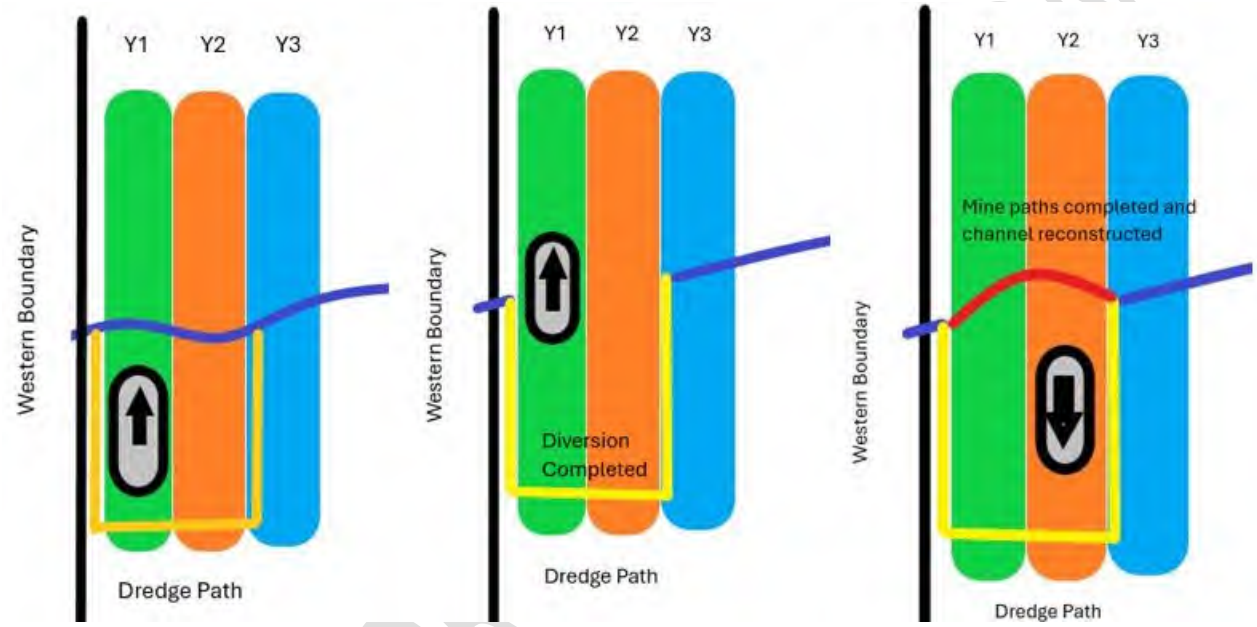
(b) East–west oriented creeks and drains will be diverted into previously mined areas (behind the mining void) and into the adjacent mine path (to the east as mining moves inland), prior to mining progressing through the creek or drain's existing alignment. This requires a temporary diversion of the creek or drain around the active mining area. Once mining has advanced beyond the alignment, a permanent reconstructed channel can be constructed and the creek, and where required drain, can be reinstated.

Creeks and drains will likely be disturbed several times, with temporary diversions occurring each time the active mining area intersects these waterbodies, potentially once per year for up to 3 months at a time per waterbody. Diverting the creek or drain around two sections of mine path at a time reduces the number of diversions required. Refer **Figure 4** for further detail.



As the dredge approaches the creek or drain, a temporary diversion (shown in yellow) is constructed behind the mining void.

The creek or drain is then diverted into this temporary channel, allowing the dredge to continue along its planned path.

Once the mining void has progressed beyond the proposed reconstructed alignment, the diversion is redirected into the newly rehabilitated channel (shown in red).

Figure 4: Diversion methodology for east west waterbodies

5.15 Fish relocation will be undertaken onsite as part of the diversion process as specified in 4.7.

5.16 The five creeks that will be diverted and mined are Northern Creek, Central Creek, Clarke Creek, Wasabi Creek and Southern Creek. Each of these creeks will be reinstated during progressive rehabilitation. **Table 1** identifies the creeks that are to be diverted, and their pre-mining and indicative post mining lengths. The diversion methodology to be applied has also been identified.

5.17 Some of the original artificial drainage channels may be reinstated, particularly if land contouring alone does not provide sufficient drainage. Creeks and drains will be connected to the constructed wetland area or re-established natural creek systems to support site hydrology and ecological function.

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Table 1: Creek extent pre and post mining

Creek	Length pre-mining (based on continually or intermittent flow extent)	Length post-mining (indicative but not less than the pre-ming length)	Diversion methodology to be applied
Northern Creek	1,088m	1,100m	East West
Central Creek	650m	700m	East West
Clarke Creek	680m	700m	North South
Wasabi Creek	727m	750m	North South / East West
Southern Creek	1,088m	1,100m	East West

Extraction of run of mine material

5.18 Following the removal of topsoil and overburden, the floating dredge can extract the run of mine material (**ROM**) from the newly stripped area from within the mine void without the use of other machinery.

5.19 The floating dredge will sit in a 1ha dredge pond, located in the mining void. The maximum depth of the mining void is 10m, which will maintain a natural water level approximating the ambient water table height. A picture of the type of floating dredge that will be used in the Project is shown in **Figure 5** below.

Figure 5: Floating dredge proposed to be used

5.20 The dredge has a suction cutter at the end of the dredge arm. The suction cutter will excavate the pit face by cutting into the bank and breaking down consolidated material. The loosened material will be drawn in through the suction head below water level, immediately mixed with water taken from the dredge pond to form a slurry and pumped to the field screening unit within the safety bund area.

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5.21 The dredge is capable of precise cutting and will cut slopes at approximately 1 vertical to 3 horizontal (1V:3H), which is consistent with industry standards for cutter suction dredging and provides for stable batters. The presence of water in the mining void provides sufficient pressure to ensure slope stability, as does the progressive tails deposition in the rear of the mining void. Safety bunds around the outside of the mining void will ensure that heavy machinery does not operate on the edge of the mining void, creating pressure on the slopes.

Initial screening of run of mine material and deposit of initial waste materials

5.22 The Field Screening Unit undertakes the initial screening of the ROM. Slurry passes through a trommel (a rotating cylindrical screen), which separates larger, coarser materials and debris (+2mm) from finer particles. Oversized material captured by the trommel is removed from the process stream to prevent damage or blockages in downstream equipment.

5.23 The slurry then enters the desliming circuit, which removes very fine silt and clay particles (referred to, when mixed with water, as "slimes"). By eliminating these particles, the desliming circuit improves the recovery of valuable heavy minerals and reduces the load on the WCP.

5.24 The large reject material from the trommel and the slimes will be returned to the rear of the mining void to be used in the progressive rehabilitation (see Section 7 for further discussion).

5.25 After screening and desliming, ROM is pumped as a slurry to the WCP for further processing.

6. Processing of run of mine material and transportation to market

6.1 Authorisations for further processing and transport are not being sought through this Fast-track application, as they have already been granted (or applications are being processed), as outlined in Sections 1.2 – 1.5. The resource consents and other permissions that have been obtained provide for a full mine to market process that results in finished product being exported to markets around the world. The following information is provided to explain the overall processing methodology and to place the proposed activities within the full operational context.

6.2 Following extraction, ROM will be processed in two stages. The first stage of processing will be undertaken on site at the WCP to extract Heavy Mineral Concentrate (HMC). The HMC will then be transported by truck to the MSP at Rapahoe to undergo the second stage of processing.

6.3 Consent for the MSP at Rapahoe was granted by the Grey District Council in October 2025.

6.4 Consent from the Grey District Council for the establishment, operation and maintenance of the WCP and access road is currently being processed and is expected to be granted prior to lodgment of this application. Consent for the earthworks component of this activity was granted by the West Coast Regional Council in February 2026.

Stage 1 processing - WCP

6.5 Mined ore will be pumped as a slurry from the mining void to the WCP, a fixed processing facility that receives material from mining activities across the resource area. At the WCP, valuable heavy minerals are separated from sand and silt using a water-based gravity

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separation process. This produces three material streams: HMC, middles and tails ('middles' and 'tails' are referred to generically as 'tailings' in this application).

6.6 Tailings are returned to the mining void as slurry, while clean water is managed and reused within the process. The HMC is dewatered to 10-15%, temporarily stored and transported off site by heavy vehicle for further processing at the MSP at Rapahoe.

Stage 2 processing - MSP

6.7 Processing at the MSP enables the extraction of concentrated garnet and ilmenite products.

6.8 The MSP has been strategically located at Rapahoe to ensure proximity to rail where product will be transported in containers to Lyttleton or Timaru Port for export to global markets. Waste material from the MSP (which has come from the SB) will be transported by heavy vehicle back to the WCP at the SB. That material will be deposited within a bunker at the WCP before it is pumped back to the mining void as a slurry to be used to backfill the mine pit for rehabilitation.

6.9 The MSP represents a critical component of the long-term viability and growth of the sand mining industry on the West Coast. The MSP provides significant value-add by enabling on-shore, and in-region, refinement of mineral products prior to export.

7. Management of processing water and stormwater

7.1 Water will be required for the processing of ROM at the WCP. Water used for processing, as well as stormwater captured on the WCP site, will be managed through a MWF located adjacent to the WCP.

7.2 The MWF will include lined treatment ponds and thickener tanks that enable sediment and fine particles to settle out of return water using biodegradable flocculants. Treated (clean) water will be recycled back into the processing system, while settled solids will be combined with tailings and returned to the mine pit as a slurry to support backfilling and rehabilitation.

7.3 The MWF is part of the ancillary infrastructure required to operate the WCP and will be authorised by the consent for the WCP.

Processing water

7.4 Processing water will be sourced from the existing water take location on the CB, unless further investigation identifies a practical alternative water source on the SB through future testing. Consent GDC-3154-23 / WCRC-2023-0046 authorises the abstraction of water for processing CB-mined material at the WCP for a 12 year duration. A new consent is being sought via this application to ensure the water take is available to the newly located WCP, and to support longer-term mining of the SB. It is proposed that the existing consent be surrendered as part of the grant of the new take. The approximate water take location on the CB is indicated on **Plan H**.

7.5 Water taken will be used to fill the ponds at the MWF, storing water for when it is required to be used for processing ROM at the WCP. The peak water take will occur when the WCP is restarted to process material from the SB or following maintenance or shutdowns. This is because the tanks and pipelines of the WCP must be filled with water prior to material being processed. During these periods, the full take of 63l/s will be required, likely over several days.

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7.6 Once processing is underway, water demand will significantly decrease. Water is recycled and reused throughout the plant, reducing the need for a continuous fresh supply. Only intermittent top-ups will be required to offset the water that remains in the HMC, and therefore lost from the site. It is estimated that approximately 10-15% of water drawn from the bore will be retained in HMC. This makes up the largest water loss within the system.

7.7 To compensate, make-up water will be drawn down at an average rate of 9.5l/s for the duration of processing. In practice, make-up water will be taken in short bursts of typically 15-20 minutes at a time, two to three times per day, at the peak rate of 63l/s.

7.8 Tailings will be mixed with water to form a slurry to be pumped back to the mine void. Tailings will be deposited at the rear of the pit by cyclone and the water will re-enter the mine void and rejoin the surrounding hydrological system.

7.9 The slurry circuit (the pumping of ROM to the WCP and tailings back to the mine void, all undertaken as a slurry) is considered to have a largely neutral effect on the water level in the mining void. The water that returns with the tailings help maintain, or even increase, water levels in the void, offsetting any lowering of the water table caused by the removal of the slurry from the mine void.

7.10 The MWF is designed to treat and temporarily hold process water before it is recycled for use in the WCP. After processing, excess water is treated via a thickener tank, which serves as the primary treatment stage. Fines and suspended sediment are separated from the water in the thickener tank. This water then flows into the forebay and ponds for further settling and storage. A flocculant may be added to enhance the settlement of fine particles. Fines and slimes collected in the thickener tank and forebay are pumped back to the mining void and mixed with coarse tailings for use in rehabilitation. Clean water is recycled back into the WCP for reuse in mineral separation processes or for transporting tailings as a slurry back to the mining void.

7.11 There is no discharge from the MWF treatment ponds to any surrounding water bodies. The only discharge is to the mining void.

7.12 If necessary to maintain capacity in the MWF excess water may be pumped back into the mining void to dissipate naturally.

7.13 It is possible that dissolved metals could be liberated and mobilised because of the mechanical processes of mineral separation and sand and slimes deposition during backfilling of the worked excavation. Lime augmentation (i.e. lime dosing) of tailings and slimes at the time of emplacement within the void, and the inclusion of lime boulders in creek reconstruction will mitigate these effects. Both groundwater and surface water quality and quantity monitoring will be undertaken across the site as set out in the Water Management, Monitoring and Mitigation Plan.

Stormwater

7.14 Stormwater captured within the mining disturbance area will be contained on site by the safety bunds constructed on either side of the mining void. It will either be allowed to infiltrate into the sandy subsoils, or directed to discharge into the mining void where there is sufficient capacity for the water to assimilate into the ground water.

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7.15 Stormwater generated in the WCP area, including runoff from roofs, hardstand areas, stockpiles, and processing surfaces, will be collected via a network of drains, bunds and sumps, and directed to the ponds at the MWF. To maintain operational capacity during high rainfall periods, treated stormwater may be pumped to the mining void to dissipate naturally.

8. Rehabilitation and mine closure

8.1 Rehabilitation of the SB will be undertaken in three stages:

(a) Mined land will be progressively rehabilitated as the mining void advances;

(b) Each section will be rehabilitated as it is completed and mining moves to the next section; and

(c) Final rehabilitation and mine closure will be undertaken once mining of the SB is fully completed.

Progressive rehabilitation of mining void

8.2 The total area of disturbed land is proposed to be limited to 16ha within the SB at any one time, for the purposes of mitigating potential effects relating to dust, landscape, visual and sedimentation/ water quality.

8.3 The 16ha limitation for the mining area means that the site will be progressively rehabilitated by filling the mining void with waste material as mining advances, replacing topsoil and re-grassing the mined area. The 16ha limitation is proposed to only apply to those disturbed areas with less than 80% vegetative cover and mined land will be removed from the disturbed area calculation once that level of vegetative cover has been reached. The disturbed area limits include contingency for any periods of slow growth that may occur (e.g. during winter or a cold wet spring).

8.4 Rehabilitation of the mining void will take place at the same time as mining occurs and is expected to be completed within 12 months of the conclusion of mining in that location. The waste material (known as "tailings") produced by the initial screening of raw material at the Field Screening Unit will be pumped back into the rear of the mining void immediately. Any tailings from the WCP will also be pumped back and deposited at the rear of the mining void. Waste material from the MSP that has been transported back to the SB will also be pumped from the WCP to the mining void and deposited with the tailings to assist with rehabilitating the landform.

8.5 The tailings will be deposited at the rear of the mining void using dewatering cyclones which assist in separating water from solids to create a more stable land surface suitable for rehabilitation. The water separated from the tailings as they are dispersed is discharged back into the mining void.

8.6 The material to be returned to the excavated area includes un-mineralised sand, clay slimes, and gravel and rock greater than 2mm. Tailings will be allowed to naturally beach (spread) out. The cyclone will be moved as required to distribute the tailings evenly across the area.

8.7 Tailings will then be levelled and contoured, as per a surveyed final landform design, with the use of excavators and bulldozers ready to receive the pre-stripped overburden and topsoil. This topsoil and overburden, as well as material from outside the mining disturbance area within the wider application area and the bunds as they are retired, will be spread out and used as a growing medium for rehabilitation of the site. Once overburden

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and topsoil are replaced, the land will be re-vegetated with grass and other vegetation that was removed prior to mining, where possible and appropriate.

8.8 Initial vegetative cover will be established as soon as practicable (potentially using hydroseeding) to minimise any erosion potential. This will be followed by the establishment of longer term, permanent pasture species.

Progressive rehabilitation of each section

8.9 As the mining of each section is completed, the section will be rehabilitated to its final landform which includes a proposed wetland of approximately 51.7ha on the eastern boundary of Sections 1 and 2, which will be constructed in stages (addressed in Section 7.17 below).

8.10 Approximately 5.6 million tonnes (equivalent to 2.6 million cubic metres at a bulk density of 2.2 g/cm^3) of HMC will be removed from the mining disturbance area over the life of the project for further processing and export., To achieve the proposed post-mining contours, material will be sourced from areas located outside the mining disturbance area, from the higher terrace, to be used as fill to reconstruct the final landform. When balanced against the available redistribution material, the final change in landform equates to an average reduction in land height of approximately 0.63m across the entire 408ha consent area.

8.11 The western boundary will be returned to its current ground level to minimise any effects from coastal hazards. Restoring this area to its natural elevation maintains the existing buffer between the active coastal environment and the inland mined area and future farmland. This helps to ensure that the rehabilitated land is not at increased risk from coastal hazards such as erosion or ponding from storm surge events.

8.12 The site is naturally wet and exhibits poor drainage, despite the presence of a humped and hollowed landform and an established network of creeks and drains throughout the area. Following mining activities, the site will be rehabilitated to improve drainage and soil conditions, enabling its return to more productive farmland use.

8.13 The final landform will be contoured to slope towards reestablished creeks to improve drainage and ensure the future productive use of the site. The five diverted creeks (Northern Creek, Central Creek, Clarke Creek, Wasabi Creek and Southern Creek – refer section 4.16 – 4.17) will be reconstructed along more natural, meandering paths, as opposed to their straight and rectified channels, to enhance ecological and hydrological values while maintaining current catchment drainage patterns. Post mining creek extent will ensure no loss of extent or value. Some existing drains may be reinstated if contouring alone is insufficient. Some modified humping and hollowing will be incorporated, though it is intended to be less pronounced than the existing humping and hollowing, and will include the raising of the low areas (hollows) above the water table to reduce sediment and nutrient runoff from future farming activity providing long-term ecological benefits and improved drainage across the site.

8.14 Fences, internal farm roads, bridges and culverts will be reinstated as required.

8.15 The anticipated final land contour is illustrated in **Plan I**.

8.16 A Work Programme will be submitted to the Grey District Council and West Coast Regional Council annually, which will specify rehabilitation works to be undertaken in each 12-month

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period. This will include a summary of the rehabilitation completed during the previous 12 months. This is standard practice for mining activities on the West Coast.

Proposed wetland

8.17 The proposed wetland will be constructed in two stages as follows:

(a) The first stage of the wetland will be constructed on Section 1: Granite Creek North, north of Granite Creek and south of the WCP, following completion of Section 1;

(b) The second stage of the wetland will be constructed on Section 2: Granite Creek South, north of Cargill Road and south of Granite Creek, following completion of Section 2.

8.18 The new wetland will be established along the eastern boundary, planted in native species and fenced from stock.

8.19 There will be an increase in the extent and integrity of wetland across the site due to the construction of the new wetland area. Indigenous biodiversity values are expected to increase at the site, including a net gain in wetland area and indigenous vegetation cover.

8.20 The proposed wetland is shown in **Plan J**.

Proposed planting

8.21 The Applicant has engaged Glasson Huxtable Landscape Architects to assess the potential landscape and visual amenity effects of the proposal. The Landscape Assessment identifies areas where current vegetation should be retained and additional planting, associated with the restoration of creeks and construction of the wetland area, is to be undertaken. These plantings have been designed both for ecological and landscape mitigation for the project and will have long term ecological benefits in terms of stream health and habitat for indigenous species.

8.22 Due to the distance of the mining activity from public viewpoints for the majority of its operation, bunding and planting works are restricted to managing the effects of noise. There are four noise bunds also proposed as set out in Section 7.23. Bunds will have an inward facing grassed slope with dense planting on the crest and outward facing slope.

8.23 Planting and bunding includes:

(a) Lot 2 DP2178 bund - 3m high with a 4.8m wide crest (24m width) approximately 500m long;

(b) Warren Road bund – 3m high with a 4.8m wide crest (24m width) approximately 900m long ;

(c) Cargill Road bund - at the eastern edge of the site stretching north – 3m high with a 4.8m crest (24m width) approximately 460m long;

(d) 101 Cargill Road bund – on the western boundary - 3m high with a 4.8m wide crest (24m width) approximately 440m long.

8.24 Retention of key vegetation has been identified at:

(a) Planting clusters near the WCP;

(b) Planting clusters along the eastern application area boundary north of Cargill Road;

(c) Planting patch adjacent to 101 Cargill Road; and

(d) Riparian vegetation adjacent to Granite Creek;

Closure sequence

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8.25 Final rehabilitation of Section 3 (Cargill Road) will occur following the completion of mining activities in this area.

8.26 As progressive rehabilitation will be undertaken across the SB there will be limited final contouring and blending required once mining is complete. Any final contouring/blending at the southern end of the mining disturbance area will use material from within the wider application area as required.

9. Plant and machinery

9.1 The following machinery listed in **Table 2** is likely to be required to undertake mining, pumping and rehabilitation of the site (although specific models may differ).

Table 2: Mining machinery list

Type	Supplier	Model	Number
Bucketwheel Cutter Suction Dredge	Neumann Contractors	Series 350	1
Dozer	Komatsu	D71PX-24	2
Grader	Komatsu	GD655-7	1
Integrated Tool Carrier	Hitachi	ZW220-5	3
Artic 6wd 45 Truck	Hitachi	B45E	3
Excavator (Long stick)	Hitachi	ZX890LCH	2
Excavator (30 or 40 tonne)	Hitachi	ZX345USLC	2
Field Screening Unit (trommel)	Bespoke		1

9.2 Additional mining equipment and vehicles will be used on site, including a variety of pumps (including land-based, floating and submersible) and light 4-wheel drive vehicles for the transport of mining personnel.

10. Site operation

10.1 This section describes how the site will be operated, in terms of hours of operation, site configuration, transport, lighting, dust management and hazardous substances use.

Hours of operation

10.2 Mining activities associated with the extraction of material will be undertaken during daylight hours only, consistent with the existing consent granted for the CB.

10.3 Hours of daylight are between 30 minutes before sunrise to 30 minutes after sunset[1].

10.4 Mining shall not occur between the hours of 0600 and 0700 within 500m of the dwellings located at:

(a) Lot 2 DP2178;
(b) 37, 41, 43 and 50 Warren Road;
(c) 64, 86 and 101 Cargill Road.

10.5 There will be no mining on Sundays.

[1] *Sunrise and sunset times can be found at* https://www.sunrise-and-sunset.com/en/sun/new-zealand/westport/2023/june

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Site configuration

10.6 Access tracks will be required within the mining area. These will be formed to provide light vehicle and machinery access for the preparation, mining and rehabilitation of various areas as mining progresses. These access tracks will move as mining progresses.

10.7 It is proposed to retain the existing access points for farming activities for the duration of the mining activity, to ensure that any ongoing farming traffic is kept separate from the mine traffic.

Vehicle movements

10.8 There are 57 full time staff proposed to be employed across the WCP and wider mine site at the SB. This includes 18 staff to be employed specifically for the mining activity.

10.9 Vehicle movements associated with mining activities are largely generated by the existence of the WCP adjacent to the SB. They will therefore be authorised by the WCP consent.

Lighting

10.10 Due to activities taking place during daylight hours only, only minimal lighting will be required on the mine site and at the mining void.

10.11 There will be limited fixed lighting in the mine area, which may include lighting around the pump to allow for the pump circuit to be checked overnight. Any fixed lighting in the mine area will be shrouded and adhere to the principles outlined below.

10.12 Lighting will not exceed 2.0 lux spill (horizontal and vertical) onto any adjoining property, measured at any point more than 2m inside the boundary of the adjoining property or the closest window on the adjoining property (whichever is the closest).

10.13 All lighting on site will adhere to the Australian Government's National Light Pollution Guidelines for Wildlife January 2023 (or subsequent revision), including but not limited to:

(a) Utilising the Seabird Light Mitigation Toolbox in Appendix G – Seabirds (Schedule 4);
(b) All fixed lighting shall be pointed downward and shielded to avoid light spill, with a lighting temperature of no more than 2000K, and be filtered to reduce blue and violet wavelengths;
(c) Lights shall only illuminate the object or area intended;
(d) Fixed lights shall be mounted as close to the ground as practicable;
(e) External lighting shall use the lowest intensity lighting as possible, while ensuring compliance with workplace health and safety requirements;
(f) External lighting shall be equipped with light minimising technology, including motion sensors or timers;
(g) Mobile lighting within the mine site will adhere to the above principles, including the dipping of headlights of vehicles operating on site.

10.14 Adherence to the above standards will minimise light spill, thereby preserving the natural character and dark night sky of the coastal environment. The measures proposed will also assist in avoiding the risk of adverse effects on the Westland Petrel Colony located approximately 5.5km north of the WCP location. These standards are consistent with the conditions of consent granted for the CB.

Noise

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10.15 Noise will be generated from the activities at the mining void including excavators and front end loaders to strip top soil and overburden, trucks to move material to the rear of the site, the dredge and field screening unit and the spreading of tails from the cyclone.

10.16 Noise generation has been taken into account in the design of the project. Hours of operation control the activity each day. Earthworks near dwellings will be minimised, and noise mitigation bunds will be constructed at four locations as outlined in Section 7.23.

10.17 The site will operate in accordance with a Noise Management Plan, which sets out the management techniques to be applied to ensure that the site operates in accordance with best practice and unnecessary noise generation is minimised by:

(a) Exhaust silencers fitted to all mobile plant;
(b) Power from the grid used in preference to diesel generators where possible;
(c) Vehicles and equipment maintained to avoid unnecessary noise and vibration;
(d) Trucking contractor behaviour expectations including following speed limit; restrictions, no unnecessary sounding of horns or revving of engines, avoidance of engine braking, vehicles to be properly maintained;
(e) Metal to metal contact avoided during the loading of trucks;
(f) No tonal reversing alarms;
(g) Site vehicles to follow speed limits and drive in consistent manner, no amplified music permitted inside vehicle cabs, horns to be used in emergency only;
(h) Access road and working surface maintained free from potholes and corrugations.

10.18 The following noise limits are proposed to apply at or within the notional boundary of any dwelling existing at the date consent is granted on any other site, except in relation to the four dwellings on Warren Road, three dwellings on Cargill Road and at Lot 2 DP2178:

(a) Daytime (0700-2200): 55 dB LAeq (15 min)
(b) Night-time (2200-0700): 45 dB LAeq (15 min) and 75 dB LAFmax
(c) when measured and assessed in accordance with the latest New Zealand noise standards: NZS 6801:2008 “Acoustics – Measurement of environmental sound” and NZS 6802:2008 “Acoustics -Environmental Noise”.

10.19 At some locations, extraction of ore can proceed between 0600 and 0700hrs (classified as night-time under the District Plan) while still complying with the 45 dB L_{Aeq} noise limit.

Dust Management

10.20 Some activities proposed to be undertaken have the potential to generate dust emissions. While the application site is within a high rainfall area, there are periods of dry weather.

10.21 As the mining activity is a wet process dust generating activities will be limited to times of overburden removal and rehabilitation and vehicle movements on site. These activities are intermittent (not always continuous) and can be managed with techniques outlined in the Dust Management Plan. Dust will be managed via visual inspections, use of water carts and other dust suppression techniques as required.

10.22 The Applicant has installed dust monitors on the perimeter of the mine site. These monitoring stations will remain in place for the duration of mining activities on site.

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Hazardous substances use, storage and management

10.23 The refuelling of machinery will be undertaken on site using a mobile fuel tanker with a centralised fuel store located at the WCP (40,000 litres). The proposed above ground tank will be authorised by the WCP consent.

10.24 Re-fuelling will be completed under direct supervision of the machine operator to minimise the risk of spills occurring. Refuelling will occur at least 20m away from waterbodies.

10.25 Mechanical repairs and servicing will occur at the WCP area. In the event of major mechanical break-down, machines may be taken to an off-site workshop. Spill kits and procedures will be available on site in the event of a fuel or oil spill occurring.

10.26 All waste oil and fuel containers will be removed from the site promptly.

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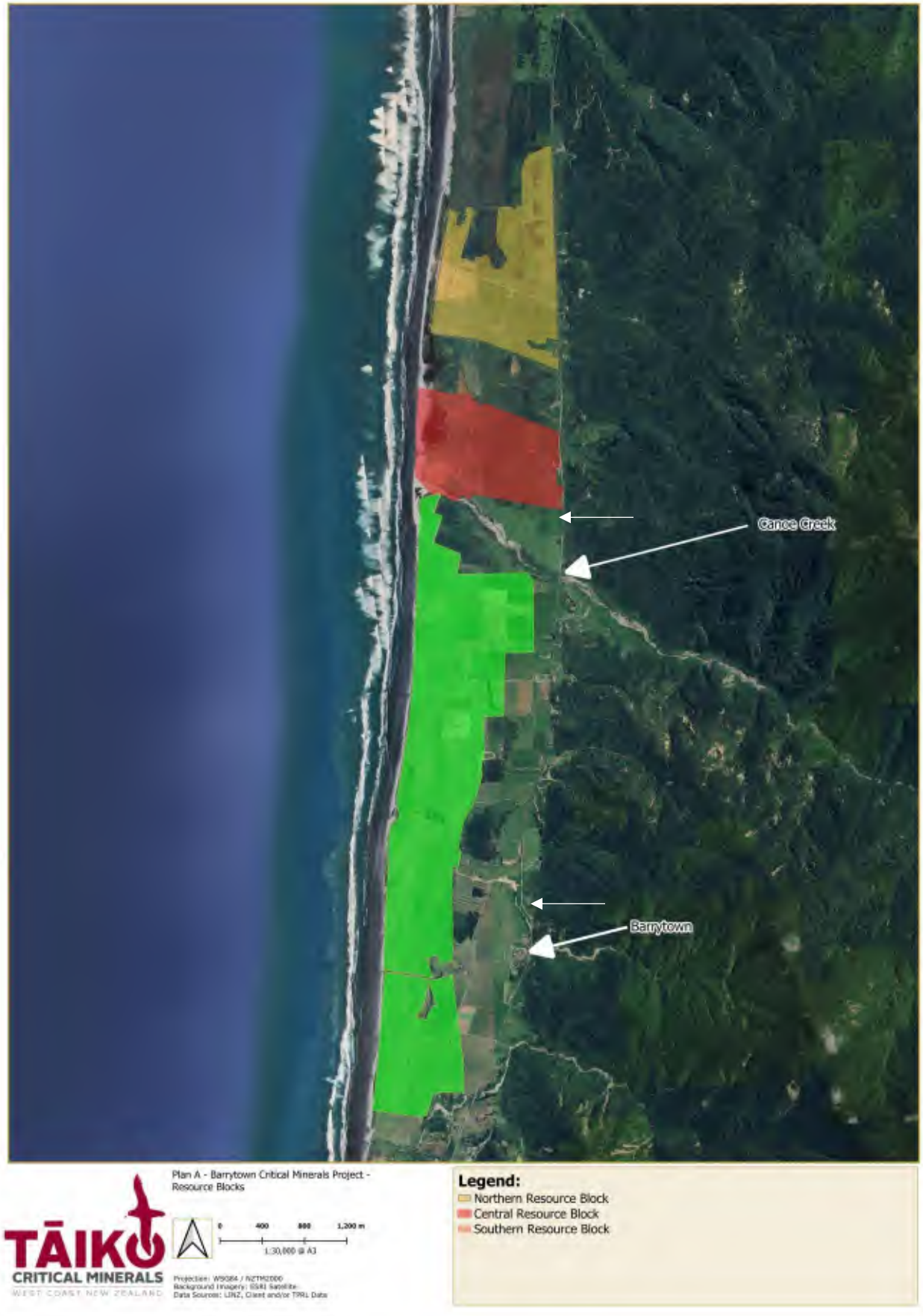
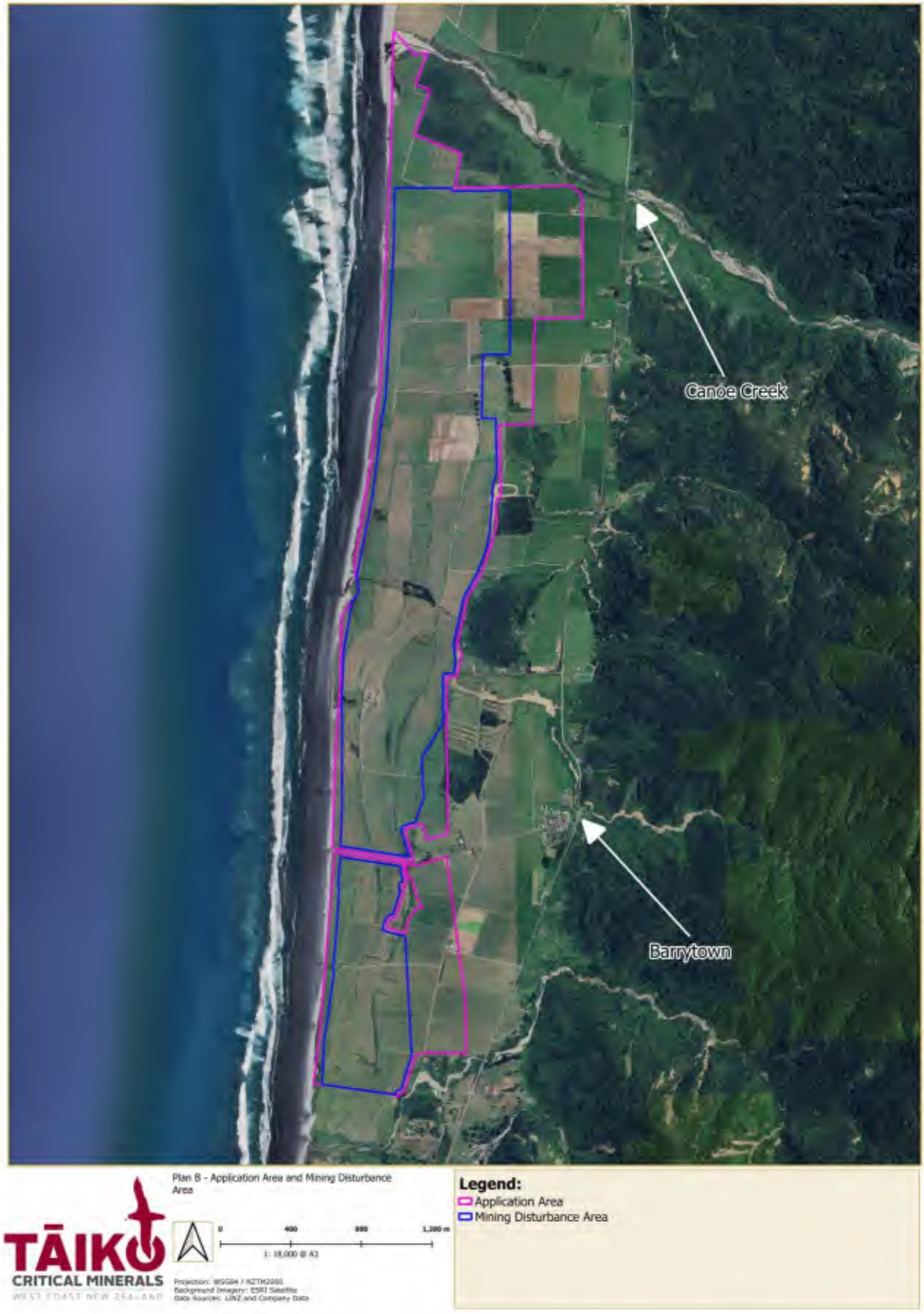
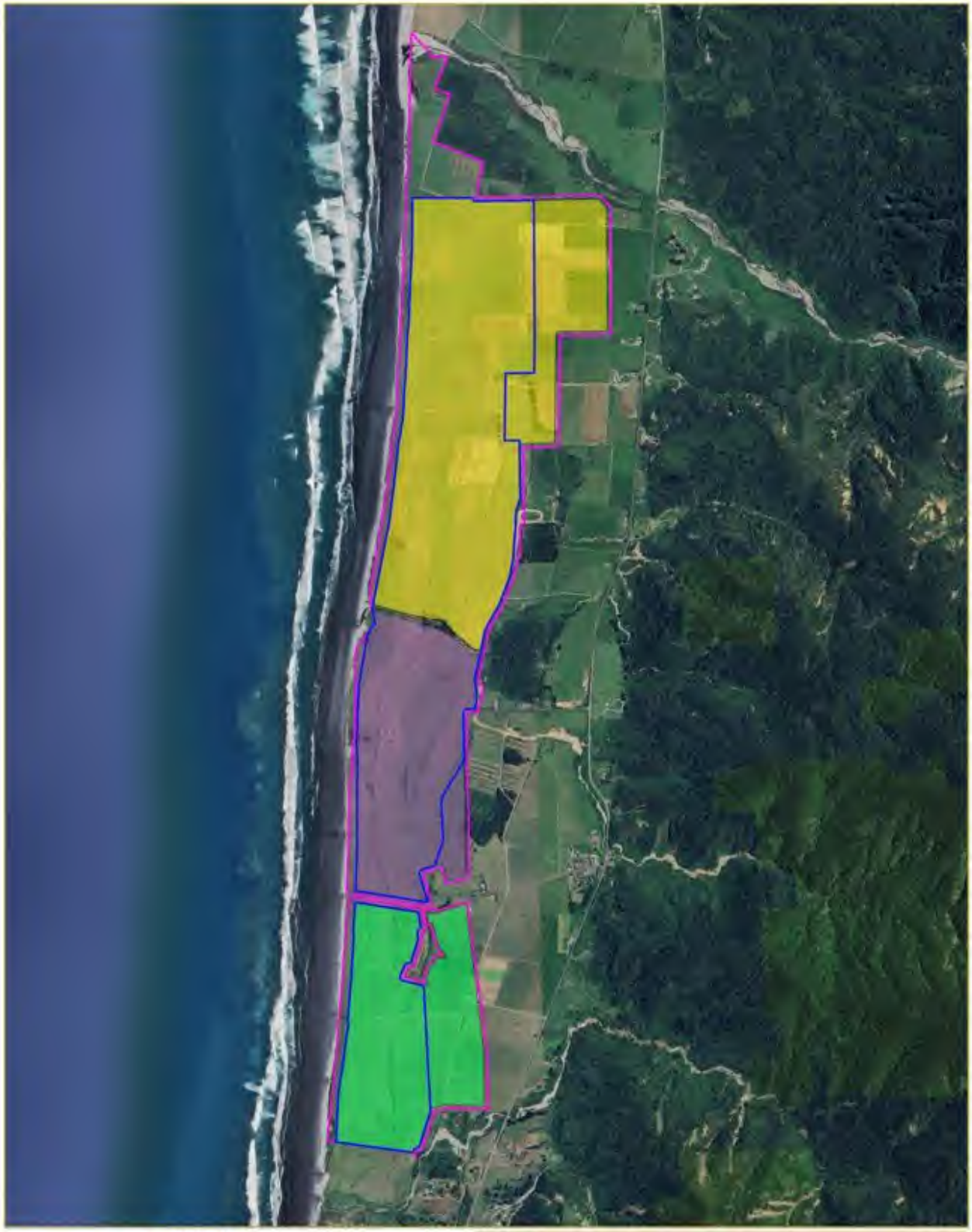
Plan A: Barrytown Critical Minerals Project – Resource Blocks



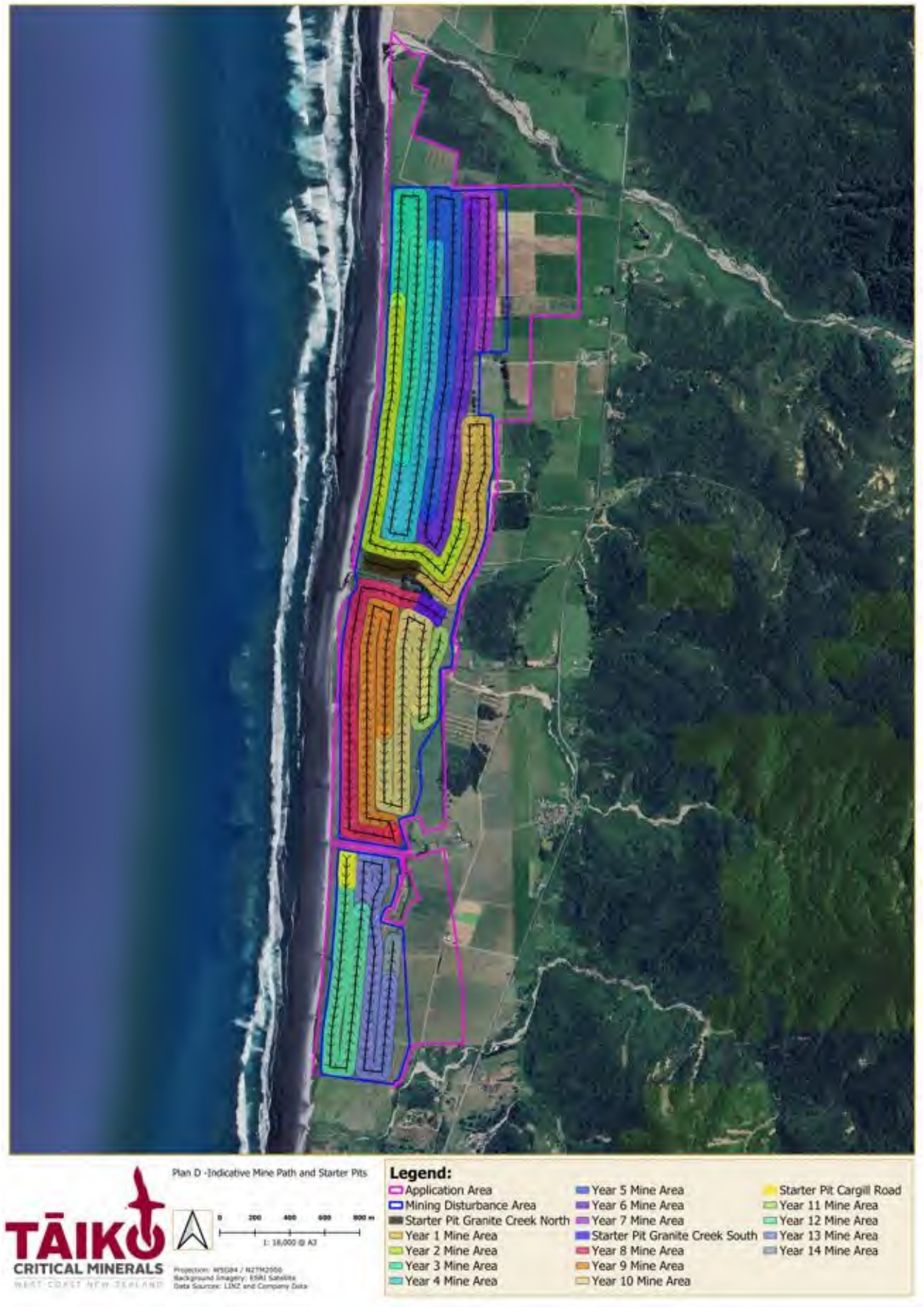
Plan B: Southern Block Application Area and Proposed Mining Disturbance Area



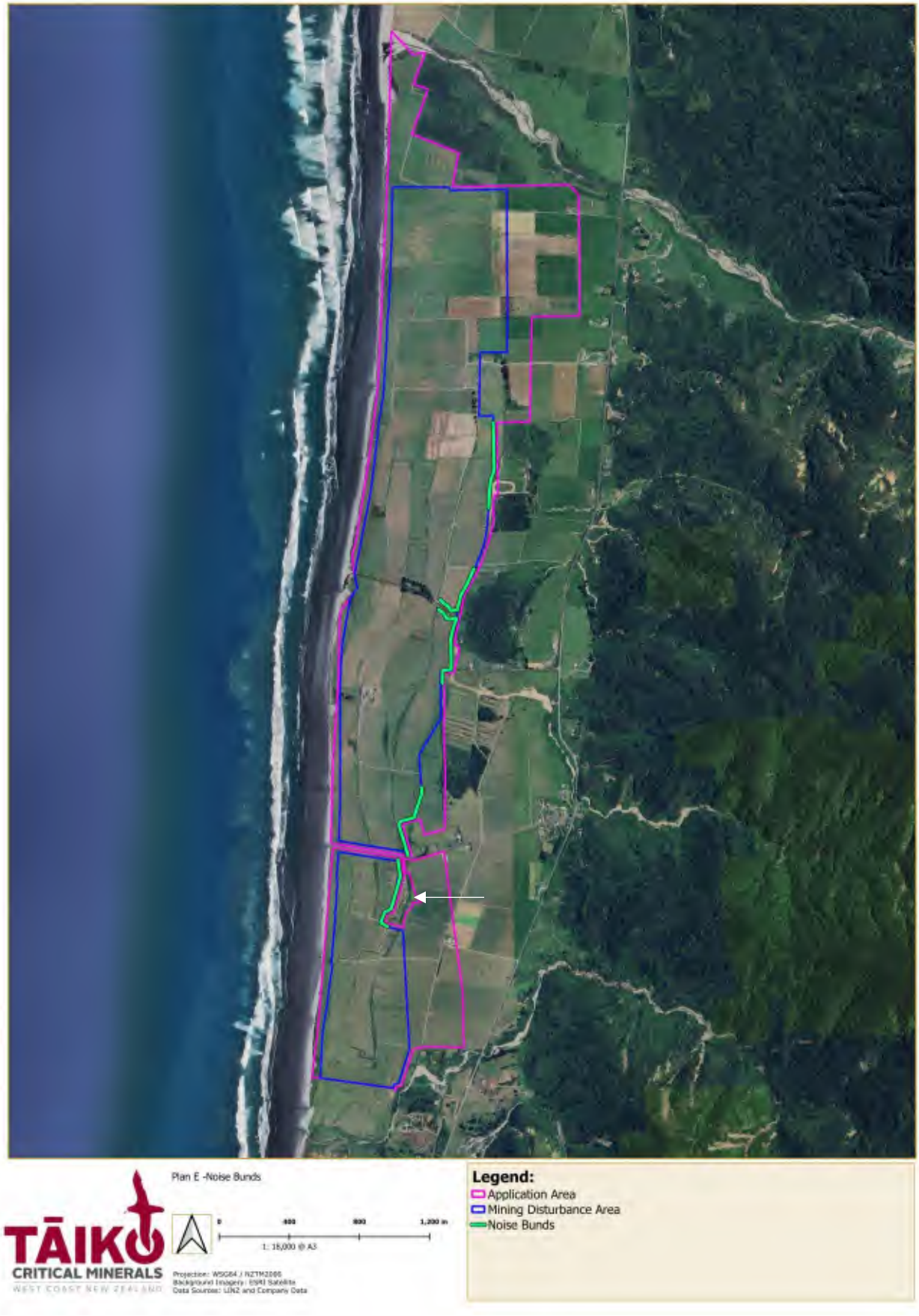
Plan C: Mining Sections within the Southern Block



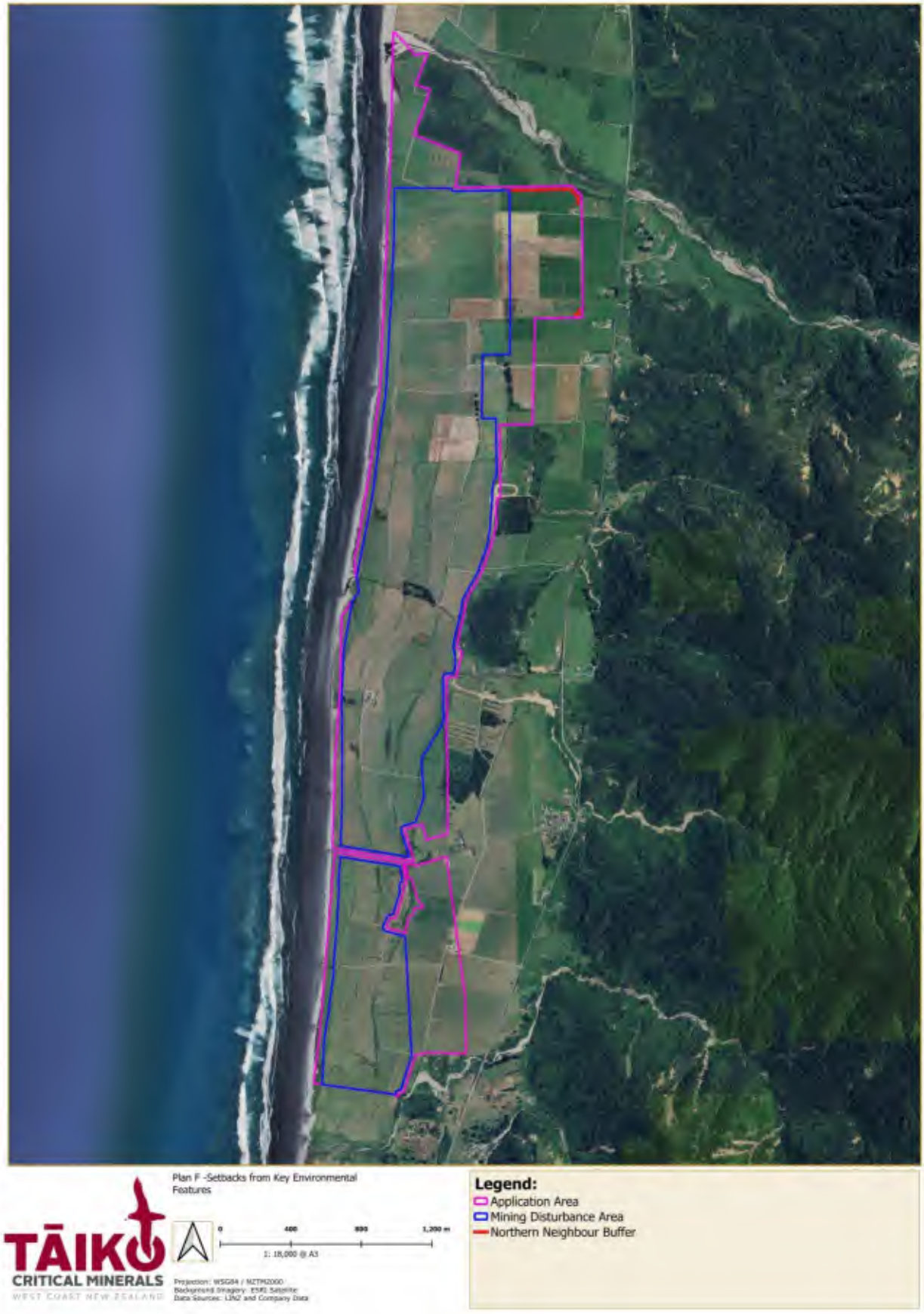
Plan D: Indicative Mine Path Including Mine Starter Pits



Plan E: Noise Bunds



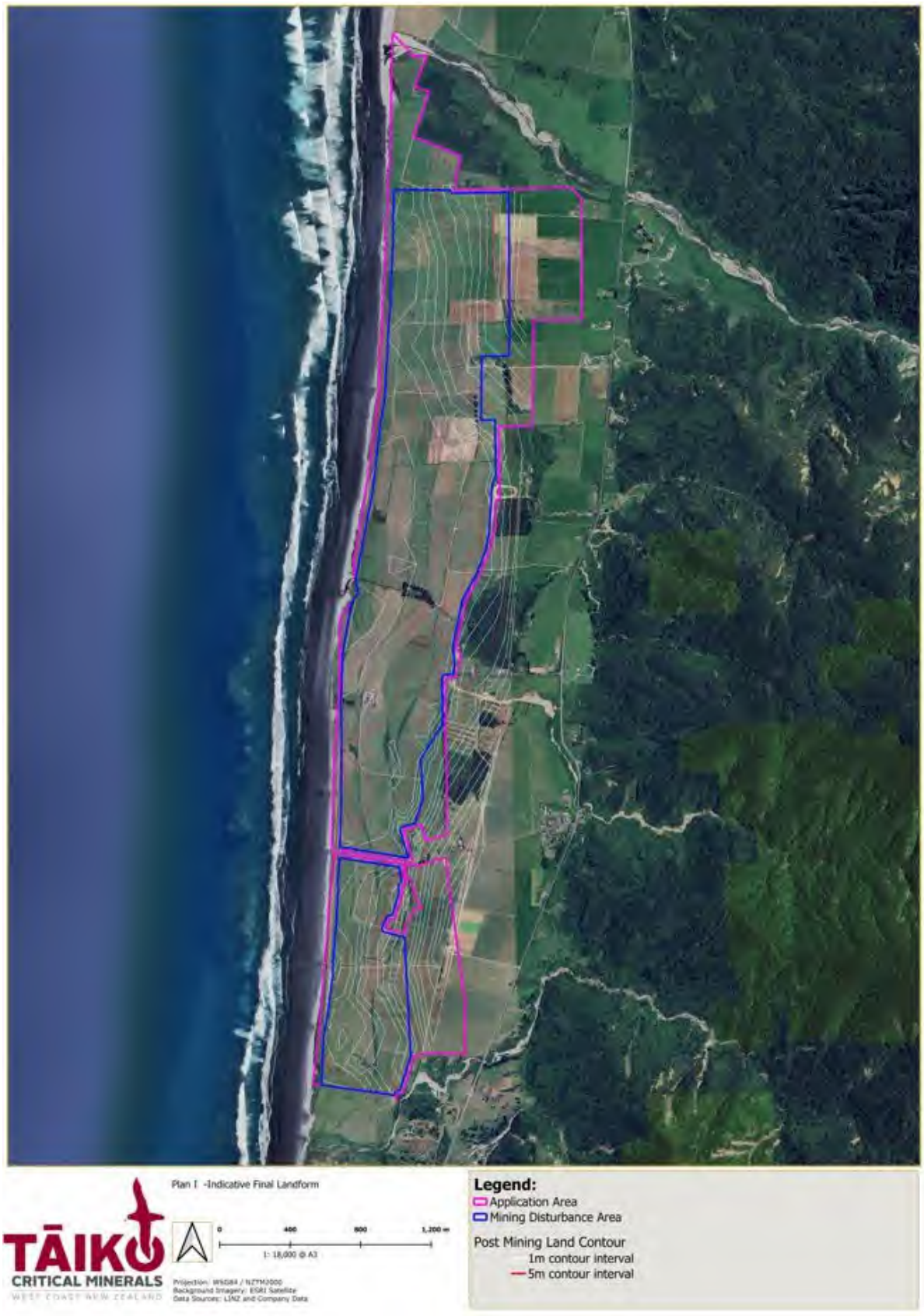
Plan F: Setbacks From Key Environmental Features



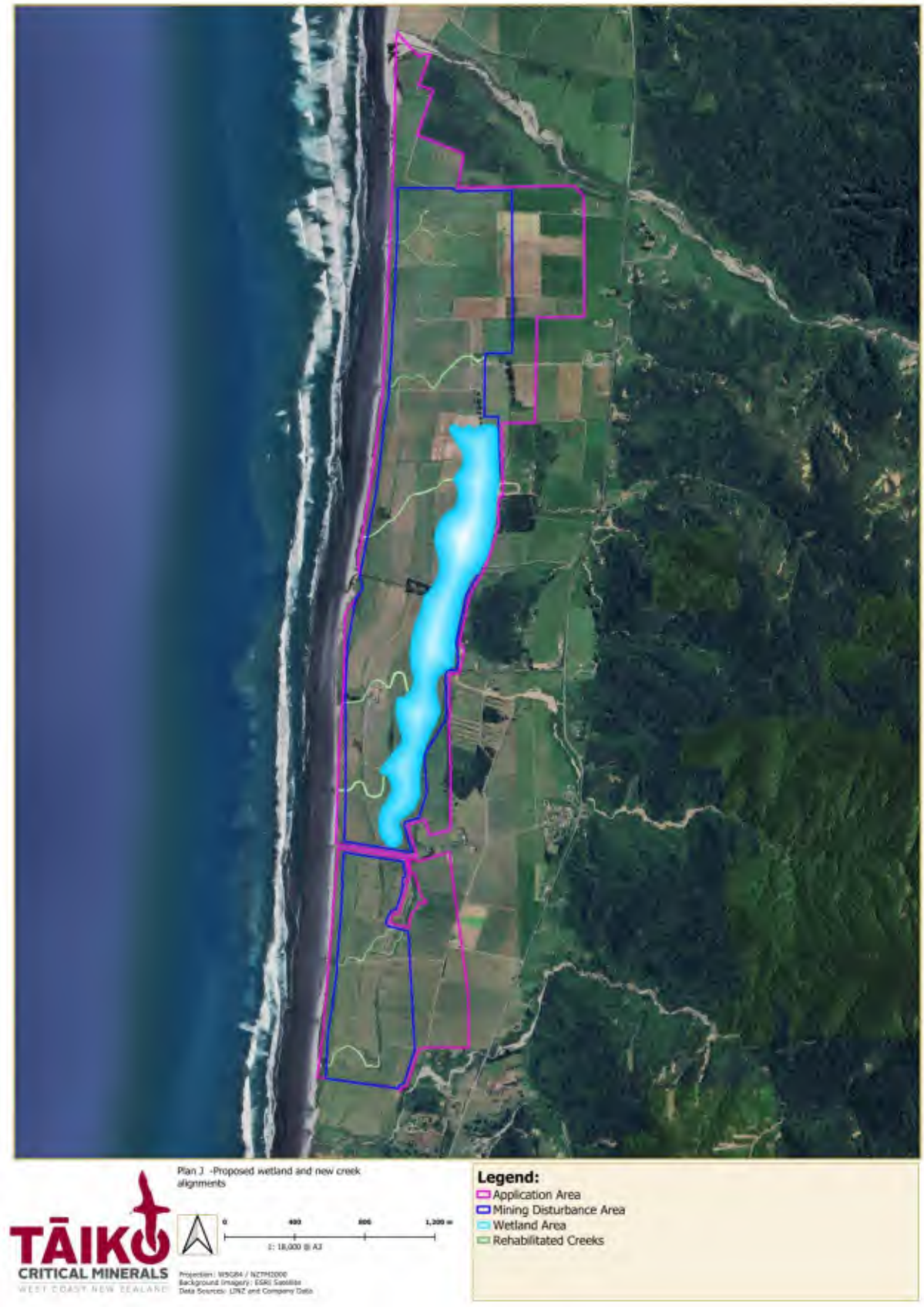
Plan G: Waterbodies on the Southern Block including the five creeks requiring diversion

Plan H: Location of Water Take

Plan I: Indicative Final Land Contour



Plan J: Proposed Post-Mining Wetland and Watercourse Rehabilitation Layout



Appendix B

Proposed conditions

Barrytown Critical Minerals Project
Southern Block
Proposed Resource Consent Conditions

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General Conditions for Grey District Council and West Coast Regional Council	
1.0 General	
1.1	The Consent Holder must carry out the mineral sand mining activities in general accordance with the application made through the Fast-track Approvals process, the Site Plan enclosed as Schedule 1 prepared by Tai Poutini Resources Ltd and the following management plans [to be inserted].
1.2	The Consent Holder must ensure all staff and contractors are made aware of, and have access to, the resource consent conditions prior to the commencement of mining. A copy of the resource consent conditions must also be readily available on-site.
1.3	All actual and reasonable costs incurred by the Consent Authorities in monitoring, enforcement and administration of this resource consent must be met by the Consent Holder.
1.4	a. Within 2 months of the commencement of these consents, the Consent Holder must appoint an Accountable Person to be responsible for ensuring compliance with all conditions of these consents. The Accountable Person must be based on-site for a minimum of 4 hours per day, for three days per week. The Accountable Person must: i. Review, submit and ensure compliance with all management plans listed in the conditions of these consents; ii. Ensure there is another person who can provide cover in the event they are sick or unavailable, and to provide for succession ('Nominated Cover Person'); iii. Be the point of contact between the Consent Holder, the Consent Authorities, the Community Liaison Group and the community generally, and pro-actively engage with these parties as required under these consents; iv. Deliver on reporting requirements required by the conditions of these consents. b. The Consent Authorities must be advised of the name and contact details of the Accountable Person and the Nominated Cover Person when they are appointed. In the event that the Accountable Person or Nominated Cover Person change, the Consent Authorities must be notified. A sign must be erected at the property boundary adjacent to the site access road, which provides the name and contact details of the Accountable Person and Nominated Cover Person required to be appointed under sub-clause a
2.0 Notification	
2.1	For monitoring purposes, the Consent Holder must notify the Consent Authorities of the following: a. The intended commencement date of works on-site at least 15 working days prior to commencement of works on-site; and b. The intended completion of final mine closure rehabilitation activities at least 15 working days prior to works ceasing on-site.
3.0 Review of Conditions	
3.1	Pursuant to Section 128(1) of the Resource Management Act 1991, the Consent Authorities may review any of the conditions of these consents by serving notice on the Consent Holder

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	within a period of 60 working days, commencing on each anniversary of the date of commencement of these consents for any of the following purposes: a. To deal with any unanticipated adverse effect on the environment which may arise from the exercise of the consents which is appropriate to deal with at a later stage. b. To assess the appropriateness of imposed monitoring parameters, monitoring regimes and monitoring frequencies and to alter these accordingly. c. To ensure that any management plan required by conditions gives effect to conditions of these consents. d. If the information made available to the Consent Authorities by the applicant for the purposes of applying for consent contained material inaccuracies and the effects of the exercise of the consent are such that it is necessary to apply more appropriate conditions.
4.0 Bond Conditions	
4.1	The Consent Holder must provide and maintain in favour of the Consent Authorities (the West Coast Regional Council and the Grey District Council [jointly for their respective interests]) a bond or bonds related to mine closure activities required by these consents.
4.2	The payment of the bond quantum by the Consent Holder, as required by Condition 4.5 must either be: a. A bond in favour of the Consent Authorities for the guarantee sum in a form and executed by a surety acceptable to the Consent Authorities; or b. A cash bond deposited with and held in a bank account by the Consent Authorities.
4.3	Where a bond is guaranteed in accordance with Condition 4.2 a., the guarantor must bind itself to pay up to the bond quantum for the carrying out and completion of all obligations of the Consent Holder under the bond.
4.4	The bond (as set at any time under Condition 4.1) must be held or remain in full force and effect throughout the term of these consents until all conditions under these consents have been performed unless otherwise agreed by the Consent Authorities.
4.5	a. The bond quantum must be $300,000. b. The method for arriving at the bond quantum does not limit the scope of the bond, which is set by Condition 4.1.
4.6	The provisions of Section 109 of the Resource Management Act 1991 must apply to any bond, or bonds, required pursuant to the above and must not be limited by the details of the bond instrument.
4.7	The amount of the bond may be inflation adjusted annually, if requested by the Consent Authorities, by the movement of the CPI relative to the CPI at the date when the bond is first provided.
4.8	The Consent Holder must not exercise these consents:

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	a. Until the bond required by Condition 4.1 has been fully executed by the Consent Holder and guarantor, or has been deposited with the Consent Authorities, or b. In respect of any inflation adjusted bond referred to in Condition 4.7, after 30 working days have expired from the date the Consent Holder was notified of the terms of the inflation adjusted bond by the Consent Authorities unless the inflation adjusted bond has been executed with the Consent Authorities by the Consent Holder and guarantor, or has been deposited with the Consent Authority; or c. In respect of any bond sum changed or reviewed pursuant to Sections 127 or 128 of the Act, after thirty 30 working days have expired from the date the Consent Holder was notified of the decision of the changed or reviewed bond by the Consent Authorities unless the changed or reviewed bond has been executed with the Consent Authorities by the Consent Holder and guarantor, or has been deposited with the Consent Authorities, or d. If, during the term of these consents, the whole or any part of the bond is required to be used for the carrying out and completion of all obligations of the Consent Holder under the bond, unless the full bond has been executed with the Consent Authorities by the Consent Holder and guarantor, or has been deposited with the Consent Authorities.
4.9	The Consent Holder must complete such work requested in respect of which any bond or deposit is held, within the time period nominated by the Consent Authorities' written request.
4.10	If the consents are transferred in part or whole to another party or person, the bond must continue until any outstanding work at the date of transfer is completed to ensure compliance with the conditions of these consents, unless the Consent Authorities are satisfied adequate provisions have been made to transfer the liability to the new Consent Holder.
4.11	In the event of any such transfer of the consents, the Consent Holder must ensure that the transfer provides a replacement bond to the Consent Authorities on the terms required by the Bond Conditions.
4.12	The Consent Holder must meet the costs of providing any bond, or bonds, including the costs of the bond and any substitute bond. ***Advice Note:*** • *The Consent Authority will release the bond upon the closure of the mine if all conditions of consent have been complied with to the satisfaction of the Consent Authorities.*
5.0 Annual Work Programme	
5.1	At least 20 working days prior to mining activities commencing and thereafter on or before the anniversary date of the mining activities commencing, the Consent Holder must submit a programme of work ("Annual Work Programme") for certification by the Consent Authorities detailing: a. The proposed works to be carried out over the next 12 months including: i. Equipment to be used; ii. Areas of topsoil and overburden stripping and stockpile locations; iii. New areas of land disturbance that will be mined; iv. Access tracks;

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	v. Drilling or prospecting sites and other tracks to be constructed; vi. Native freshwater fish capture and relocation plan and any other wildlife management required (lizards and birds); vii. Proposed location, and relocation, of the penguin fence; and viii. Any other site works within the consent area. b. The approximate open volume of the mining void at the start of the year including the depth of excavations and the area of the mining void. c. Extent of creek diversions and reclamations. d. The progressive rehabilitation works to be carried out over the next 12 months including: i. Areas of unrestored land (i.e. any land not finally topsoiled and revegetated) at the beginning of the 12-month period; ii. The area that will be fully rehabilitated during the forthcoming 12-months; iii. Maximum slope angles, bench heights and widths of recontoured ground, if applicable; iv. Rehabilitation methods and techniques including replacement of topsoil and vegetation cover with seed collection and plant procurement details; d. Description of measures to prevent adverse effects on natural waterbodies, including drainage works within the consent area, and the collection and treatment of site run-off; e. Measures to ensure soil conservation; f. A description and analysis of any unexpected adverse effects that have arisen as a result of activities within the last 12 months, the steps taken to address those adverse effects and measures implemented to avoid a repeat occurrence of them.
5.2	The following plans, reports and results of monitoring must also be submitted as part of the Annual Work Programme: a. A detailed plan or aerial photograph showing: i. The open working area at the start of the year; ii. Proposed mine path for the forthcoming year including haul and access roads; iii. Rehabilitated ground behind the mining void area; iv. Location of existing and intended topsoil or overburden dumps and their dimensions; v. Location of natural surface water bodies; vi. Proposed diversions of water bodies, location of fish diversions and reclamations of creeks; vii. Location of present and intended drainage works and settling ponds; and viii. Any other site works within the consent area. b. A Site Specific Erosion and Sediment Control Plan in accordance with Condition 18.2. c. Results of surface water quality, surface water flows, and groundwater level monitoring from the previous 12 months in the form of an Annual Hydrological and Water Quality Report required by Condition 24.5. d. Any proposed updates to management plans submitted in accordance with the respective conditions of consent.

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	e. Results of any previous dust monitoring required by Condition 26.3.
5.3	The Consent Holder must provide the Consent Authorities with any further information, which the Consent Authorities may reasonably request after considering any Annual Work Programme. This information must be provided within 5 working days of any request from the Consent Authorities.
6.0 Management Plans	
6.1	At least 20 working days prior to undertaking any activities authorised by these consents, the Consent Holder must submit the following management plans to the Consent Authorities for certification: a. Noise Management Plan b. Avian Management Plan c. Lizard Management Plan d. Native Freshwater Fish Capture and Relocation Plan e. Dust Management Plan f. Rehabilitation Management Plan g. Water Management Plan h. Erosion and Sediment Control Plan i. Landscape Planting Plan j. Lighting Management Plan Advice Notes: • These are collectively referred to as 'Management Plans'. • Where a plan requires the input of an appropriately qualified professional, the Consent Authorities may engage an appropriately qualified person to peer review the plan as part of the certification process.
6.2	a. The purpose of the Management Plans is to implement the relevant conditions of these consents. All Management Plans must include (where relevant): i. The purpose/objective of the plan; ii. Reference to the conditions of these consents that the management plan implements; iii. How each of the relevant conditions have been given effect to; iv. Procedures for implementing the relevant plan; v. Plan auditing check lists; vi. Monitoring programmes and/or monitoring protocols; vii. Feedback mechanisms for adaptive management, including circumstances in which a material change to the management plan would be required; viii. An organisational chart showing staff and contractor positions and responsibilities for plan implementation; ix. Relevant training and induction procedures and training schedules; and x. Reporting procedures and format for providing the results of any monitoring or surveys required by the plan. b. Where plans require the input of an appropriately qualified professional, the Consent Holder must engage an appropriately qualified person to prepare the Plan.
6.3	Site activities must not commence until the Management Plans listed in Condition 6.1 have been certified by the Consent Authorities.

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6.4	a. If the Consent Holder has not received a response from the Consent Authorities within 20 working days of the date of submission of a management plan under Condition 6.1, the management plan must be deemed certified. b. If the response from the Consent Authorities is that they are not able to certify the management plans, the Consent Holder must consider any reasons and recommendations provided by the Consent Authorities, amend the management plan accordingly, and resubmit the management plan to the Consent Authorities.
6.5	The Consent Holder may amend a management plan at any time to take into account: a. Any positive measure/s to ensure the stated objectives of the management plan are achieved; b. Any changes required to further reduce the potential for adverse effects as a result of actions identified in the Annual Work Programme; and c. Any required actions identified as a result of monitoring to address a. or b. Where the preparation of a management plan required the input of an appropriately qualified person, any amendment to that management plan must also be undertaken by an appropriately qualified person. Advice Note: • *Some management plans have ongoing annual review requirements which are required in order to manage effects. These specific review requirements are stipulated in the relevant conditions of this consent.*
6.6	Any amended management plan must be provided to the Consent Authorities within 20 working days of its review, for recertification in accordance with Condition 6.1. Advice Note: • *The Consent Authorities may engage an appropriately qualified person to peer review the amendments.*
6.7	A management plan may only be amended in a way that is consistent with, and does not contravene, the conditions of these resource consents.
6.8	A copy of the latest version of the certified Management Plans must be kept on site at all times and all personnel must be made aware of each Plan and their responsibilities under each Plan.
6.9	Subject to any other conditions of these consents, all activities must be undertaken in accordance with the latest version of the certified Management Plans.
7.0 Method of Operations	
7.1	a. The mine boundaries must be clearly marked on the ground as per Schedule 1 before any earthworks take place, with the following setbacks applied: i. 20m from the consent boundary; ii. 20m from Granite Creek iii. 20m from Fagan Creek;

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	iv. 50m from the mean high water spring v. 20m from the proposed SNA PUN-049; vi. 20 from all private property boundaries not within the consent area as shown on Schedule 1; vii. 200m from dwellings other than where noise bunds are proposed.
7.2	The maximum area of site disturbance must not exceed 16.0 hectares at any one time. Advice Note: • *The disturbed area includes the stripped area ahead of mining, mining void and active rehabilitation areas.*
7.3	a. The Consent Holder must strip soil material ahead of mining operations and stockpile it for progressive and final mine closure rehabilitation purposes. b. Stockpiled soil must be protected from erosion caused by water and wind as far as practicable.
7.4	The Consent Holder must not bury any topsoil or soil material suitable as a growing medium or remove it from the site.
8.0 Hazardous Substances	
8.1	a. Refuelling, lubrication and mechanical repairs of equipment and storage of hazardous substances and dangerous goods must be undertaken in such a manner that ensures spillages of hazardous substances or dangerous goods onto the land surface or into a waterbody do not occur, including that refuelling must not occur outside the mining area or within 20 metres of a water body. b. Any accidental discharge of greater than 20 litres of fuel, oil or hazardous substances must be reported immediately to the Consent Authorities along with details of the steps taken to remedy and/or mitigate the adverse effects of the discharge.
8.2	All contractors and/or operators transporting or storing more than 20 litres of fuel, oil or hazardous substances must carry spill kits to contain any fuel, oil or hazardous substances discharges on-site.
8.3	A list of all hazardous substances and dangerous goods stored or used on site must be maintained on site at all times showing the location of the storage and use.
8.4	The Consent Holder must undertake quarterly systematic testing of the heavy minerals concentrate from within the active mining area to confirm that the concentrate remains below the acceptable level of radioactivity concentration limits as specified in Schedule 2 of the Radiation Safety Act 2016. Copies of the independent test results must be submitted to the Consent Authority within 10 working days of receipt of the results. Advice Note: • *If material meets the criteria in Schedule 2 of the Radiation Safety Act 2016, the extraction, processing and transport of heavy minerals concentrate will require a Source Licence under this Act, and may possibly require a radiation safety plan as per section 18 of the Act.*

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8.5	In the absence of any extant and current New Zealand Code of Practice for handling naturally occurring radioactive materials, the Consent Holder must carry out all activities on site in accordance with the Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing Code of Practice and Safety Guide published by the Australian Radiation Protection and Nuclear Safety Agency. Advice Note: • *The Code of Practice within this consent condition requires that if radiation levels exceed 1Bq/g, the relevant authority must be notified, which differs from state to state. In the New Zealand context, the relevant body to notify is the Office of Radiation Safety.*
8.6	a. The Consent Holder must maintain radiation monitoring devices in the locations specified in the Dust Management Plan. Data from the radiation monitoring devices must be collected and analysed once every three months. Copies of the test results must be submitted to the Consent Authorities with 10 working days of receipt of the results. b. If the radiation monitoring devices record radiation levels exceeding the equivalent of 1 mSv (millisievert) above background levels over 12 months (i.e., the sum of results from the past four device readings at each location minus background levels established prior to the activity commencing), then the Radiation Safety Act 2016 applies, and the Consent Holder must: i. inform and consult the Office of Radiation Safety, New Zealand Ministry of Health; and ii. carry out all activities on site in accordance with the Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing Code of Practice and Safety Guide published by the Australian Radiation Protection and Nuclear Safety Agency (or any subsequent revision).
9.0 Rehabilitation and Rehabilitation Management Plan	
9.1	The Consent Holder must carry out progressive rehabilitation, to achieve the following requirements: a. Reinstatement of productive pasture; b. Reinstatement of existing creek and drainage patterns to reflect pre-mining catchment areas ensuring no loss of extent, with appropriate riparian planting, in accordance with the Rehabilitation Management Plan; c. Construction of wetland and riparian areas in accordance with the Rehabilitation Management Plan;
9.2	At the completion of mining (final mine closure), the mine area must be fully rehabilitated, by reinstating the productive pasture in general accordance with the Rehabilitation Management Plan. The objectives of the Rehabilitation Management Plan are: a. To create a final landform with a similar contour and profile at final mine closure as that which existed prior to mining but with improved drainage across the site; b. To establish vegetation cover on all areas disturbed by mining activity; c. To protect freshwater values associated with natural waterways in accordance with the Rehabilitation Plan; and

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	d. To construct and establish a permanent wetland area that contributes to ecological enhancement, hydrological function and landscape integration at final mine closure. Advice Notes: • *Final mine closure is the completion of all mining and progressive rehabilitation works.* • *All Management Plans are required to adhere to the requirements of Condition 6.0.*
9.3	The Rehabilitation Management Plan must include the following: a. A programme of progressive rehabilitation of the pre-mining landform, adhering to maximum disturbed area limits. b. The original and final mine closure land contours. c. Contouring of all post-mining landforms. d. Establishment of pasture cover over all disturbed land. e. Restoration of diversion discharge channels. f. Construction and planting details for the constructed wetland area. g. Erosion and sediment runoff control measures. h. Removal of equipment; and i. Post-mining weed and pest control requirements.
9.4	If for any reason active mining ceases for more than 6 months, operational stockpiles must be removed and the stockpiled material returned to the mining area, and all disturbed areas must be rehabilitated as required by the conditions of these consents within 12 months from the date of the last mining activity.
10.0 Complaints and Non-Compliance	
10.1	The Consent Holder must maintain a complaints register for all aspects of operations in relation to these consents. The register must be available to the Consent Authorities at all times and must detail: a. the date, time and type of any complaint; b. the cause of the complaint; and c. any action taken in response to the complaint.
10.2	Upon receipt of any complaint, the Consent Holder must promptly investigate the complaint, take action to remedy or mitigate the cause of the complaint and within 24 hours inform the Consent Authorities of the details of the complaint and any action taken.
10.3	Complaints which may infer non-compliance with the conditions of these consents, must be referred to the Consent Authorities within 48 hours of their receipt.

10.4	a. The Consent Holder must immediately notify the Consent Authorities upon becoming aware of any non-compliance with the conditions of these consents b. Within 5 working days thereafter the Consent Holder must provide written notification to the Consent Authorities which explains the cause of the non-compliance, and if the cause was within the control of the Consent Holder, steps which were taken to remedy the non-compliance and steps which will be taken to prevent any further occurrence of non-compliance with the conditions of these consents. Advice Note: • *This consent condition does not replace the compliance and enforcement responsibilities of the Consent Authorities.*
Grey District Council Conditions	
11.0 Hours of Operation	
11.1	a. Mining, overburden and topsoil stripping, bund development and any related activities must not operate during the hours of darkness. For the purpose of this condition, hours of darkness are between 30 minutes after sunset to 30 minutes before sunrise. b. Mining shall not occur between the hours of 0600 and 0700 within 500m of the dwellings located at Lot 2 DP2178, 23, 37, 41, 43 and 50 Warren Road, and 64, 67, 86 and 101 Cargill Road. c. Mining shall not be undertaken on Sunday. Advice Notes: • *Sunrise and sunset times can be found at https://www.sunrise-and-sunset.com/en/sun/new-zealand/greymouth* • *In addition to Condition 12.1, further restrictions on noise are contained in Conditions 13.1 – 13.4 Noise.*
11.2	Mining shifts must operate only during the hours of daylight.
12.0 Noise	
12.1	The consent holder shall ensure that all operational mining activities on site do not exceed the following noise limits at or within the notional boundary of any dwelling: a. Daytime 0700 to 2200 55 dB L_{Aeq}(15 min) b. Night-time 2200 to 0700 45 dB L_{Aeq}(15 min) and 75 dB L_{AFmax} when measured and assessed in accordance with the latest New Zealand noise standards: NZS 6801:2008 "Acoustics – Measurement of environmental sound" and NZS 6802:2008 "Acoustics -Environmental Noise". Advice Note: • *'Notional boundary' is defined as a line 20 metres from any side of a dwelling or the legal boundary where this is closer to the dwelling.*

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12.2	Construction activities must be conducted in accordance with NZS 6803: 1999 "Acoustics - Construction Noise" and must comply with the "typical duration" noise limits contained within Table 2 of that Standard. Advice Note: • *Construction activities include the formation of access roads, bunds, land contouring and planting. For the avoidance of doubt, overburden stripping and topsoil removal associated with mining operations must not be considered construction activities.*
12.3	The Consent Holder must prepare a Noise Management Plan (NMP) to control day-to-day noise emissions from the site. This NMP must be submitted to the Consent Authority for certification 10 working days prior to commencement of the commencement of on-site works. As a minimum, the NMP must include: a. The person responsible for implementing the NMP b. Applicable noise conditions relating to noise c. Training of staff relating to how to minimise noise and vibration d. Mining risk analysis for noise generation e. Method for handling noise complaints f. Noise monitoring methodology, including frequency, duration, and location. Advice Note: • *All Management Plans are required to adhere to the requirements of Condition 6.0.*
12.4	a. The Consent Holder must engage a suitability qualified and experienced acoustic consultant to undertake compliance noise monitoring within 30 days of mining or processing operations occurring and thereafter at 3 monthly intervals for the first 12 months of the mining operation. Thereafter, compliance noise monitoring must be undertaken on an annual basis. b. All noise monitoring must be submitted to the Consent Authority within two weeks of completion of each monitoring event. c. If compliance with Condition 13.1 is not achieved, the Consent Holder must: i. investigate the reasons for non-compliance and within 20 working days implement additional mitigation measures to achieve compliance with those noise limits. ii. submit a report to the Consent Authority within 30 working days of the relevant monitoring event detailing the additional mitigation measures that were implemented. d. If additional mitigation measures are implemented, the Consent Holder must engage a suitability qualified and experienced acoustic consultant to undertake further compliance noise monitoring within 10 working days of any mitigation measure being implemented to determine the effectiveness of that mitigation.

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	e. If compliance with Condition 13.1 is still not achieved the Consent Holder must repeat the requirements of c. and d. until compliance is achieved.
12.5	Mining operations must utilise the best practicable option to minimise noise at all times. This includes: a. Replacement of worn machinery parts, maintenance of mufflers, lubrication of moving machinery to avoid squeaks and squeals, and appropriate operation of all equipment. b. Vehicles or equipment must not be fitted with tonal reversing alarms. c. Where reversing alarms are required, broadband reversing alarms must be used.
13.0 Avian Management	
13.1	a. Prior to and during each breeding season, the Consent Holder shall undertake regular surveys of all areas scheduled for mining to identify any bird breeding or nesting activity. Where surveys indicate that nesting is likely to occur, the Consent Holder shall implement appropriate deterrence measures, including walkovers, visual cues, audio bird scarers, and strategic placement of machinery, to discourage birds from establishing nests. Advice Note: • *Conditions relating to the Avian Management Plan are Conditions 13.7 – 13.9.*
13.2	Staff, contractors and visitors associated with the mining activity must not be permitted to bring dogs to the site at any time, except for conservation purposes.
13.3	a. The Consent Holder must deploy wildlife cameras at low spots and creek mouths along the coastal edge of the mine disturbance area as required to monitor for Kororā at locations likely to experience activity as determined by a suitably qualified ecologist and set to record for at least 10 nights every month. b. The cameras must be equipped with motion sensors and be installed by a suitably qualified ecologist. c. Imagery must be reviewed for wildlife interactions at least weekly by a suitably qualified ecologist, retained for a minimum of 6 months, and be made available to the Consent Authority or the Department of Conservation on request.
13.4	a. Any interactions with wildlife recorded as a result of the monitoring requirements in the Avian Management Plan including the wildlife cameras required by Condition 13.3, must be reported to the Consent Authority and the Department of Conservation on a weekly basis from 1 November to 31 January each year, and on a monthly basis from 1 February to 31 October. b. Footage must be made available to the Department of Conservation and the consenting authority as set out in Condition 13.3.
13.5	a. The Consent Holder must engage a suitably qualified expert to carry out annual penguin surveys of Pakiroa beach and the mine area using a certified conservation dog within 500m of the mining disturbance area to detect the presence of Kororā.

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	b. The first survey must be conducted within the first 12 months of the commencement date of the resource consent, and at least two annual surveys must be completed before mining commences. c. If penguins or burrows are detected the location must be mapped and the Consent Holder must undertake the following management actions: i. If penguins are detected using the mining area to access other habitats, any existing access ways must be maintained and/or works affecting that accessway must be completed in the period April – June (outside the breeding and moult period). ii. Any potential penguin burrows identified must be investigated, including use of a burrowscope, to determine whether Kororā are using them. iii. Where any penguin burrows are compromised by mining (i.e. there are direct effects), replacement artificial burrows or nest boxes must be installed at a rate of 2:1. Any additional nest boxes provided must be located within the vegetated coastal foreshore habitat associated with any identified accessways. iv. If penguins are found within the application site, a specific Penguin Management Plan must be developed by a suitably qualified and experienced ecologist on behalf of the applicant in consultation with the West Coast Penguin Trust. The West Coast Penguin Trust must be reimbursed for reasonable time and expenses associated with consultation on the Penguin Management Plan. v. Any deceased penguins found on or near the mine site must be provided to the Department of Conservation for necropsy. ***Advice Note:*** • *If a certified conservation dog is unavailable or unable to complete the survey, human surveys and increased camera monitoring will be undertaken in accordance with the advice of a suitably qualified ecologist.*
13.6	a. The Consent Holder must erect and maintain a moveable penguin fence around the perimeter of the mining areas identified in the current Annual Work Plan to deter Kororā from entering hazardous areas. b. The penguin fence must be comprised of geosynthetic mesh to a height of at least 900mm above ground and buried at least 300mm below the ground and with posts no greater than 4m apart. c. The fence installation must be certified by a suitably qualified ecologist as preventing the ingress of Korora to the active mine disturbance area. d. The certification must be supplied to the Consent Authority prior to mining commencing. e. Upon completion of all mining activities and associated site rehabilitation, all penguin fencing must be removed. Advice Note: • *The requirement to erect a penguin fence only applies if Kororā are detected within 500m proximity of the active mining disturbance area. If no Kororā are detected within 500m of the active mine disturbance area a penguin fence is deemed unnecessary.*

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13.7	The Consent Holder must conduct activities on site in general accordance with an Avian Management Plan (AMP) prepared by a suitably qualified ecologist or ornithologist. The objectives of the AMP are: a. To ensure adverse effects on the threatened and at risk birds present in the vicinity of the site and any other threatened and at risk species detected by subsequent monitoring are avoided. b. To ensure significant adverse effects on important bird habitats adjoining the mining site and the coastal margin are avoided. c. To ensure safe ongoing use of the site and its environs by the birds which currently occur in the area. Advice Note: • *All Management Plans are required to adhere to the requirements of Condition 6.0.* • *Threatened or at-risk bird species refers to the Conservation Status according to the Department of Conservation's Threatened Classification System.*
13.8	The AMP must detail: a. A description of the site and surrounding avian habitats b. A description of the threatened and at risk indigenous birds likely to be present in these habitats and which species require specific mitigation measures c. A description of the mitigation measures that are required to be implemented to avoid effects on threatened and at risk indigenous birds . d. A procedure for managing and responding to Westland Petrel or other wildlife being found on the mine site; e. Details of the penguin fence described in condition 13.6. f. A description of the monitoring requirements to assess the effectiveness of the AMP.
13.9	The AMP must be reviewed annually by the Consent Holder. Any proposed amendments to the AMP must be submitted to Council for certification and must: a. Achieve the AMP's objectives including avoiding effects on any threatened or at-risk indigenous bird species; b. Comply with the conditions of this resource consent; c. Have been reviewed by an appropriately qualified and experienced ecologist or ornithologist; d. Have been provided in advance to Te Rūnanga o Ngāti Waewae and the Buller/Kawatiri (for Tāiko) and the Greymouth (for other wildlife) office of the Department of Conservation for comment (and feedback received collated and submitted with the amendments to be provided to Council); and

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	e. Follow the certification process set out in Condition 6.1. Advice Note: • *Any disturbance or relocation of avifauna may require a permit from the Department of Conservation under the Wildlife Act (1953).*
13.10	a. The Consent Holder must engage a suitably qualified expert(s) to undertake all monitoring of avian species from the commencement of consent until at least one year following the cessation of mining activities on this site. b. The monitoring must be carried out in accordance with the monitoring requirements in the AMP.
13.11	An annual bird management report must be provided to the Consent Authority, Te Rūnanga o Ngāti Waewae, the Buller/Kawatiri and Greymouth offices of the Department of Conservation in Westport, the West Coast Penguin Trust, Paparoa Wildlife Trust, the Community Liaison Group and Waka Kotahi NZ Transport Agency Environment and Sustainability Team (via: environment@nzta.govt.nz), no later than 30 June each year. The report must include the following matters: a. The timing and duration of any mining within 100m of the proposed SNA Site PUN-049; b. Results of seasonal bird surveys at the site; c. Timing of nest detection surveys and observations relating to nesting or other behaviours observed within the area to be mined; d. Efforts to deter any attempts at nesting within the area to be mined and the outcome of those efforts; e. Species attempting to nest within the area to be mined (including threatened and at risk species); f. Date of first nesting attempts (if any) for threatened and at risk species within the area to be mined; g. Number and location of nesting attempts by threatened and at risk species within the area to be mined; h. Outcome of individual nesting attempts by threatened and at risk species within the area to be mined; i. Results of annual kororā surveys on Pakiroa Beach, the implications for mine operations and any management actions undertaken; j. Number, dates and location of any mining operation vehicle strikes or near misses involving the Westland Petrel or Korora; k. Autopsy outcomes for any dead Westland Petrel or Kororā collected; l. The findings of any lighting audits undertaken during the year and steps taken to resolve any issues identified;

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	m. A summary of any revisions made to the AMP and the reasons for the changes; n. The date and duration of any operational shut-downs; and o. The results of the quarterly walk-through surveys of birds using the lagoon area.
14.0 Lizard Management	
14.1	The Consent Holder must conduct activities on site in general accordance with a Lizard Management Plan (LMP) prepared by a suitably qualified ecologist. The objective of the LMP is to avoid, remedy or mitigate adverse effects on indigenous lizards present within the project area.
14.2	The LMP must include (but is not limited to): a. Survey of lizard species and habitats within the site; b. Methods for lizard capture, salvage, and relocation; c. Identification of release sites and habitat enhancement measures; d. Timing of works to minimise impacts on lizards; e. Monitoring and reporting requirements; f. Contingency procedures if lizards are discovered during works.
14.3	Site works must not commence until the Consent Authority has certified the LMP.
15.0 Native Freshwater Fish Management	
15.1	The Consent Holder must conduct activities on site in general accordance with a Native Freshwater Fish Capture and Relocation Plan (NFFCRP) prepared by a suitably qualified freshwater ecologist. The objective of the NFFCRP is to avoid, remedy or mitigate adverse effects on native fish present within the project area.
15.2	This NFFCRP must detail how native fish will be salvaged and relocated prior to streamworks commencing and must include but not be limited to: a. Methodologies to capture fish within the impact streams and wetland habitats, or justification there is no habitat for native fish present at the time of earthworks; b. Fishing effort; c. Details of the relocation site; d. Storage and transport measures including prevention of predation and death during capture; e. Euthanasia methods for diseased or pest species,
15.3	Streamworks must not commence until the Consent Authority has certified the NFFCRP.

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16.0 Landscape Mitigation and Rehabilitation	
16.1	a. As soon as practicable following the commencement date of this consent, and prior to the commencement of mining, the Consent Holder must construct bunds and complete planting and fencing in accordance with the "Landscape Mitigation Package" prepared by Glasson Huxtable Landscape Architects dated February 2026, REV C (Schedule 2).
16.2	New bunds are to be constructed 3.0 metres high and 24 metres wide with an inward facing grassed slope and dense planting on the crest and outward facing slopes. While primarily required for noise mitigation, the bunds will also provide visual screening. Bunds are to be located: a. On the western boundary of Lot 2 DP2178. b. Near the bottom of Warren Road (with a separation at Granite Creek). c. On the northern side of Cargill Road at the eastern boundary. d. On the southern side of Cargill Road, alongside the western boundary of 114 Cargill Road. The above areas are illustrated within the "Landscape Mitigation Package" prepared by Glasson Huxtable Landscape Architects dated February 2026, REV C (Schedule 2).
16.4	Vegetation to be retained includes: a. The stand of Old Man Pines and the large cluster of vegetation near the consented WCP. b. Clusters of vegetation along the eastern application area boundary north of Cargill Road. c. The patch of vegetation adjacent to 101 Cargill Road. d. The stand of Old Man Pine and other riparian vegetation adjacent to Granite Creek. The above areas are illustrated within the "Landscape Mitigation Package" prepared by Glasson Huxtable Landscape Architects dated February 2026, REV C (Schedule 5).
16.5	Plant species selection, grades, spacing, densities and quantities, along with the planting methodology must adhere to the guidance provided in the Landscape Planting Plan to be prepared under condition 6.0.
16.6	The Consent Holder must source plants required for mitigation and rehabilitation planting from within the Punakaiki Ecological District or North Westland Ecological Region in order of preference. Where this is unable to be achieved, the Consent Holder must notify the Consent Authority and work with the Consent Authority and a suitably qualified Landscape Architect or Ecologist to determine an appropriate alternative plant source.
16.7	The wetland construction, Granite Creek riparian planting, and creek and drainage riparian planting must be undertaken and managed in accordance with the Landscape Mitigation Package" prepared by Glasson Huxtable Landscape Architects dated February 2026, REV C (Schedule 2) and the further details to be provided in the Landscape Management Plan and Rehabilitation Plan to be prepared under condition 6.0.
16.8	The Rehabilitation Management Plan must include:

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	a. A description of the site; b. A description of the riparian planting required by Conditions 16.5; c. A final wetland design that, when the planting required in Condition 16.6 achieves an area of at least 50ha with the following habitats: i. At least 5.2ha of shallow marsh with an average depth of 0.4m ii. At least 2.8ha of mid-depth water with an average depth of 1m iii. At least 5.3ha of deep open water with an average depth of 2m iv. At least 15.3ha of flaxland and dry edge vegetation v. At least 5.3ha of Carex Rushlands vi. At least 15.6ha of Raupo vii. At least 4.1ha of raised islands d. Wetland construction methodology, including details of the pre-mining and post-mining areas of the constructed wetland; e. Site preparation requirements for the wetland and riparian planting; f. Planting methodology for planting and establishment of the wetland and riparian areas; g. Monitoring and maintenance requirements to ensure the survival and ecological functioning of the constructed wetland, including pest and weed control; h. A timeline for the planting which aligns with conditions 16.1 to 16.7.
16.9	The Landscape Management Plan must include: a. Detailed planting areas (m2 amounts) for areas such as bunds and screening planting not covered by the Rehabilitation Plan. b. Plant species (common name and botanical name), grades, spacing/densities and quantities. c. Planting specifications (with a particular focus on planting methodology and maintenance). d. Staging of planting (pre-mining, during mining and post mining). e. Typical planting and fencing details.
16.10	Each plant shall be of nursey stock and be of good form that is true to species. Plants shall be healthy, vigorous and free of disease, injury, parasites or insects and not root bound.
16.11	All new planting areas required by this consent including wetlands and riparian areas shall be fenced off with stock proof post and wire fencing immediately following planting.
16.12	All planting must be maintained for the duration of the consent. Maintenance includes weeding, spraying, staking, watering, fertilising, trimming, pest removal and plant replacement. The aim is to have plants which are vigorous and thriving, thereby providing effective screening and rehabilitation.
16.13	Any plants that are dead, diseased, fail to thrive or are damaged must be replaced with the same or similar plant species within the following planting season.

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16.14	The existing mature flax and raupo located within the site will be utilised where possible for direct vegetation transfer associated with the constructed wetland.
17.0 Lighting	
17.1	Fixed lighting must not exceed 2.0 lux spill (horizontal and vertical) of light onto any adjoining property, measured at any point more than 2m inside the boundary of the adjoining property or the closest window on the adjoining property whichever is the closest.
17.2	Lighting must be designed in a manner which adheres to the Australian Government's National Light Pollution Guidelines for Wildlife January 2023 (or subsequent revision); including but not limited to: a. All fixed lighting must be directed downward, shielded to avoid light spill outside of permitted limits, operate primarily in the yellow orange spectrum, and be filtered to reduce blue and violet wavelengths; b. Lights must only illuminate the object or area intended; c. Fixed lights must be mounted as close to the ground as practicable while still achieving site lighting requirements; d. External lighting must be minimised on the seaward side of buildings to minimise light spill toward the coast; and e. External lighting must use the lowest intensity lighting possible, while ensuring compliance with workplace health and safety requirements.
18.0 Accidental Discovery Protocol	
18.1	Immediately following the discovery of material suspected to be a taonga, kōiwi or archaeological site the following steps shall be taken: a. All works on the site will cease immediately at that place and within 20m around the site. b. Immediate steps will be taken to secure the site to ensure the archaeological material is not further disturbed. c. The contractor/works supervisor/owner will notify the Rūnanga, Council and the Area Archaeologist of Heritage New Zealand. In the case of kōiwi (human remains), the New Zealand Police must be notified. d. The Rūnanga and Heritage New Zealand will jointly appoint/advise a qualified archaeologist who will confirm the nature of the accidentally discovered material. e. The contractor/works supervisor/owner will also consult the Rūnanga on any matters of tikanga (protocol) that are required in relation to the discovery and prior to the commencement of any investigation. f. If kōiwi (human remains) are uncovered, in addition to the steps above, the area must be treated with utmost discretion and respect, and the kōiwi dealt with according to both law and tikanga, as guided by the Rūnanga. Remains are not to be moved until such time as Rūnanga, NZ Police and Heritage New Zealand have responded.

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	g. Works in the site shall not recommence until authorised by the Rūnanga, Heritage New Zealand (and the NZ Police in the case of kōiwi). h. All parties will work towards work recommencing in the shortest possible timeframe while ensuring that any archaeological sites discovered are protected until as much information as practicable is gained and a decision regarding their appropriate management is made, including obtaining an archaeological authority under the Heritage New Zealand Pouhere Taonga Act 2014 if necessary. Appropriate management may include recording or removal of archaeological material. i. Although bound to uphold the requirements of the Protected Objects Act 1975, the contractor/works supervisor/owner recognises the relationship between Ngāi Tahu whānui, including its Rūnanga, and any taonga (Māori artefacts) that may be discovered. Where Rūnanga so request, any information recorded as a result of the find such as a description of location and content, is to be provided for their records.
General Conditions to Apply to all West Coast Regional Council Consents	
20.0 Method of Mining	
20.1	The consent holder must only carry out mining activities within the mining area shown on the attached map titled "Tāiko Fast-track Application" prepared by Tai Poutini Professional Services Ltd dated [*insert date here*] attached as Schedule 1.
20.2	The maximum combined surface area of un-rehabilitated disturbed land in the application area must not exceed 16.0 hectares at any one time.
20.3	The mining and associated activities under this consent must not cause or induce erosion or slope instability outside the mining area (during operations), or the application area as part of final rehabilitation.
21.0 Erosion and Sediment Control Plan	
21.1	The Consent Holder must operate in general accordance with the Erosion and Sediment Control Plan labelled 'Barrytown Mineral Sand Operation Erosion and Sediment Control Plan and Water Management' (ESCP) prepared by Ridley Dunphy Environmental Ltd, dated [*insert date here*]. The objectives of the ESCP are: a. To use established guidelines and practices to minimise sedimentation of waterbodies adjacent to the mining area; b. To assist with compliance with the water quality parameters in Condition 24.
21.2	A Site Specific Erosion and Sediment Control Plan (SSESCP) must be prepared and reviewed annually and submitted to the Consent Authority with the Annual Work Programme, reflecting the water management measures proposed for construction and mining for the following 12 months, and adhering to principles of the Erosion and Sediment Control Plan in Condition 21.1 above. The SSESCP must include: a. Location of the work; b. Contour information; c. Erosion and Sediment Controls (ESCs);

	d. Chemical treatment requirements, design and details; e. Internal catchment boundaries; f. Details of earthworks and ESC construction methods; g. Contingency measures; h. ESC design details; i. A programme for managing non-stabilised areas; j. The identification staff who will manage ESCs; k. The identification of staff who monitor compliance with consent conditions; l. A chain of responsibility for managing erosion and sediment control issues; and m. Methods and procedures for decommissioning ESCs (if applicable).
22.0 Water Management Plan	
22.1	The Consent Holder must operate the mine in general accordance with a Water Management Plan (WMP) prepared by a suitably qualified hydrologist. The objectives of the Water Management Plan are: a. The rate of take of water from Canoe Creek gallery is not greater than 10% of Canoe Creek's MALF. b. The groundwater level in the mining void will not be manipulated to materially lower or raise pond water levels beyond 20% of baseline dredge pond water depth. c. Pumping of groundwater will be minimised by avoiding dewatering and associated water table lowering while excavating saturated material within the void down to the economic mineral grade limit or maximum reach depth of the dredge. d. Water pumped from the void will be conveyed to the WCP. Water will be ordinarily pumped back to the dredge pond tailings zone to achieve the hydrological effect management goals and the objective in ii above. e. The quality of any groundwater that could enter surface water or coastal water or Wasabi Springs will be monitored to confirm that it meets standards which are consistent with Hydrological effects goal III in 6.1 of the Water Management Plan. f. Detailed design information for the water management system shall be issued to WCRC for review and comment at least 16 weeks prior to the start of mining operations. Design information will include design drawings of the infiltration trenches and basin. g. The rate of take of water will be monitored in accordance with the Resource Management (Measurement and Reporting of Water Takes) Regulations and the pumping rate will be restricted to 63 L/s instantaneous rate, and 5,400 m^3/d or 62.5 L/s on a daily basis. The maximum rate of take is anticipated to be required for infrequent periods of up to 7 days. It is also anticipated that the long-term abstraction rate would be less at 9.5 L/s.

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	h. The rehabilitated mine area will provide for the establishment of a large wetland complex in the east of the former mining area. Advice Note: • *All Management Plans are required to adhere to the requirements of Condition 6.0.*
22.2	The WMP must include a description of the water management methods for the site, including: a. A description of the baseline monitoring and the receiving environment; b. The proposed mine disturbance area; c. A description of all site activities with the potential to cause hydrological impacts; d. The water management actions that will be implemented to avoid hydrological effects, including: i. The water treatment train, including settling infrastructure; ii. The return of limed water to the mining void; e. Operational water level and water quality monitoring requirements for the duration of the activity; f. Groundwater level thresholds and actions to be taken should these thresholds be exceeded; g. Surface water body flow threshold for Canoe Creek and actions to be taken should that threshold be exceeded; h. Actions to be taken if water quality thresholds are exceeded; i. Final Rehabilitation requirements to avoid adverse hydrological impacts on waterbodies post-mining; j. Audit checklists; k. An organisational chart showing staff and contractor positions and responsibilities for plan implementation; and l. Relevant training and induction procedures and schedules.
22.3	The WMP must be updated on an annual basis and must be submitted to the Consent Authority for certification in accordance with condition 6.0. The annual update is required to: a. reflect the proposed mining operations for the following 12 months; and b. provide any additional or amended monitoring and mitigation requirements in order to reduce the potential for adverse hydrological and/or water quality effects.
Conditions to Apply to WCRC Discharge Permit	

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23.0 Method of Discharge during mining activity

23.1

During mining, treated mine water is only permitted to be discharged directly to the mining void, and from the Mine Water Facility, if:

a. metal and metalloid water quality parameters in Table A below are complied with at the sites shown in Schedule 3; and
b. the non-metal water quality parameters in Table B below are complied with at the sites shown in Schedule 3 (as required by Condition 23.2) and the locations defined in Table B.

Table A - metals and metalloids

Parameter	Threshold mg/L	Dependency
Aluminium	0.62[B]	Hardness, pH, Dissolved Organic Carbon
Arsenic	0.013	As arsenic (V)
Boron	0.94	NA
Cadmium	0.0002[D]	Hardness
Chromium	0.0033[D]	Hardness, as chromium (III)
Copper	0.0039[E]	Hardness, pH, Dissolved Organic Carbon
Iron	1.0	As total fraction
Lead	0.0034[D]	Hardness
Manganese	1.9	NA
Nickel	0.011[D]	Hardness
Zinc	0.008[D]	Hardness

[A] dissolved fraction, unless stated

[B] at hardness = 25 g/m^3, pH = 7.0, Dissolved Organic Carbon = 1.0 g/m^3

[C] 95%-ile trigger value

[D] at hardness = 30 g/m^3

[E] at hardness = 25 g/m^3, pH = 7.0, Dissolved Organic Carbon = 2.0 g/m^3

Table B – Non-metals

Parameter	Threshold	Notes/Monitoring Location
Turbidity	20 NTU	Applies to discharges to Northern Creek, Central Creek, Granite Creek downstream, Unnamed Creek north of

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			Cargill Road, Wasabi Creek and Southern Creek, shown in Schedule 3.
	Visual clarity	Conspicuous visual change	In the receiving water bodies of Northern Creek, Central Creek, Granite Creek downstream, Unnamed Creek north of Cargill Road, Wasabi Creek and Southern Creek as shown in in Schedule 3.
		Relevant NPS-FM (2020) attribute state for visual clarity	No change in the attribute states of the receiving surface water bodies, as an annual median and a 95%-ile, versus the baseline states. See advice note b below. Monitoring locations are Northern Creek, Central Creek, Granite Creek downstream, Unnamed Creek north of Cargill Road, Wasabi Creek and Southern Creek shown in Schedule 3.
	Dissolved Reactive Phosphorus (DRP)	Relevant NPS-FM (2020) attribute state	No change in the attribute states of the receiving surface water bodies, as an annual median and a 95%-ile, versus the baseline states. See advice note b below. Monitoring locations are Northern Creek, Central Creek, Granite Creek downstream, Unnamed Creek north of Cargill Road, Wasabi Creek and Southern Creek shown in Schedule 3.

Advice Notes:

- *Water quality monitoring conditions to establish the ability to discharge under this condition are contained in Condition 24.0 below.*
- *The attribute state for visual clarity and DRP must be either*
  - *a) defined via at least 12 months of baseline monitoring in Northern Creek, Central Creek, Granite Creek downstream, Unnamed Creek north of Cargill Road, Wasabi Creek and Southern Creek; or*
  - *b) assumed to be of pristine water quality (A Band).*
- *In the case of a), the monitoring data and attribute state assessment must be submitted to WCRC for approval at least 4 weeks prior to the start of mining operations.*

23.2	The Consent Holder must ensure that discharges to surface and groundwater do not contain any contaminants other than suspended sediments, naturally occurring elements and metals, and water treatment chemicals in accordance with Conditions below: a. The use of any water treatment chemical(s) is/are permitted provided they are used in accordance with its Material Safety Data Sheet(s) (MSDS). b. The Consent Holder must notify the Consent Authority in writing and provide the respective MSDS of any water treatment chemical(s) used in accordance with the above condition before it is used.
23.3	The Consent Holder must take all practicable measures to prevent uncontaminated stormwater entering the mine workings and disturbed areas to reduce the volume of water

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	passing through the mining pond/settling pond system, and to improve the efficiency of the water reticulating system.
24.0 Water Monitoring	
24.1	The Consent Holder must carry out water monitoring at the locations shown in the ESCP and Water Management Plan, and as listed in the table below:

Location	**Parameter(s)**	**Frequency**
Canoe Creek @ State Highway 6	Flow	Hourly
Canoe Creek Gallery	Flow Level	Hourly 6 Hourly
Discharges to mining void @ Mine Water Facility near Wet Concentrator Plant	Flow	Continuous, Automated
Northern Creek	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others)
Central Creek (WCP)	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others)
Clarke Creek upstream	Monitoring Suite A* Visual clarity Flow	Quarterly (metals) Monthly (Others) Hourly
Little Granite Creek upstream	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others)
Granite Creek upstream	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others)
Granite Creek downstream of mining	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others) Hourly
Unnamed creek north of Cargill Road	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others)
Wasabi Creek	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others)
Wasabi Springs	Monitoring Suite A* Visual clarity Flow	Quarterly (metals) Monthly (Others) Hourly
Southern Creek	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others)

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	PZ 1	Water level and Monitoring Suite A*	6 hourly Quarterly (metals)
	PZ 2	Water level and Monitoring Suite A*	6 hourly Quarterly (metals)
	PZ 3	Water level and Monitoring Suite A*	6 Hourly Quarterly (metals)
	PZ 4	Water level and Monitoring Suite A*	6 Hourly Quarterly Metals

*Monitoring Suite A includes the following water quality indicators:

Dissolved metals	***Others***
Aluminium (Q)	EC (M)
Arsenic (Q)	pH (M)
Boron (Q)	Turbidity (M)
Cadmium (Q)	TSS (M)
Chromium (Q)	Hardness (Q)
Copper (Q)	Sulphate (Q)
Iron (Q)	Amm-N (M)
Nickel (Q)	NO_3-N (M)
Lead (Q)	Dissolved Reactive Phosphorus (M)
Manganese (Q)	
Zinc (Q)	

The Clarke Creek, Little Granite Creek and Granite Creek upstream observation locations must be upstream of the mining disturbance area.

Downstream monitoring sites will be located within the 50m buffer between MHWS and the mining disturbance area.

24.2	Notwithstanding Condition 24.1, all discharges associated with the mining operations authorised under these consents must not cause any of the following effects within any receiving waterbody measured at the downstream water quality monitoring sites in Condition 24.1: a. Any conspicuous oil or grease films, scums or foams, or floatable or suspended materials,

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	b. Any conspicuous change in the colour or visual clarity, c. Any emission of an objectionable odour, d. Any significant adverse effects on aquatic life, or e. The rendering of fresh water unsuitable for consumption by farm animals.
24.3	Sampling required under the conditions of this consent must be undertaken and analysed by suitably qualified personnel and the results supplied to the Consent Authority annually as part of the annual works programme.
24.4	An Annual Hydrological and Water Quality Report must be submitted to the Consent Authority with the Annual Work Programme in accordance with Condition 5.2 for review and evaluation of compliance. The report must be prepared by a suitably qualified and experienced person and include the following information: a. A summary of the monitoring undertaken over the preceding 12 months. The summary must: i. Reference the specific consent conditions under which the monitoring has been undertaken to show how the conditions have been complied with; ii. Provide tables of the water quality data collected in accordance with Condition 24.1. b. Discussion and evaluation of the monitoring data in relation to the relevant conditions including a summary of compliance with conditions; c. A summary of the actions that have been undertaken in response to any exceedance(s) of water quality limits; d. Records of the visual inspections that have been undertaken in accordance with Condition 24.1, 24.2 and condition 24.3.
24.5	a. The Consent Holder must engage a suitably qualified aquatic ecologist to carry out annual macroinvertebrate and fish surveys in Northern Creek, Central Creek, Clarke Creek, Granite Creek, Wasabi Creek and Southern Creek. b. The proposed survey methodology, including the locations where macroinvertebrate (taxa number and composition) and fish sampling will be undertaken, the timing of the sampling, the methods that will be used to undertake the sampling, the name of the authorised person who will undertake the monitoring and reporting methods must be submitted to the Consent Authority 20 working days prior to the survey being undertaken, for the Consent Authority to certify the survey methodology. Advice Note: • *If the Consent Authority refuses to certify the survey methodology, it is expected to give reasons in writing.* • *If the Consent Holder refuses certification the Consent Holder must resubmit the survey methodology for certification addressing any concerns of the Consent Authority.* • *Surveys must not be undertaken until certification is achieved.*

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	• *The results of the survey must be submitted to the Consent Authority within 10 working days of the results being received.* • *The surveys required by this condition are to inform baseline information about aquatic biota present within the waterbodies around the consent area and monitor long term trends in species diversity and prevalence.*
24.6	a. Macroinvertebrate monitoring required by Condition 24.5 must be conducted using Protocol P2 and C1 from the Ministry for the Environment Macroinvertebrate Guidelines and the samples must be analysed by an aquatic ecologist experienced in macroinvertebrate sampling and identification. b. Monitoring must be undertaken on a day on which there has been no major flood event in the preceding week. Whenever practicable, sites that have been sampled in the past must be used.
Conditions to Apply to West Coast Regional Council Air Discharge Permit	
25.0 Dust Management Plan	
25.1	The Consent Holder must operate the site in general accordance with a Dust Management Plan. The objective of the Dust Management Plan is to detail the best practicable option to avoid dust nuisance being caused by mining works and to mitigate any such effects should they occur.
25.2	The Dust Management Plan must include: a. Potential sources of dust that may be created during the mining project. b. Sensitive receptors in the vicinity of identified potential sources of dust for targeted dust management. c. Dust management and mitigation methods. d. Dust monitoring methods. e. Training of staff in relation to dust management; and f. Methods for managing complaints regarding discharges of dust g. Keeping of compliance records.
25.3	Vehicles travelling within the site on unsealed roads must not exceed 15 km/hr on site at all times.
25.4	If wind measured at the meteorological station on the Central Block site exceeds 20km/hr, the Consent Holder must: a. Limit activities that generate dust downwind of sensitive receptors identified in the Dust Management Plan; b. Conduct frequent visual inspections of exposed earthwork areas; and

	c. Assess the need for additional controls such as increased water application rates.
26.0 Air Quality Management and Monitoring	
26.1	There must be no offensive or objectionable discharge of dust into air from the minerals extraction, processing and loading operations that result in an adverse effect beyond the legal boundary of the site. Advice Note: • *For the purpose of Condition 28.1 the Consent Authority will consider an effect that is offensive or objectionable to have occurred if an Enforcement Officer of the Consent Authority deems it so having regard to:* *a. The frequency, intensity, duration, amount, effect and location of the suspended or particulate matter; and/or* *b. Receipt of complaints from neighbours or the public: or* *c. Relevant written advice or a report from an Environmental Health Officer of a territorial authority or health authority.*
26.2	a. The Consent Holder must install, operate and maintain [X] Dust Deposition Gauges in the locations shown in the Dust Management Plan. b. Dust recorded in the gauges must not exceed a value of 4g/m^2/30 days above background levels. c. Dust deposition gauges will operate as follows: i. Commissioned and run to collect 1 year of baseline data prior to mining commencing in respective block ii. Decommissioned 1 year after rehabilitation has been completed. iii. Gauges in the vicinity of Warren Road will be operational throughout the activity. Advice Note: • *Background levels are to be determined by data collected prior to the commencement date of this consent.*
26.3	a. If a breach of Condition 26.3.b is detected, the Consent Holder must notify the Consent Authority within two working days of the breach being detected. b. The Consent Holder must investigate possible reasons for the breach and take all necessary steps to achieve compliance in the following 30-day period.
Conditions to Apply to WCRC Water Take Permit	
27.0 Groundwater abstraction outcomes	
27.1	Mine void and water table exposure and associated mitigation measures must achieve the following outcomes: a. The hydrological responses to mining activity ensure that quality of water discharged to receiving waters will not cause adverse impacts on stream ecology or visual clarity; b. The pre-mining surface drainage patterns are restored such that the catchment areas for Clarke Creek, Granite Creek and other smaller creeks are not changed significantly;

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	c. The contouring and surface drainage installed during mine rehabilitation does not increase the rate of groundwater drainage at the site.
28.0 Diversions	
28.1	The consent holder must not commence any streamworks activity until it has obtained certification from the West Coast Regional Council for the Rehabilitation Management Plan. Advice Note: • *The Rehabilitation Management Plan is to include information on the finalised streamworks for the site. The Native Freshwater Fish Capture & Relocation Plan is to provide information on native fish relocation.*
28.2	The Rehabilitation Management Plan must include, but is not limited to, including the following streamworks information: a. Specific erosion and sediment control works for the streamworks; b. Details of construction methods (such as reclamation, diversion, channel clearance removal and construction of structures); c. Monitoring and maintenance requirements; d. Details relating to the management of exposed areas.
28.3	The Rehabilitation Management Plan must include, but is not limited to, including the following native fish relocation information: a. The timing, duration and methodologies used for fish capture and transportation; b. Specific measures for ensuring fish elsewhere in the catchment do not enter the works area; c. A description and assessment of the quantum and availability of suitable aquatic quality habitat at the relocation site; and d. The names, experience and qualifications (including any necessary permits) of those involved in undertaking the fish relocations.
28.4	The sediment and erosion controls at the site of the works must be inspected on a regular basis and within 24 hours of each rainstorm event that is likely to impair the function or performance of the erosion and sediment controls. A record must be maintained of the date, time and any maintenance undertaken in association with this condition which must be forwarded to the Consent Authority on request.
28.5	Creek and drainage construction and riparian planting must be undertaken onsite and in accordance with the approved Rehabilitation Management Plan to ensure: a. New creek and drainage channels will be constructed to: i. Ensure no loss of extent; ii. Have a meandering pattern; iii. Be formed to include run and pool habitat, and instream features including riffles and woody debris; iv. A mix of rocky and silt bottomed beds;

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	b. Riparian planting will be undertaken to: i. 5m for Granite Creek ii. Minimum of 3m for all other reconstructed creeks as shown in the Rehabilitation Management Plan; iii. Stock proof fencing erected on the outside of all riparian planting areas; iv. The Consent Holder shall ensure the on-going maintenance of any riparian planting for a period of no less than two years. This shall include on-going monitoring and eradication of woody weed species which may establish including blackberry and gorse.
28.6	a. Upon two years following permanent diversion of creek or drain flow to the new channel and completion of riparian planting, fish and macroinvertebrate surveys will be undertaken to confirm recolonisation. b. Where monitoring concludes recolonisation has not occurred, a Further Offset Works Plan shall be prepared and submitted to the Consent Authority within 2 months following the monitoring undertaken. c. The Consent Holder must implement any additional works required by the Further Offset Works Plan within 6 months following the approval by the Consent Authority or during the next planting season (whichever is appropriate to the measure adopted).
29.0 Canoe Creek water take	
29.1	The instantaneous surface water take from Canoe Creek must not exceed 63 litres per second.
29.2	The Consent Holder must undertake monitoring of the surface water take from Canoe Creek at 15 minute intervals and supply this information electronically to the Consent Authority every day, or at the interval instructed in writing by the Consent Authority. **Advice Note:** *The resource Management (Measurement and Reporting of Water Takes) Amendment Regulations 2020 applies to this water take.*
29.3	The Consent Holder must maintain auditable records and provide data in the format of date, time and rate that is suitable for electronic storage.
29.4	a. The Consent Holder must maintain the measurement device(s) in good working order so as to maintain a measurement accuracy of within ± 5% for a fully pressurised pipe or ± 10% for a partially pressurised pipe. b. The Consent Holder must provide the Consent Auhtority within initial written verification of accuracy from a suitably qualified person that the measurement device measures the volume of water to within ± 5% for a fully pressurised pipe or ± 10% for a partially pressurised pipe, and thereafter every five years for the term of the consent.
29.5	The Consent Holder must provide the following information to the Consent Authority no later than the ten working days prior to the water being taken under this consent: a. The type of measurement device(s) used to undertake the continuous monitoring together with the manufacturer's statement for that device; and b. The location of the measurement device(s) in relation to the water take point(s).

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29.6	Upon notice to the Consent Holder the Consent Authority may require the Consent Holder to cease water abstraction for a period not exceeding 48 hours, in order to undertake monitoring of natural water flows.
29.7	A fish screen on any direct surface water take must be maintained to ensure, as far as practicable, that eels, fish and fry are prevented from passing through the intake or being trapped against the screen.
29.8	The 12-year water take consent under WCRC-2023-0046 is to be offered for surrender upon commencement of this consent.

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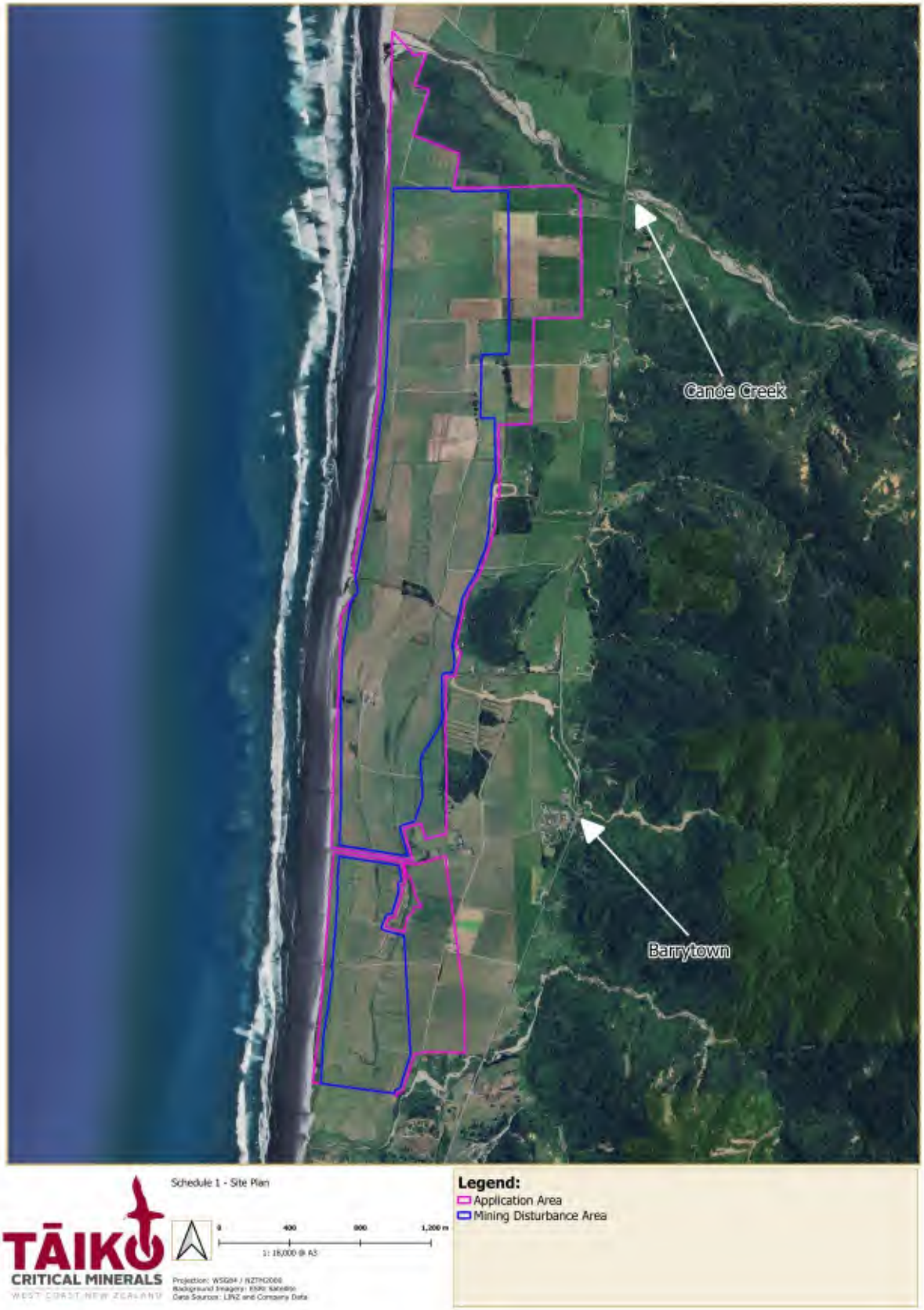
Schedule 1 – Site Plan



Schedule 2 – Landscape Mitigation Package

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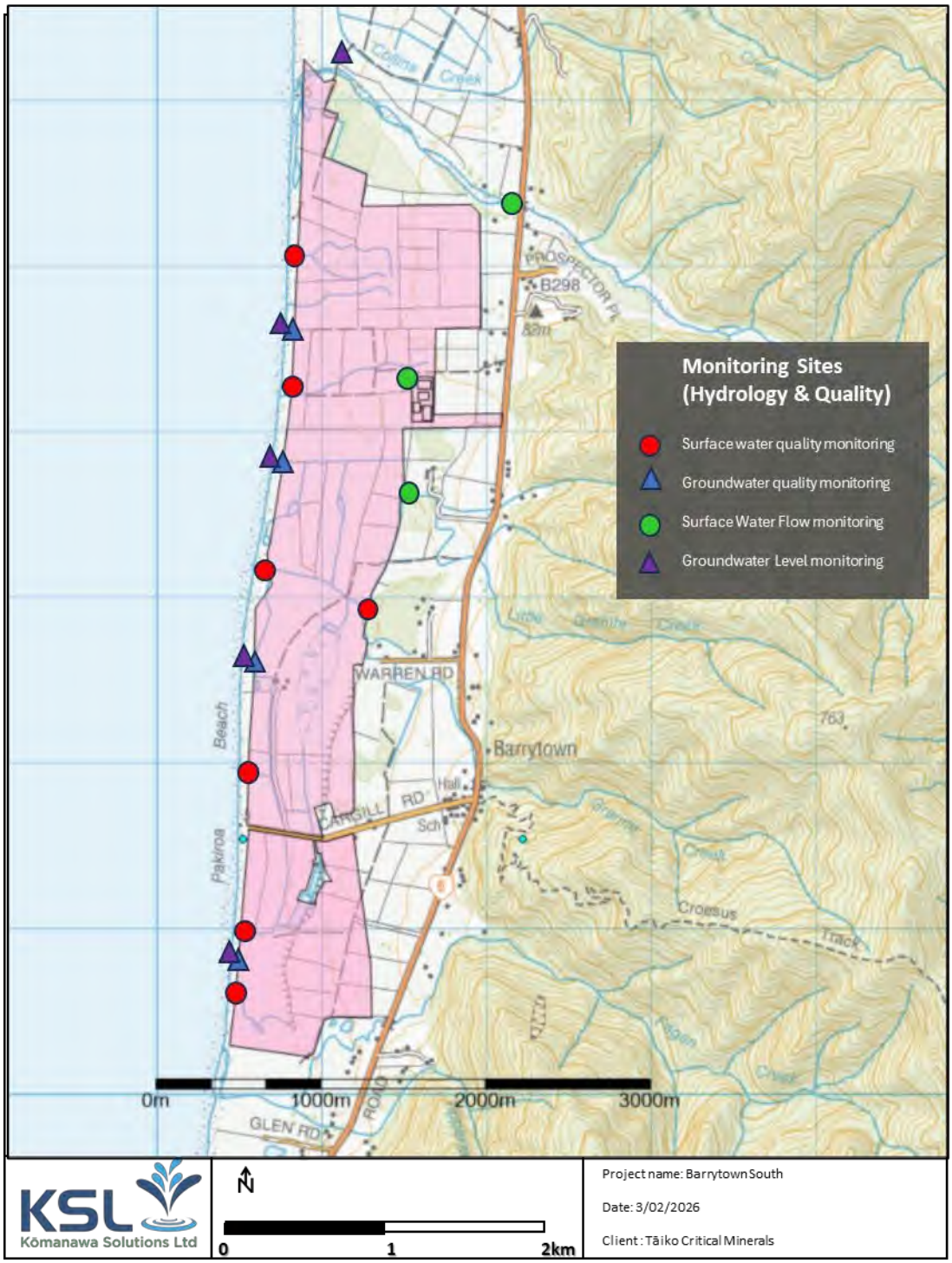
Schedule 3 – Monitoring Sites



Appendix C

Draft landscape mitigation package

GLASSON HUXTABLE
LANDSCAPE ARCHITECTS

BARRYTOWN MINERAL SANDS PROJECT:
SOUTHERN RESOURCES BLOCK

LANDSCAPE MITIGATION PACKAGE

MARCH 2026 - REVISION C

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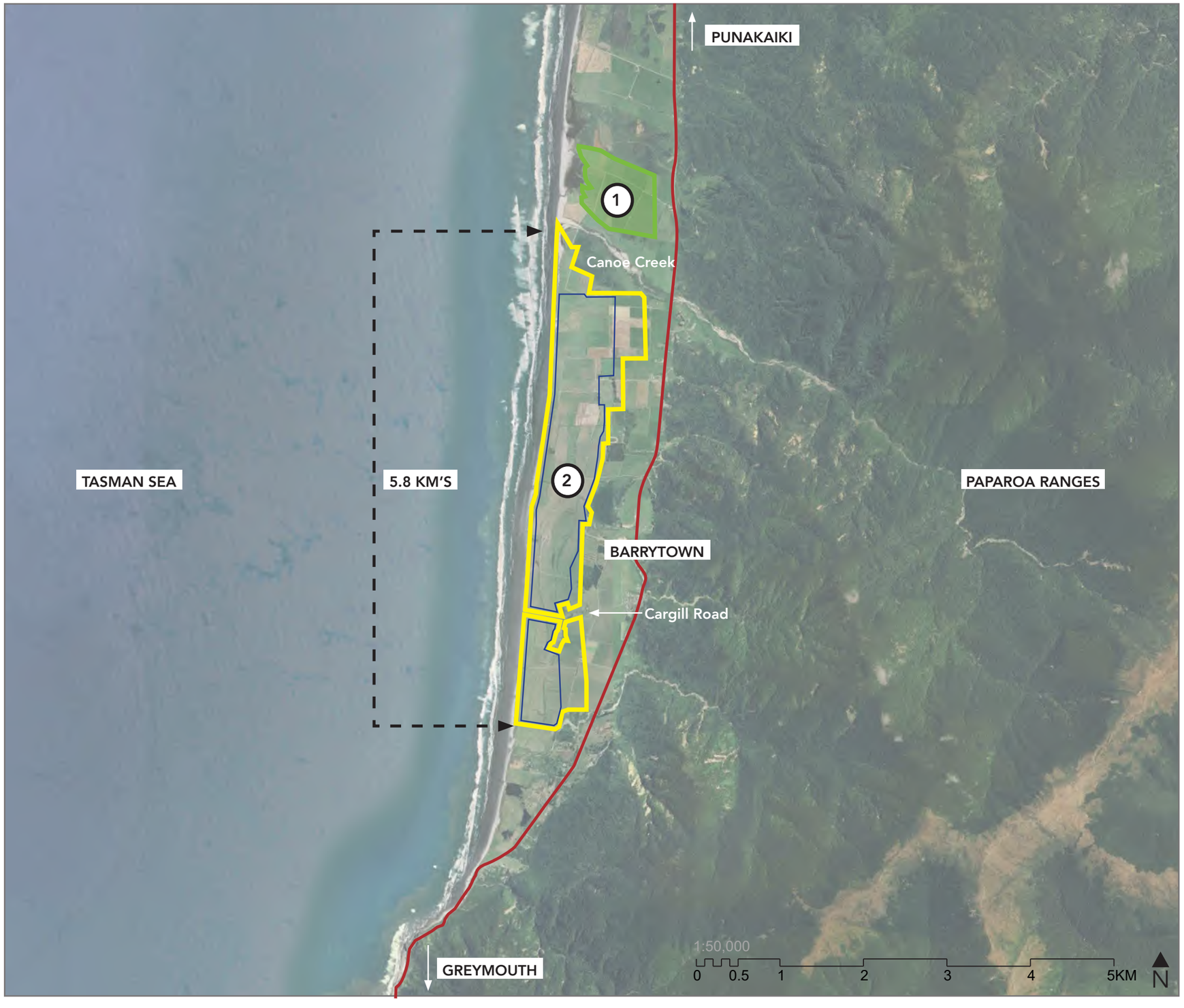
1.0 PROPOSED MINING AREA



KEY

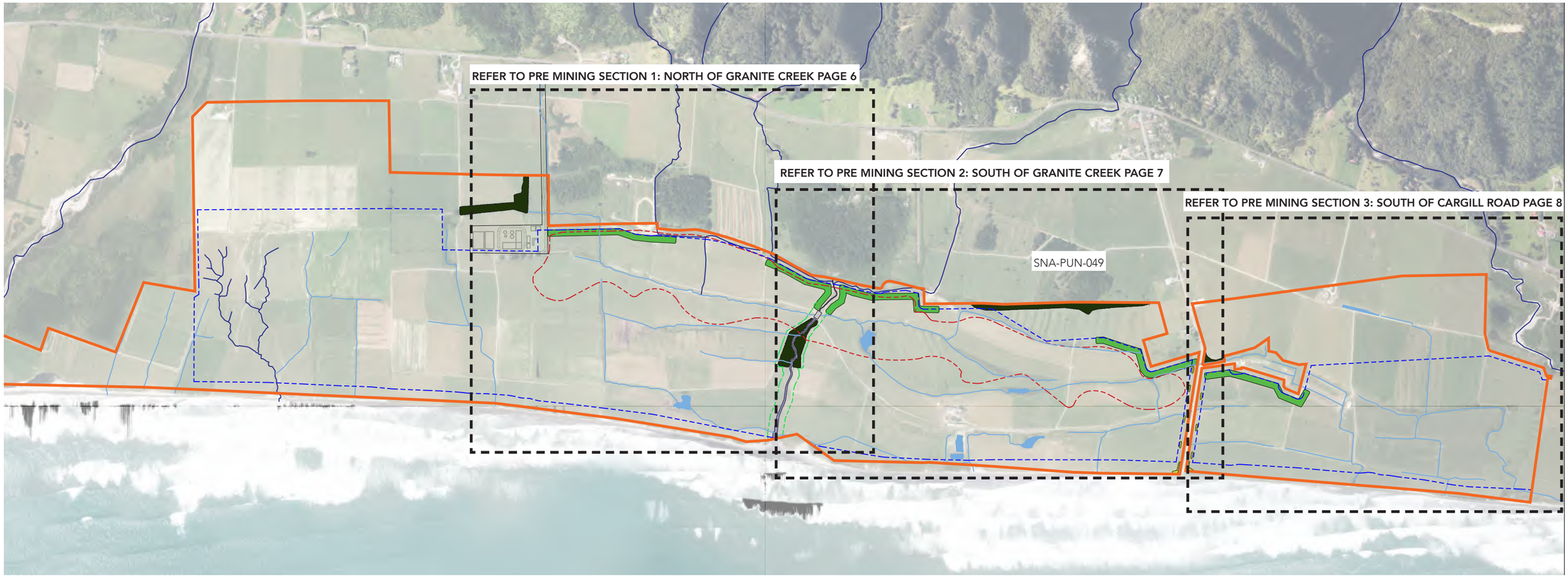
- PREVIOUS APPLICATION AREA (CONSENTED)
- PROPOSED CONSENT AREA
- PROPOSED MINING DISTURBANCE AREA
- COAST ROAD/ STATE HIGHWAY 6

1 **CENTRAL BLOCK (CB)**
A favorable decision for the CB Mineral Sands Project was delivered by commissioners in April 2024 but was subsequently appealed. A successful resolution was reached in October 2024.
This area is not part of this application.

2 **SOUTHERN BLOCK (SB)**
This area is part of this Fast Track application and includes the mining disturbance area.

LANDSCAPE MITIGATION - PRE-MINING

2.0 LANDSCAPE MITIGATION - PRE-MINING KEY PLAN



KEY

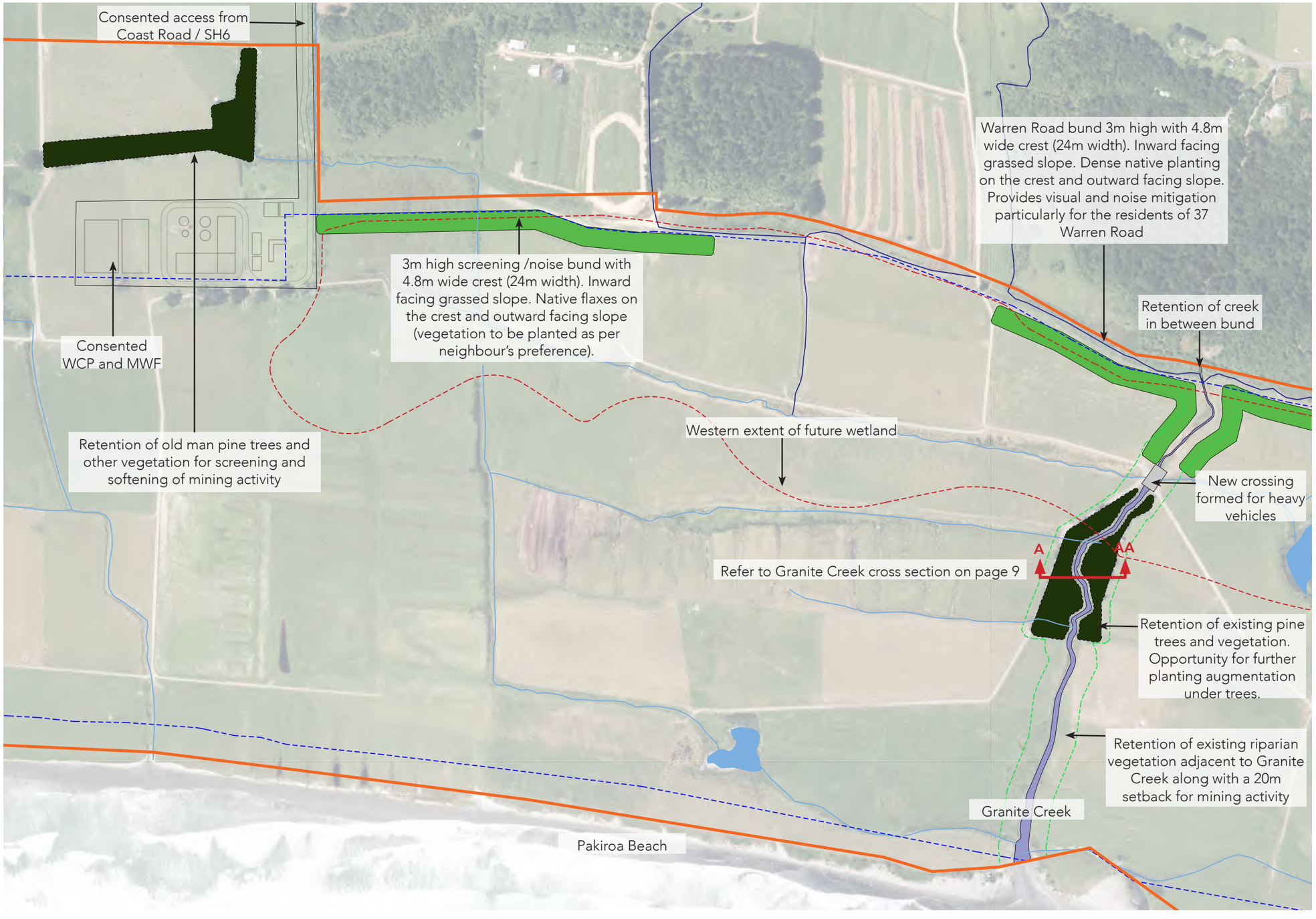
- New Native Vegetation
- Retention of Key Vegetation Areas
- New Planted Bunds (For noise and visual purposes)
- Granite Creek (To be retained)
- Consent Area
- Mining Disturbance Setback (Typically 20m Wide Unless Indicated Otherwise)
  - 20m from SNA-PUN-049
  - 20m from private property boundaries outside SRB
  - 20m from Granite Creek
  - 50m from MHWS
- 20m Setback from Granite Creek
- Existing River
- Existing Drain
- Future Wetland Area

1:15,000

0 100 500 1000 1500M N

Note:
The aim of this Pre-Mining Key Plan is to set out the different landscape areas to undergo landscape mitigation prior to mining commencing. Each of the black boxes refers to an individual sheet (page). These pages correspond with the Mining Sections (stages) outlined in the Project Description accompanying the application.

3.0 LANDSCAPE MITIGATION - PRE-MINING SECTION 1: NORTH OF GRANITE CREEK



KEY

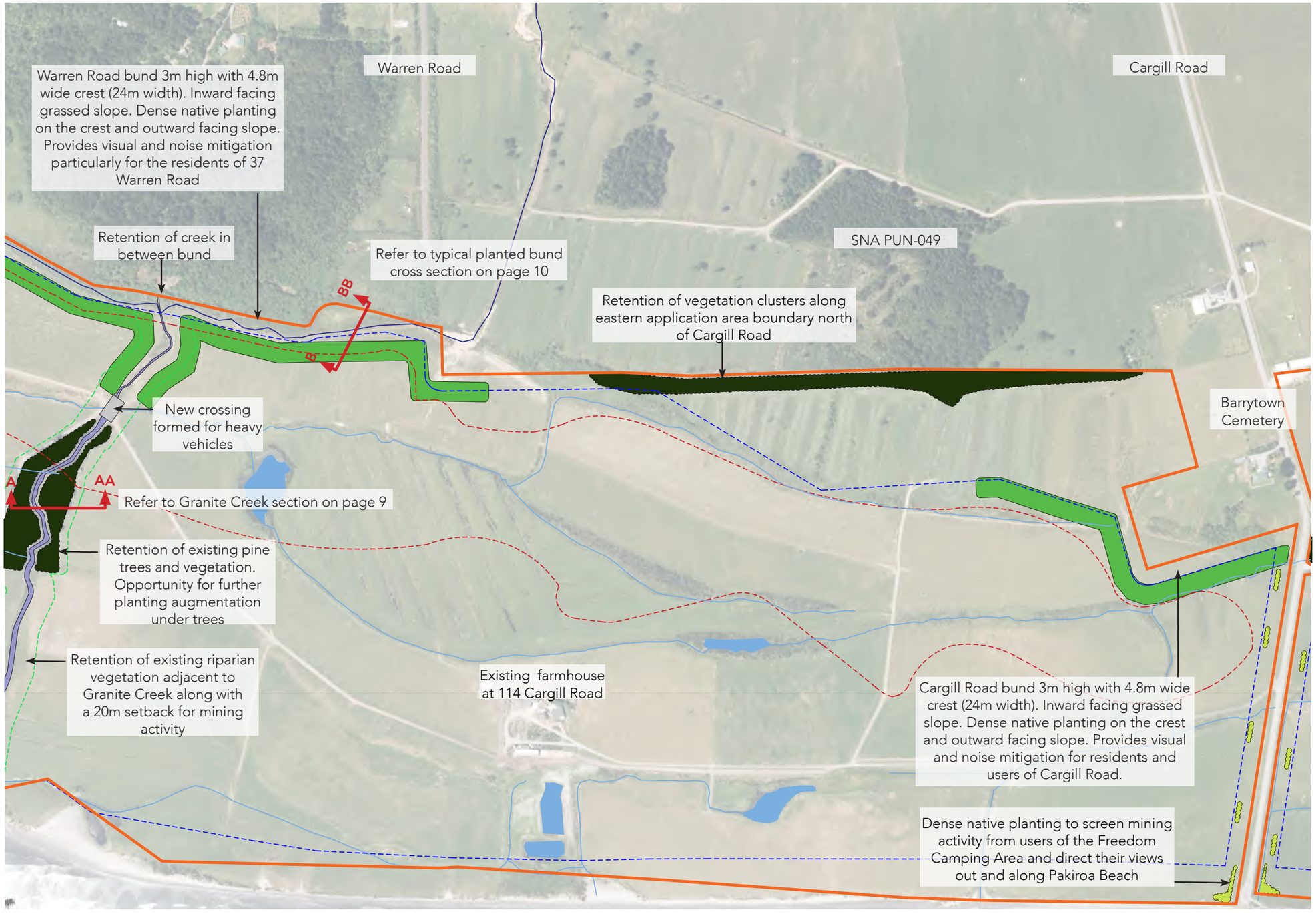
- Retention of Key Vegetation Areas
- Granite Creek (To be retained)
- New Planted Bunds (For noise and visual purposes)
- Consent Area
- Mining Disturbance Setback (Typically 20m Wide Unless Indicated Otherwise)
  - 20m from SNA-PUN-049
  - 20m from private property boundaries outside SRB
  - 20m from Granite Creek
  - 50m from MHWS
- 20m Setback from Granite Creek
- Existing River
- Existing Drain
- Future Wetland Area

1:5,000

0 50 100 200 300 400 500M N

3.0	LANDSCAPE MITIGATION	PRE-MINING SECTION 1: NORTH OF GRANITE CREEK	PROJECT NUMBER 2410	REVISION C	SCALE 1:5000@A3 1:2500@A1	DESIGN: GHLA DRAWN: EM APPVD: NC	DATE 3/03/2026

4.0 LANDSCAPE MITIGATION - PRE-MINING SECTION 2: SOUTH OF GRANITE CREEK



KEY

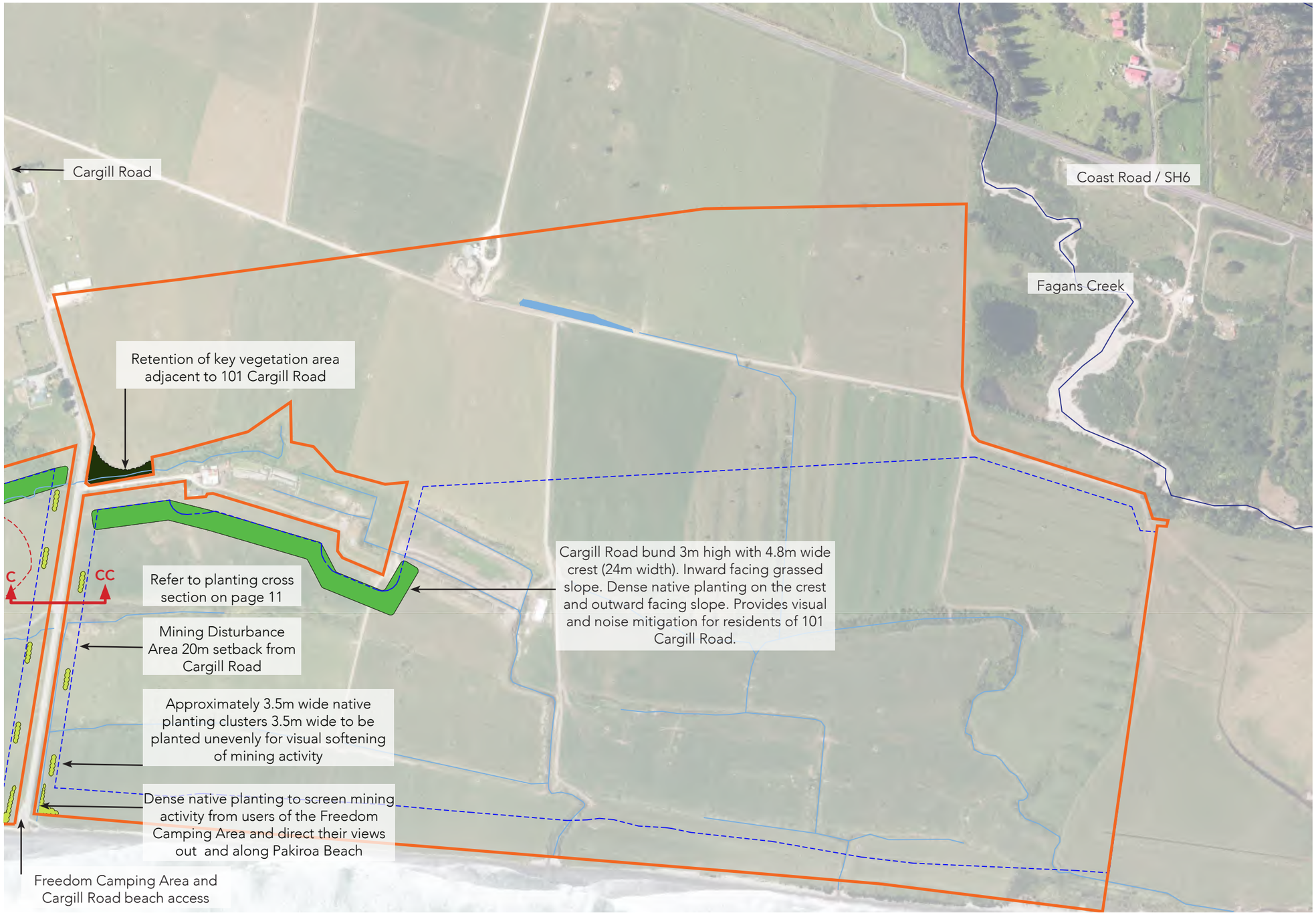
- New Native Vegetation
- Retention of Key Vegetation Areas
- Granite Creek (To be retained)
- New Planted Bunds (For noise and visual purposes)
- Consent Area
- Mining Disturbance Setback (Typically 20m Wide Unless Indicated Otherwise)
  - 20m from SNA-PUN-049
  - 20m from private property boundaries outside SRB
  - 20m from Granite Creek
  - 50m from MHWS
- 20m Setback from Granite Creek
- Existing River
- Existing Drain
- Future Wetland Area

1:5,000

0 50 100 200 300 400 500M N

4.0	LANDSCAPE MITIGATION	PRE-MINING SECTION 2: SOUTH OF GRANITE CREEK	PROJECT NUMBER 2410	REVISION C	SCALE 1:5000@A3 1:2500@A1	DESIGN: GHLA DRAWN: EM APPVD: NC	DATE 3/03/2026

5.0 LANDSCAPE MITIGATION - PRE-MINING SECTION 3: SOUTH OF CARGILL ROAD



KEY

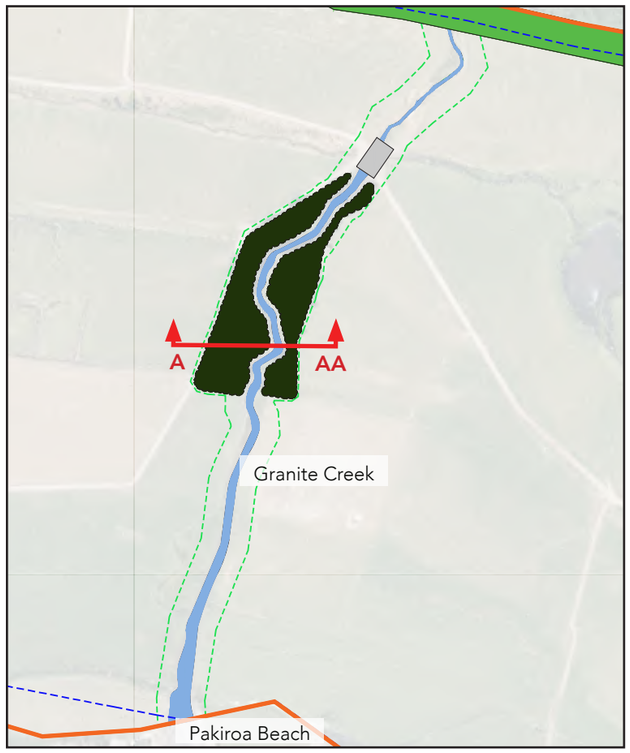
- New Native Vegetation
- Retention of Key Vegetation Areas
- New Planted Bunds (For noise and visual purposes)
- Consent Area
- Mining Disturbance Setback (Typically 20m Wide Unless Indicated Otherwise)
  - 20m from SNA-PUN-049
  - 20m from private property boundaries outside SRB
  - 20m from Granite Creek
  - 50m from MHWS
- 20m Setback from Granite Creek
- Existing River
- Existing Drain

1:5,000

0 50 100 200 300 400 500M N

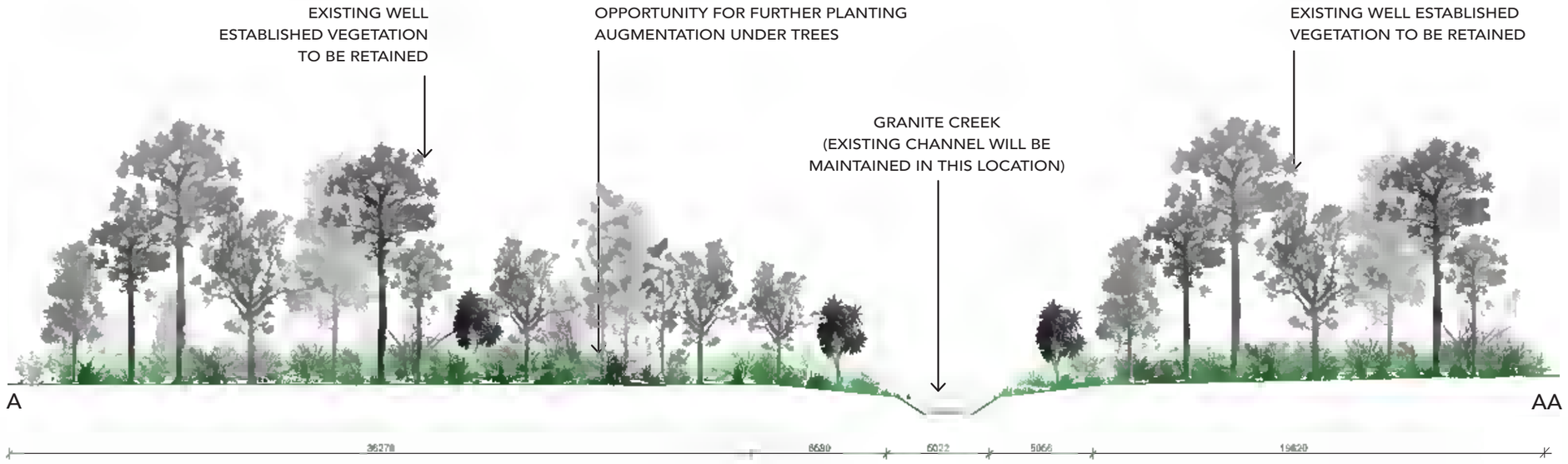
5.0	LANDSCAPE MITIGATION	PRE-MINING SECTION 3: SOUTH OF CARGILL ROAD	PROJECT NUMBER 2410	REVISION C	SCALE 1:5000@A3 1:2500@A1	DESIGN: GHLA DRAWN: EM APPVD: NC	DATE 3/03/2026

6.0 LANDSCAPE MITIGATION - PRE-MINING GRANITE CREEK



Existing planting adjacent to Granite Creek (to be retained)

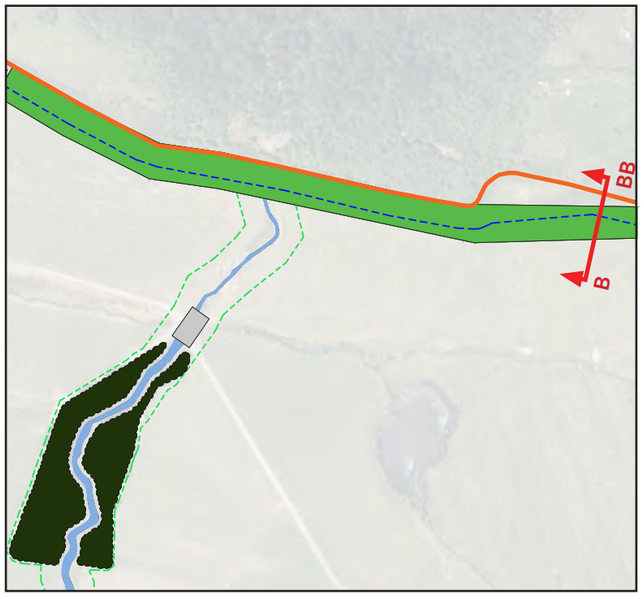
KEY PLAN - PRE MINING SECTION 1 FROM PAGE 6



SECTION A-AA_GRANITE CREEK SECTION - VEGETATION TO BE RETAINED
SCALE 1:250

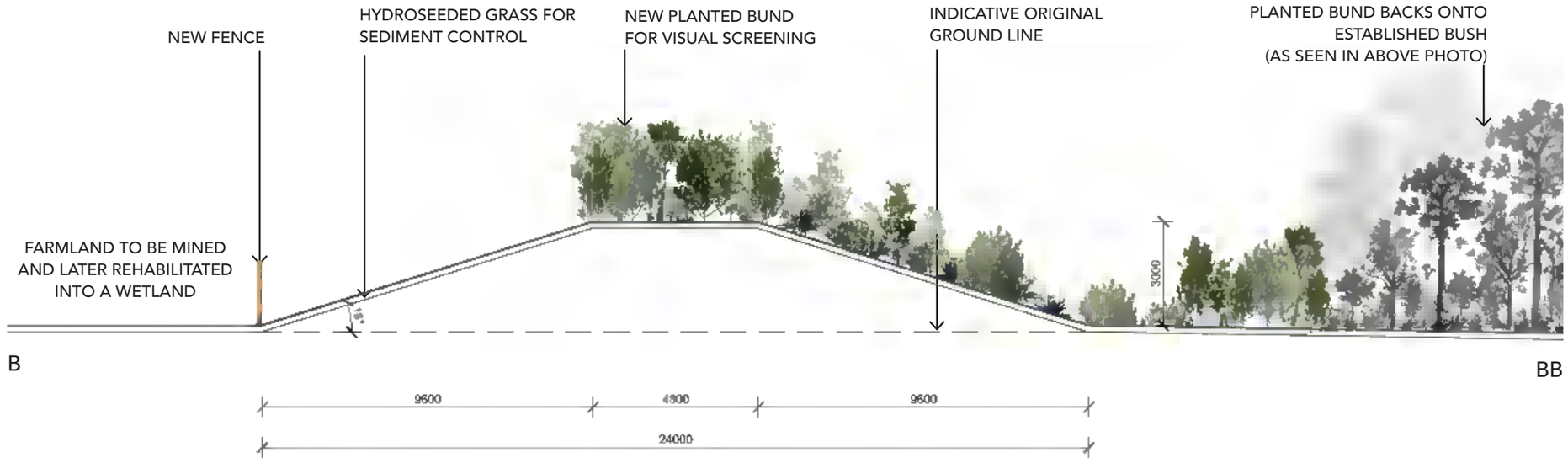
6.0	LANDSCAPE MITIGATION	PRE-MINING GRANITE CREEK	PROJECT NUMBER 2410	REVISION C	SCALE 1:250 @ A3	DESIGN: GHLA DRAWN: EM APPVD: NC	DATE 3/03/2026	9

7.0 LANDSCAPE MITIGATION - PRE-MINING PLANTED BUNDS



KEY PLAN - PRE MINING SECTION 2 FROM PAGE 7

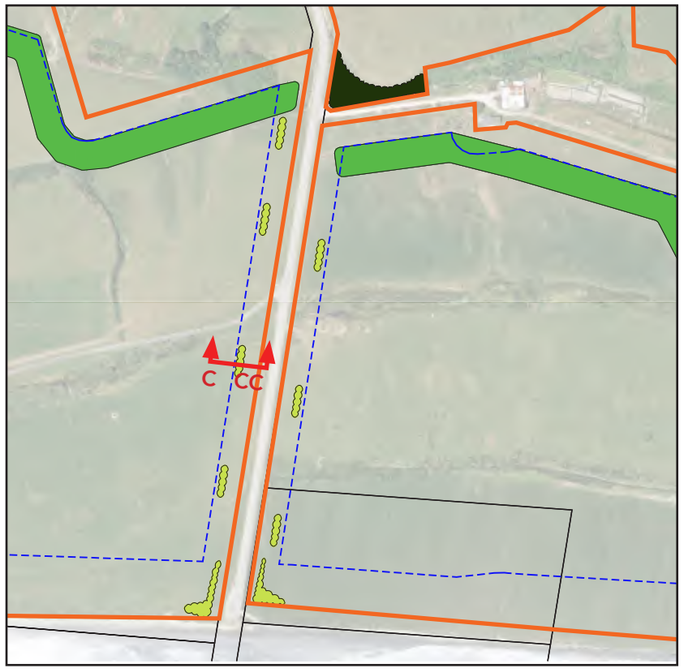
Existing farm environment and adjacent bush, near where the new Warren Road planted bund will be located



B-BB BUND _ TYPICAL 3M HIGH BUND
SCALE 1:150

7.0	LANDSCAPE MITIGATION	PRE-MINING PLANT BUNDS	PROJECT NUMBER 2410	REVISION C	SCALE 1:150 @ A3 1:75 @A1	DESIGN: GHLA DRAWN: EM APPVD: NC	DATE 3/03/2026	10

8.0 LANDSCAPE MITIGATION - PRE-MINING CARGILL ROAD NATIVE PLANTING

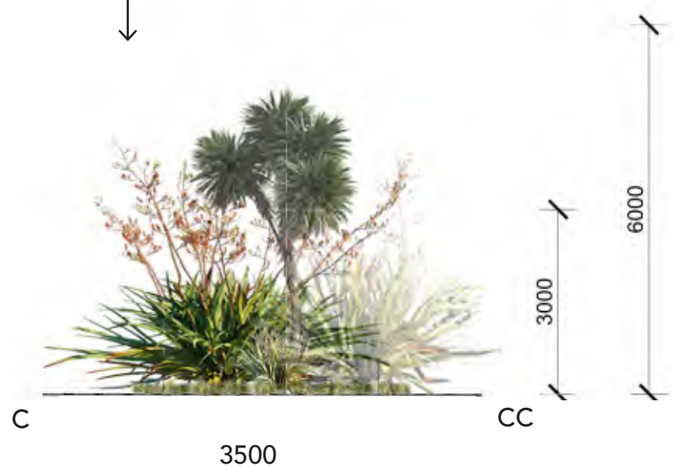


KEY PLAN - PRE MINING SECTION 3 FROM PAGE 8

Note:
The section shows a typical design for the clusters of planting that will be implemented along Cargill Road within the 20 metre setback area. The aim is to screen and soften some of the mining activity when it comes closest to Cargill Road. This is balanced with the desire to maintain some views up and down the coast and not create a 'tunnel' effect along Cargill Road.

INDICATIVE CLUSTER SCREENING PLANTING - PLAN
SCALE 1:100

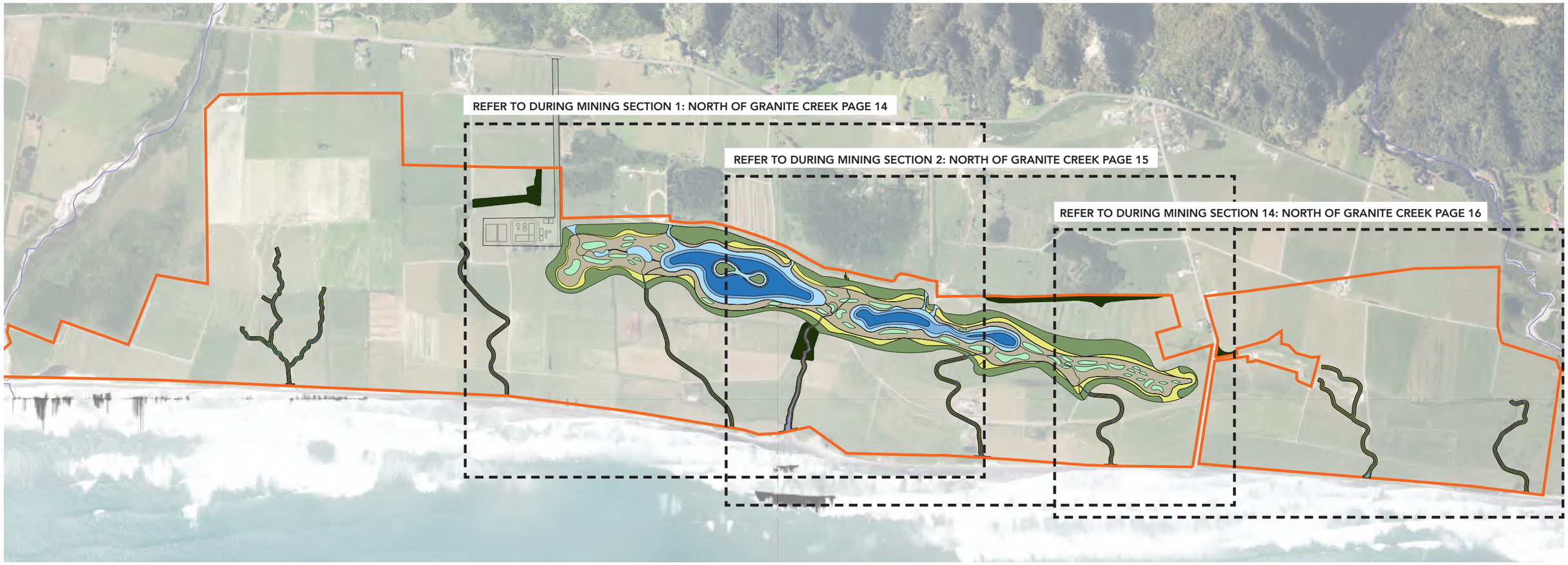
MULTIPLE ROWS OF STAGGERED VISUAL SCREENING FOR SOFTENING OF MINING ACTIVITIES
(Mixture of flax and small trees).



INDICATIVE CLUSTER SCREENING PLANTING - SECTION C-CC
SCALE 1:100

LANDSCAPE REHABILITATION - DURING MINING

9.0 LANDSCAPE REHABILITATION PLAN - DURING MINING KEY PLAN



KEY

- Shallow Marsh - Average Depth 0.4m
- Mid-depth Water - Average Depth 1m
- Deep Open water - Average Depth 2m
- Flaxland and Dry Edge Vegetation
- Carex Rushlands
- Raupo Wetland
- Raised Islands
- Riparian Planting
- Existing Planting to be Retained
- Consent Area

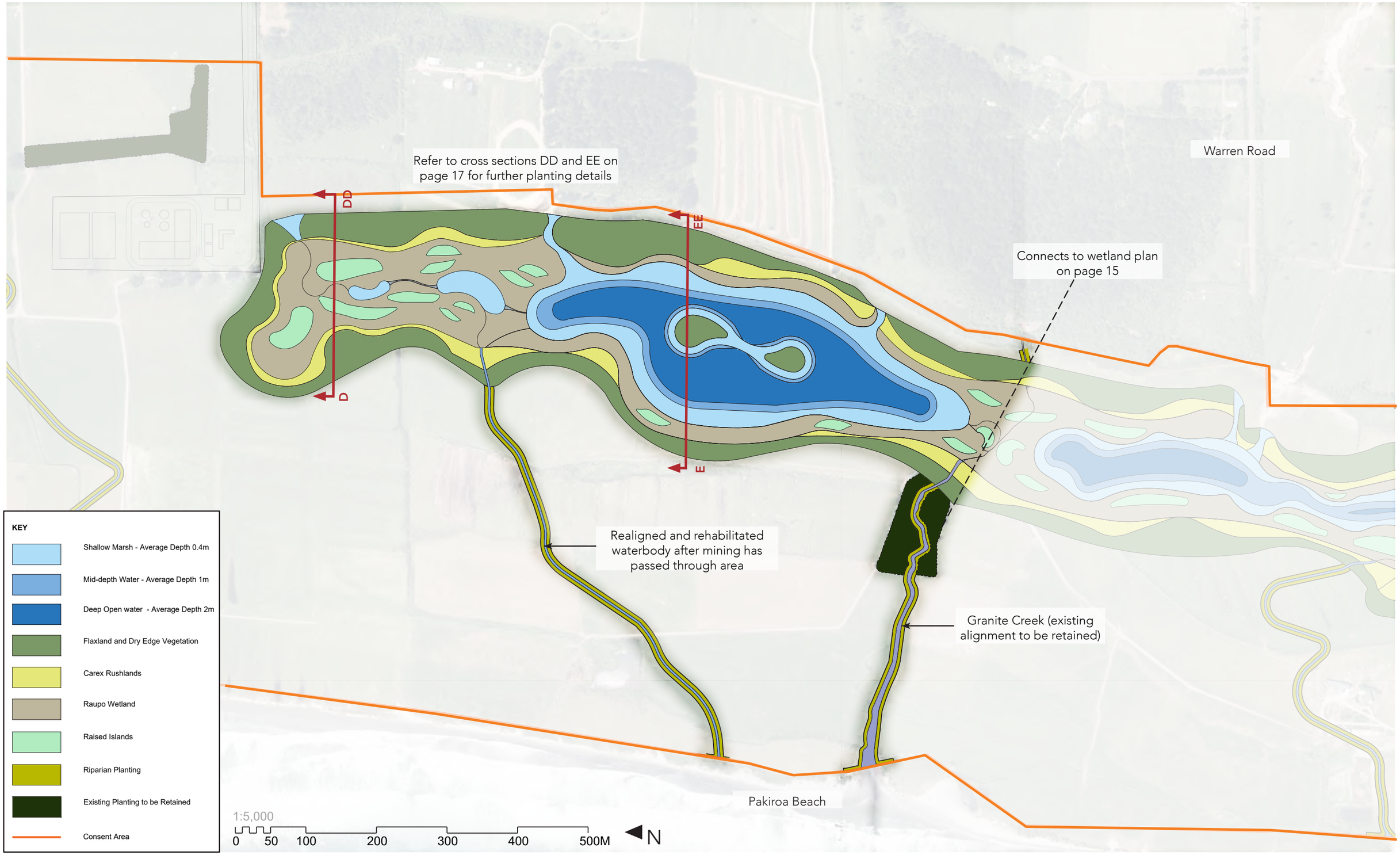
1:15,000

0 100 500 1000 1500M

N

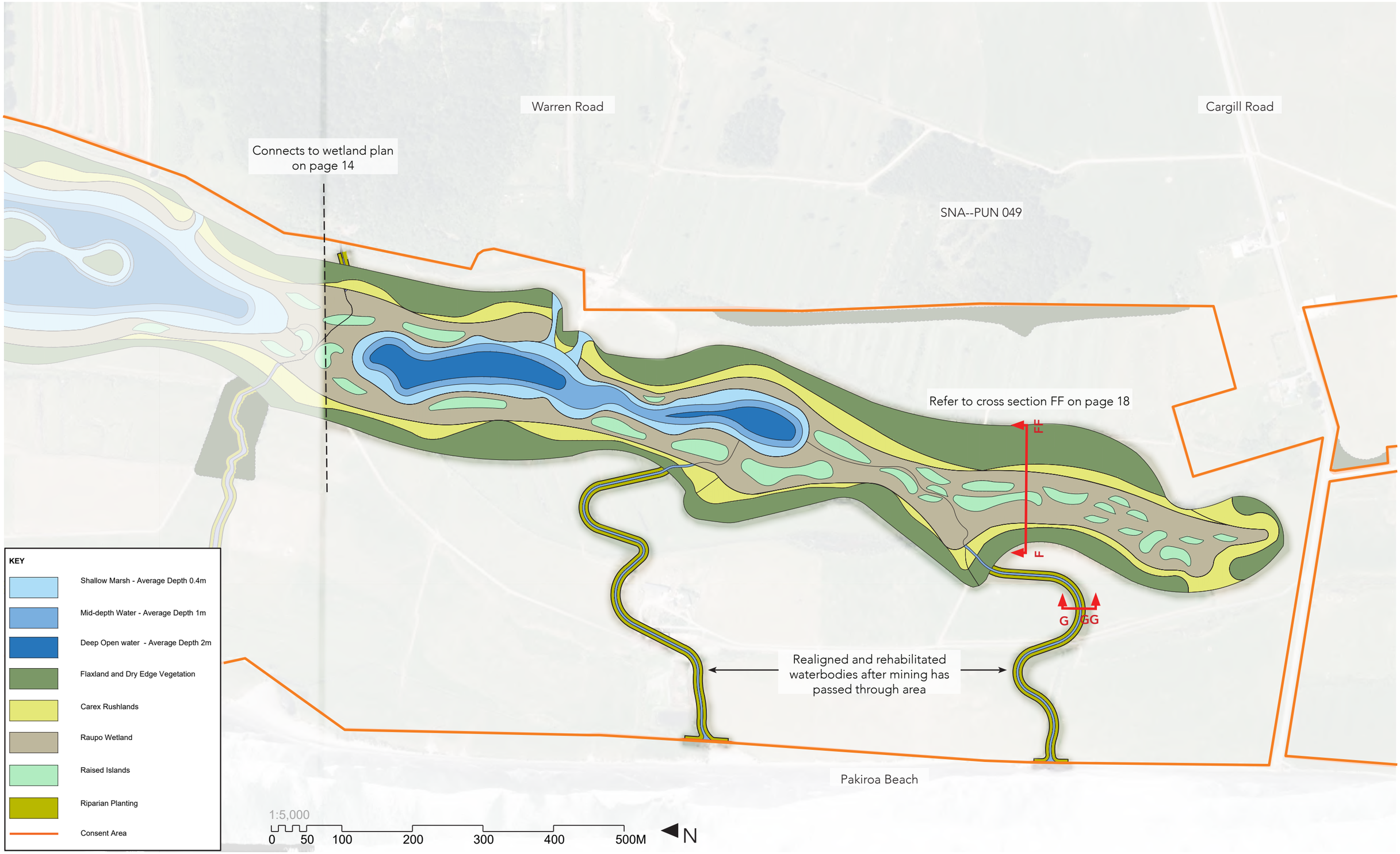
Note:
The aim of this During Mining Key Plan is to set out the different landscape areas to be rehabilitated into a large wetland and smaller riparian margins during mining. Each of the black boxes refers to an individual sheet (page). These pages correspond with the Mining Sections (stages) outlined in the Project Description accompanying the application. The end goal is to have a well functioning large connected wetland of about 53.7 hectares in size.

10.0 LANDSCAPE REHABILITATION PLAN - DURING MINING SECTION 1: NORTH OF GRANITE CREEK



10.0	LANDSCAPE MITIGATION	DURING MINING SECTION 1: NORTH OF GRANITE CREEK	PROJECT NUMBER 2410	REVISION C	SCALE 1:5000 @ A3	DESIGN: GHLA DRAWN: EM APPVD: NC	DATE 3/03/2026

11.0 LANDSCAPE REHABILITATION PLAN - DURING MINING SECTION 2: SOUTH OF GRANITE CREEK

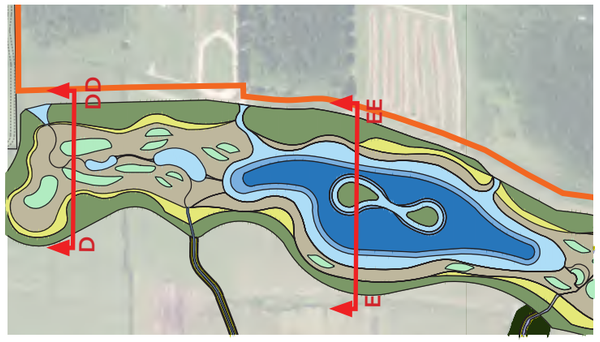


11.0	LANDSCAPE MITIGATION	DURING MINING SECTION 2: SOUTH OF GRANITE CREEK	PROJECT NUMBER 2410	REVISION C	SCALE 1:5000 @ A3	DESIGN: GHLA DRAWN: EM APPVD: NC	DATE 3/03/2026

12.0 LANDSCAPE REHABILITATION PLAN - DURING MINING STAGE 3: SOUTH OF CARGILL ROAD

12.0	LANDSCAPE MITIGATION	DURING MINING SECTION 3: SOUTH OF GRANITE CREEK	PROJECT NUMBER 2410	REVISION C	SCALE 1:5000 @ A3	DESIGN: GHLA DRAWN: EM APPVD: NC	DATE 3/03/2026

13.0 LANDSCAPE REHABILITATION - DURING MINING SECTION 1: NORTH OF GRANITE CREEK



KEY PLAN - DURING MINING SECTION 1 FROM PAGE 13

Note:
The design and layout of the well functioning large connected wetland has been informed by Landscape Architects, Ecologists and Hydrologists working together.

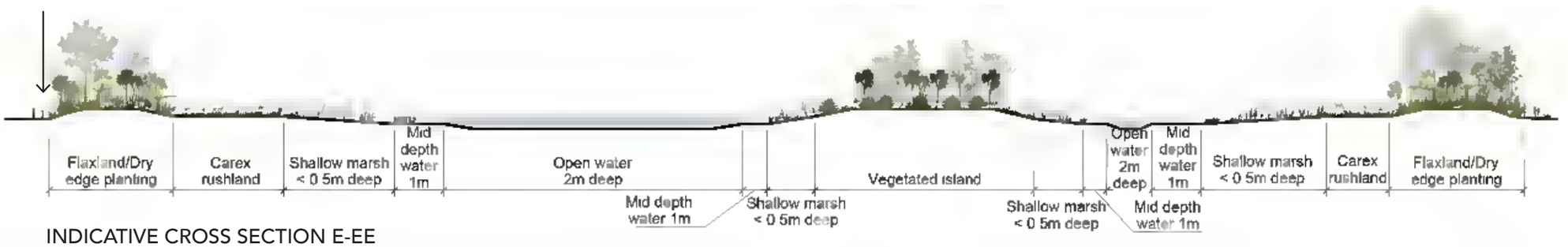
NEW STOCK PROOF FENCING ON THE OUTSIDE OF ALL THE PLANTING AREAS

INDICATIVE CROSS SECTION D-DD

1:750

0 5 10 20 30 45 60M

NEW STOCK PROOF FENCING ON THE OUTSIDE OF ALL THE PLANTING AREAS

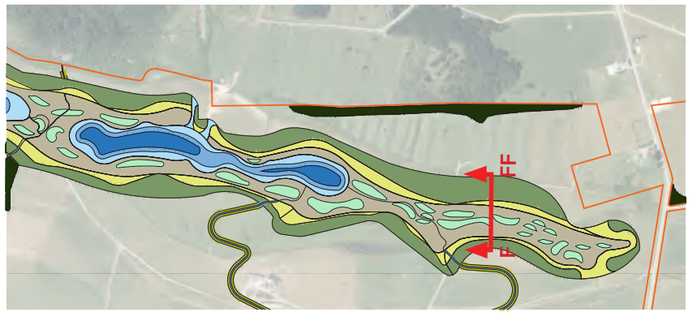


INDICATIVE CROSS SECTION E-EE

1:1,000

0 10 20 30 40 50 60 70 80 90 100M

14.0 LANDSCAPE REHABILITATION - DURING MINING SECTION 2: SOUTH OF GRANITE CREEK



KEY PLAN - DURING MINING SECTION 2 FROM PAGE 13

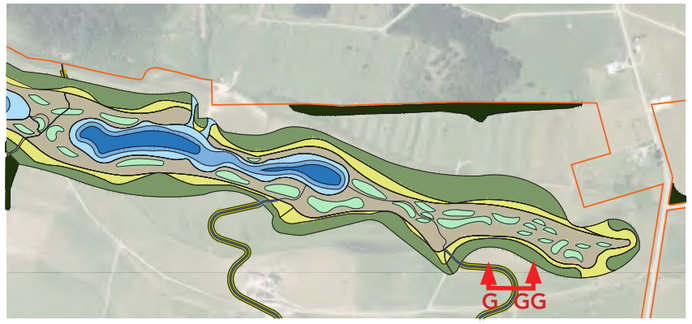
INDICATIVE CROSS SECTION F-FF

1:500

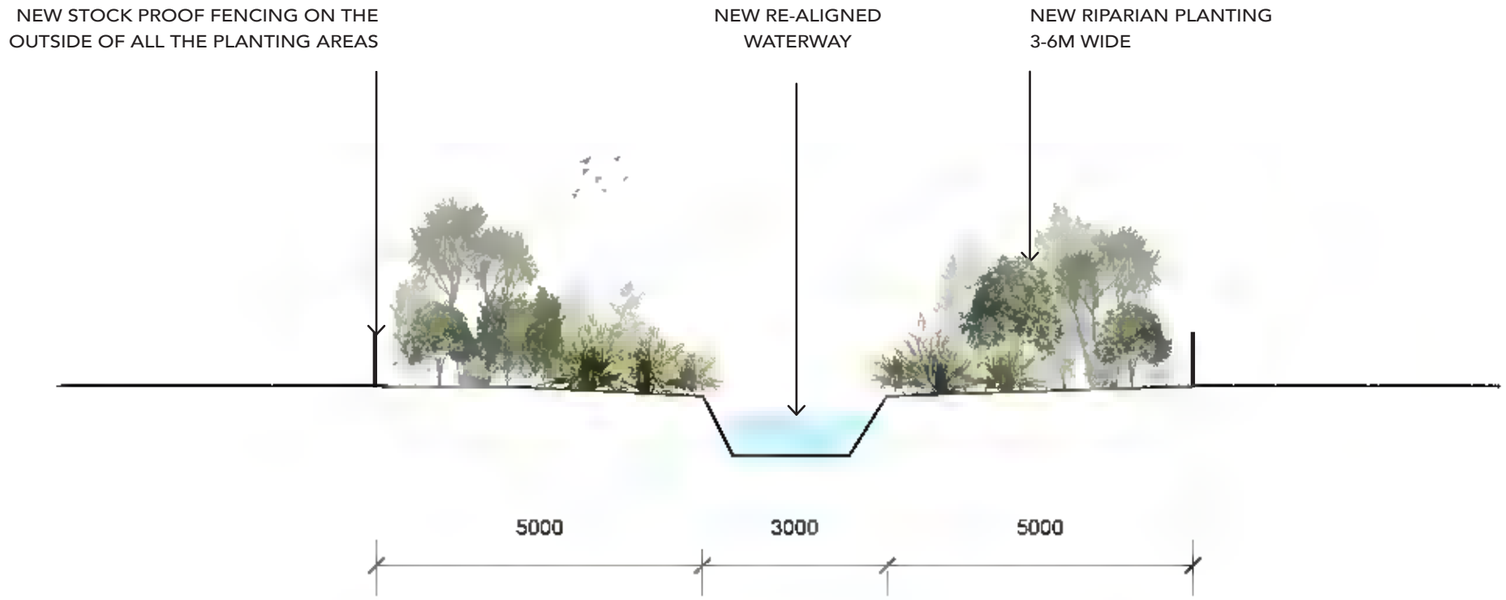
0 5 10 20 30 40 50M

14.0	LANDSCAPE MITIGATION	DURING MINING SECTION: SOUTH OF GRANITE CREEK	PROJECT NUMBER 2410	REVISION C	SCALE 1:500 @ A3	DESIGN: GHLA DRAWN: EM APPVD: NC	DATE 3/03/2026

15.0 LANDSCAPE REHABILITATION - DURING MINING SECTION 2: REALIGNED WATERWAY



KEY PLAN - DURING MINING SECTION 2 FROM PAGE 13



INDICATIVE CROSS SECTION G-GG

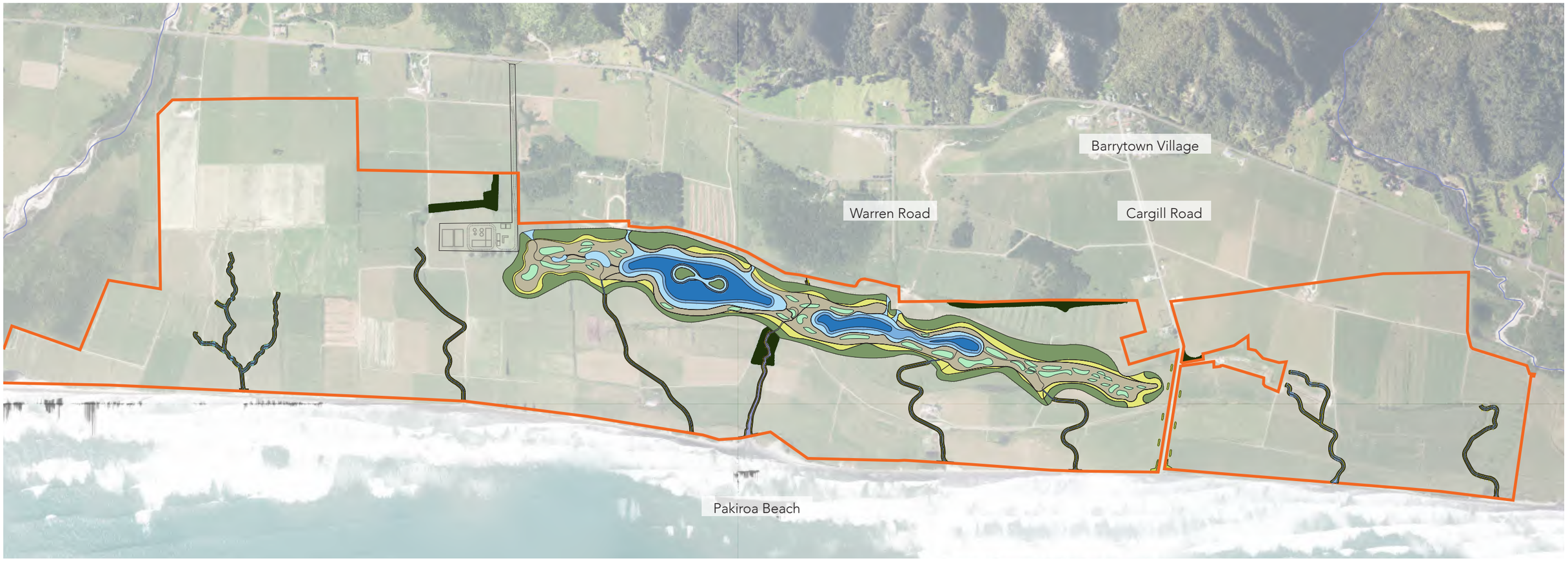
1:500

0 5 10 20 30 40 50M

Note:
Cargill Road will not be realigned.

LANDSCAPE REHABILITATION - POST MINING

16.0 LANDSCAPE REHABILITATION PLAN - POST MINING FINAL OUTCOME: SECTIONS 1, 2 & 3 COMBINED



KEY

- Shallow Marsh - Average Depth 0.4m — Total Area: 5.2ha
- Mid-depth Water - Average Depth 1m — Total Area: 2.8ha
- Deep Open water - Average Depth 2m — Total Area: 5.3ha
- Flaxland and Dry Edge Vegetation — Total Area: 15.3ha
- Carex Rushlands — Total Area: 5.3ha
- Raupo Wetland — Total Area: 15.6ha
- Raised Islands — Total Area: 4.1ha
- Riparian Planting — 3-6m in width either side of channel
- Existing Planting to be Retained
- Consent Area

TOTAL WETLAND AREA: 53.7ha Approximately

1:15,000

0 100 500 1000 1500M N

Note:
At the completion of mining activity the consent area will have:

- The existing planting areas that were retained
- Clusters of new planting along Cargill Road
- New riparian planting along waterbodies (four primary ones which have been realigned, plus Granite Creek)
- An extensive well functioning connected new wetland of approximately 53.7 hectares.

16.0	LANDSCAPE MITIGATION	DURING MINING FINAL OUTCOME: SECTIONS 1, 2 & 3 COMBINED	PROJECT NUMBER 2410	REVISION C	SCALE 1:10,000@A3 1:5000@A1	DESIGN: GHLA DRAWN: EM APPVD: NC	DATE 3/03/2026

17.0 LANDSCAPE SPECIES AND INDICATIVE GROWTH RATES

Below are the plant species that will be used for mitigation and rehabilitation planting.

- An approximate growth rate of 0.40-0.60m per year has been determined in consultation with the project Landscape Architect [Mrs Crawford] and project Ecologist [Mr Bramley]. The combined experience of these two individuals notes that these plants will sit at a lower growth rate for the first two years following planting, and will have an increase in growth rates in following years. It is also noted that larger individual specimens have a longer 'sitting' period than smaller ones.
- Growth rates can be influenced by seasonal fluctuations, maintenance, moisture/precipitation, exposure, ground conditions, and type of plant species.
- **Note:** The plant species proposed to be used are shown in Schedule of Species below, although other similar species may be used in addition to those listed (e.g., if a particular species is unavailable to source or if for any reason a species is deemed unsuitable at a later stage).

INDICATIVE PLANT GROWTH

Year of growth	Native Plant Height
1	Seed Collection
2	0.4 - 0.6m at planting
3	0.8 - 1.2m
4	1.2 - 1.8m
5	1.6 - 2.4m
6	2.0 - 3.0m
7	2.4 - 3.6m
8	2.8 - 4.2m
9	3.2 - 4.8m

SCIENTIFIC NAME	COMMON NAME	SCREENING	BUND	RIPARIAN	WETLAND	ULTIMATE SIZE (m) wxh
Aristotelia serrata	makomako, wineberry		x	x		3 x 6
Carex geminata	rautahi			x	x	1x1
Carex secta	purei			x	x	1.5 x1.5
Carex virgata	pukio	x	x	x	x	0.5 x 1
Coprosma propinqua	mikimiki	x	x	x	x	2.5 x 5
Coprosma robusta	karamu		x	x	x	2.5 x 5
Cordyline australis	tī kōuka, cabbage tree			x	x	2 x 6
Dacrycarpus dacrydioides	kahikatea, white pine			x	x	5 x 50
Juncus edgariae	edgar's rush			x	x	1 x 1
Metrosideros robusta	northern rata		x	x	x	3 x 15
Melicytus ramiflorus	māhoe, whiteywood		x	x	x	2.5 x 8
Phormium tenax	harakeke, korari, New Zealand flax	x	x	x		2 x 3
Pittosporum eugenioides	tarata, lemonwood		x	x		3 x 6
Pittosporum tenuifolium	kohuhu		x	x	x	3 x 6
Rhopalostylis sapida	nīkau	x	x			3 x 15
Typha orientalis	raupō, bull rush				x	1.5 x 2.3

18.0 PLANTING PALETTE

TREES

Aristotelia serrata
Makomako / Wineberry

Cordyline australis
Cabbage tree

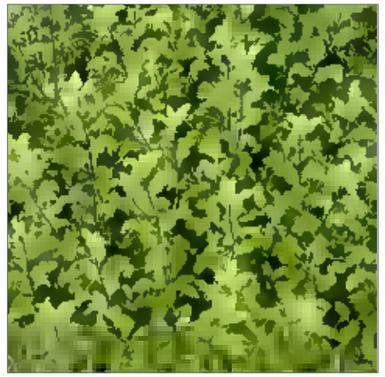
Dacrycarpus dacrydioides
Kahikatea / White Pine

Metrosideros robusta
Northern Rata

Melicytus ramiflorus
Mahoe / Whiteywood

Pittosporum eugenioides
Tarata / Lemonwood

NATIVE SHRUBS



Pittosporum tenuifolium
Kohuhu / Black Matipo

Rhoplostylis spaida
Nīkou

Carex geminata
Rautahi, Cutty grass

Carex secta
Makura Sedge

Carex virgata
Pukio / Swamp Sedge

Juncus edgariae
Wiwi

Coprosma propinqua
Mingimingi

Coprosma robusta
Karamu

Typha orientalis
Raupo /Bull rush

Phormium tenax
Harakeke / NZ Flax

Appendix D

Template section 30 letter

[Date] March 2026

Tāiko Critical Minerals
c/-100 Mackay Street
GREYMOUTH 7805
Attention: mike.meehan@tigamm.co.nz

Tāiko Critical Minerals Limited Fast-track application - Section 30(3) Fast-track Approvals Act 2024 Response

Thank you for your notification letter dated 3 March 2026 notifying the Grey District Council (Council) that you intend to lodge a substantive application for resource consents under the Fast-track Approvals Act 2024 (FTAA) for the Barrytown Minerals Project (Southern Block).

After reviewing Council records, we have identified consents that apply to land intended to be utilised as part of the Barrytown Minerals Project (Southern Block), set out in the table attached. We can confirm that there are no existing resource consents that fall under section 124C(1)(c) or section 165ZI of the Resource Management Act 1991, as referenced in section 30(3) of the FTAA.

Therefore, as no existing resource consents under section 30(3) have been identified, section 30(3)(b) applies and no further action is required by Grey District Council in respect of these sections.

If you have any questions or require further clarification, please do not hesitate to contact us.

Next steps where section 30(3)(b) of the FTAA applies

As set out under section 30(6)(b) of the FTAA, if you wish to lodge a substantive application you must do so within three (3) months of the date of this notice.

Michael McEnaney
Regulatory Manager
Grey District Council

Legal description	West Coast Regional Council consents
Section 4-6 Block V Waihero Survey District contained in Record of Title Ws2D/1085	
Section 7-8 Block V Waiwhero Survey District contained in Record of Title WS2D/855	
Lot 1 DP 3548 and Rural Section 2927 contained in Record of Title WS8C/143	
Part Section 2928 Block V Waiwhero Survey District and Defined on DP 764 contained in Record of Title WS1A/1166	
Lot 1 DP 2719 and Lot 2 DP 339364 contained in Record of Title 161879	
Section 2929 and Part Section 2634 – 2635 Block V Waiwhero Survey District and defined on DP 764 contained in Record of Title WS2A/228	
Rural Section 2930 contained in Record of Title WS1B/293	
Rural Section 2931,2932,2933,3316 and Part Rural Section 2639 contained in Record of Title WS8B/528	
Section 4033 Block V Waiwhero Survey District contained in Record of Title WS1A/892	
Part Section 5 Block IX Waiwhero Survey District contained in Record of Title WS2B/591	
Lot 1 DP 406050 contained in Record of Title 486401.	

Letter to West Coast Regional Council

TĀIKO CRITICAL MINERALS
WEST COAST NEW ZEALAND

Mining with the environment
Working with the community
A world class, high grade critical minerals deposit

4 March 2026

Darryl Lew
Chief Executive
West Coast Regional Council

By email: darryl.lew@wcrc.govt.nz

Dear Darryl

Tāiko Critical Minerals Limited – Barrytown Minerals Project – Fast-track Approvals Act 2024 application

1. As you are aware, Tāiko Critical Minerals Limited (**TCM**) is the authorised person with respect to the Barrytown Minerals Project (**Project**), which is a Schedule 2 listed project in the Fast Track Approvals Act 2024 (**FTAA**).

2. We are writing to the West Coast Regional Council (Council) in its capacity as a relevant local authority in terms of Section 11 of the FTAA to confirm that TCM will be applying for all approvals necessary under the FTAA to mine the Southern Block of the Barrytown Minerals Project.

Consultation

3. The Fast Track Approvals Amendment Act 2025 will replace consultation requirements with the requirement to notify relevant local authorities on 31 March 2026. As TCM commenced consultation with the Council prior to that date, it is required to finish consultation with the Council and is not required to notify the Council under the new provisions (see FTAA, Schedule 1, clause 10).

4. By way of summary, the Project is to undertake mineral sand mining to obtain ilmenite, garnet and other minerals across an area of the Barrytown Flats, in the Grey District. Resource consent has already been granted to TCM for initial stages of the Project, including to undertake mineral sands mining to the north of the Project site (on the Central Block), establish and operate the Mineral Separation Plant (MSP) at Rapahoe (including transportation from Barrytown Flats to the MSP) and to establish and operate a Wet Concentrator Plant for processing on site.

5. The application will seek all approvals for mining and related activities within the Southern Block including (but not limited to):

   (a) the extraction of sand using a floating dredge over approximately 280 hectares;

   (b) Remediation, rehabilitation and closure activities, including the establishment of a constructed wetland and reshaping of contours over 408 hectares.

6. Mining of the Southern Block is likely to take place over approximately 14 years followed by rehabilitation of the site, including construction of the wetland.

7. A project description, proposed conditions and draft landscape mitigation package are attached at **Appendices A, B** and **C**, respectively. These have been developed based on expert advice, consultation to date and the previous publicly notified resource consent process for the Central Block. TCM will adjust and update the draft conditions with feedback received through further consultation and further expert review and advice.

8. Approvals sought include:

   (a) Land use consents, water permits, and discharge permits related to mining and processing activities normally required under the Resource Management Act 1991;

   (b) Approvals normally required under the Wildlife Act 1953 for handling, salvage (including incidental killings) and relocation activities; and

   (c) Approvals normally required for under the Heritage New Zealand Pouhere Taonga Act 2014 to modify or destroy recorded and unrecorded archaeological sites.

9. To assist with the design and assessment of actual and potential environmental effects associated with the Project, TCM has engaged a range of technical experts to assess effects in relation to landscape, transport, hydrology, water quality, ecology (freshwater and terrestrial), erosion and sediment control, noise, archaeology, coastal hazards, metallurgy and economics. The experts TCM has engaged have extensive experience in this area, including in recent resource consent processes in the region.

10. During the publicly notified resource consent process for the Central Block, TCM listened to expert advice, matters raised during the consultation and submission process and in appeals (which were resolved by consent order). It made key changes to the proposal where it was feasible to do so to address issues raised. This included offering conditions that restricted truck movements during pick up and drop off times at Barrytown School, lighting restrictions, removing the option to truck material to the North, driving safety conditions and other operational changes.

11. TCM has undertaken extensive consultation with your team that has included several in person and online meetings with Steven May and Rachel Clark, site visits, sharing of information as well as keeping you and the West Coast Regional Council Chairman informed of the project at a high level. This engagement has focussed on Regional Council matters and has been assisted by the technical work that was undertaken as part of the previous process.

12. In addition, TCM has undertaken:

   (a) extensive consultation with Te Rūnanga o Ngāti Waewae during the development of the project;

   (b) community engagement via drop-in sessions at the Barrytown Hall on 16/17 July 2025;

   (c) one on one engagement with individual property owners; and

   (d) consultation with the Barrytown School, which has seen the school develop a future focussed plan that the company is supporting moving forward.

13. This engagement on the back of years of consultation in relation to Project as a whole has led to the development of the comprehensive application TCM has compiled.

Section 30 notice

14. Section 30(3) requires the Council to confirm by written notice whether there are any existing resource consents to which section 124C(1)(c) or 165ZI of the Resource Management Act 1991 (RMA) would apply if the approval were to be applied for as a resource consent under the RMA. The Council has previously provided a notice (dated 7 April 2025) that there are no such existing resource consents, however that notice has now expired pursuant to section 30(6)(b).

15. Tāiko therefore requests that the Council again provide notice under section 30(3). For your convenience, we attach a template at **Appendix D** (which reflects our understanding that there are no relevant existing resource consents) to facilitate issuing this notice.

16. We would be grateful if you could confirm that you have received this letter. If any further questions or matters arise that you would like to discuss, please do not hesitate to contact us. We would be grateful for your response by 27 March 2026. We are happy to make our experts available for any questions or further discussions you consider necessary.

17. We thank the West Coast Regional Council for its meaningful contribution to date.

Yours sincerely

Mike Meehan

Project Director

E: mike.meehan@tigamm.co.nz

Ph: 021-289-8636

Appendix A

Project description

Barrytown Critical Minerals Project
Southern Block

Project description – draft for consultation
4 March 2026

1. Overview

1.1 This section sets out a detailed description of the Project to inform the applications made for approvals under Schedules 5, 7, and 8 of the FTAA.

1.2 Tāiko Critical Minerals (formally TiGa Minerals and Metals, the **Applicant**) holds various resource consents from the Grey District Council and the West Coast Regional Council authorising the extraction, processing, and transportation of mined material in the form of Heavy Mineral Concentrate (**HMC**) from the Central Block (**CB**) at Barrytown, as part of its critical minerals project on the Barrytown Flats. Minerals sought to be obtained through the process are ilmenite, garnet, zircon and gold.

1.3 The initial resource consent for mining, HMC production, transportation and associated ancillary activities was subject to a publicly notified process. Through this extensive process, all aspects of the company's operations were assessed against the relevant District and Regional Plans, the Resource Management Act 1991, and applicable national direction. This enabled full participation by interested parties and agencies and resulted in a robust set of consent conditions, which have informed the company's Fast-track application, including the substantive environmental data set the company has produced and which is ongoing.

1.4 Following the granting of the substantive resource consent for the CB (north of Canoe Creek), an additional resource consents have been granted for a Mineral Separation Plant (**MSP**) at Rapahoe. Consent for the establishment, operation and maintenance of a centralised Wet Concentrator Plant (**WCP**) adjacent to the Southern Block (**SB**), associated water management infrastructure (known as the Mine Water Facility (**MWF**)) and access road, is currently being processed by the Grey District Council. Consent for the earthworks component of this activity was granted by the West Coast Regional Council in February 2026. The MSP and WCP will process material from the CB and the SB.

1.5 In adopting this approach, the company has undertaken extensive consultation with the local community, mana whenua, Councils, and relevant agencies throughout these community-facing processes. This engagement has contributed to the development and acceptance of comprehensive consent conditions and management provisions. It has also enabled the assessment and approval of high interest matters, such as trucking activities on State Highway 6. As a result, the Fast-track application is focused on seeking all necessary approvals for the mining activity within the SB. **Plan A** shows the three resource blocks of the Barrytown Critical Minerals Project.

1.6 The SB comprises approximately 408ha on the Barrytown Flats as shown in **Plan B**. All land subject to this application is privately owned with access to the site approved by the respective landowners. Mining activity is proposed to occur on approximately 280ha of the total area, which is known as the 'mining disturbance area' and shown in **Plan B**. Earthworks will be undertaken on parts of the SB outside the mining disturbance area to assist with recontouring and rehabilitation.

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1.7 Mining on the SB will be undertaken using a floating dredge of modern design. Mining will be undertaken in three sections as follows (shown on **Plan C**), although only one section will be mined at a time:

(a) Section 1: Granite Creek North;

(b) Section 2: Granite Creek South;

(c) Section 3: Cargill Road.

1.8 Mining of the SB is expected to commence in approximately 2034 - 2035 once the mineral resource on the CB has been exhausted. The WCP and MWF will be used to process material from both the CB and SB.

1.9 Various measures are proposed for the avoidance, minimisation and mitigation of ecological (terrestrial and freshwater), landscape, visual, noise and dust-related effects. The Project also includes significant ecological and landscape enhancements in the form of an extensive wetland, realignment of creeks into natural patterns, riparian planting and stock exclusion fencing.

1.10 Mining of the SB is expected to take approximately 14 years (excluding preparation and rehabilitation), based on the extraction rate of 2,000,000 tonnes per year (producing 400,000 tonnes of HMC per year). This will extend the overall mining component of the Barrytown Minerals Project to approximately 30-35 years. Taking into account pre-mining construction works and post-mining final rehabilitation and mine closure works, it is anticipated that the Project will be completed between 2055 and 2060. Approvals are sought for 35 years to provide sufficient time for mining activity to occur over stages, final rehabilitation and operational factors to take place.

1.11 The anticipated work programme for the Project is as follows:

(a) Bunding and initial mitigation planting – 1 year (2027);

(b) Mining of the Central Block (consented) – 6 years (2029 – 2034);

(c) Mining Section 1: Granite Creek North (Stage 1) – 7 years (2035 - 2042);

(d) Mining Section 2: Granite Creek South (Stage 2) – 4 years (2043 – 2047);

(e) Mining Section 3: Cargill Road (Stage 3) – 3 years (2047 - 2050);

(f) Final rehabilitation – 3 years (2050 – 2053); and

(g) An operational contingency period of 6 years (2050 – 2056 followed by the final rehabilitation proposed in (f)).

2. Consents sought and relevant land parcels

2.1 All resource consents necessary are being sought, including for the following activities:

Consent type	Activity	Rule breaches
Grey District Plan		
Land use consents	Clearance of indigenous vegetation	Rule 19.7.5(vii): Clearance of indigenous vegetation exceeds

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		permitted activity volumes outside of an SNA
Decisions Version Te Tai o Poutini Plan Rules under appeal are noted with an * e.g. ECO-R1*		
Land use consent	Clearance of indigenous vegetation	ECO-R9*: the clearance of indigenous vegetation in the coastal environment and riparian margins will exceed the permitted activity volumes
	Earthworks within riparian margins	NC-R4*: because the earthworks will be undertaken across the mining disturbance area including creeks and their riparian margins
	Structures within riparian margins	NC-R5*: existing farm bridges will be replaced post mining which are not permitted under this plan
	Structures in the coastal environment	CE-14*: existing farm bridges will be replaced post mining which are not permitted under this plan
	Mineral extraction	GRUZ-R25*: do not comply with permitted activity rule due to volume of material to be extracted, mining to be undertaken within the riparian margins of creeks and wetlands, will disturb two historic heritage sites; undertaken within 250m of a sensitive activity on an adjoining site; and operate outside permitted hours.
West Coast Regional Land and Water Plan		
Land use consent	Earthworks within riparian margins; Earthworks in the non-erosion prone area outside riparian margins; Vegetation disturbance in riparian margins	Rule 16 WCRLWP: do not comply with permitted activity rule as earthworks will exceed permitted volumes and vegetation clearance will take place in riparian margins with creeks to be mined across the site
Land use consent	Activities within the bed of a river outside of a wetland identified in Schedule 1 or 2	Rule 35 WCRLWP: Creek beds will be reconstructed in the same or similar locations and represent meandering

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		pathways, and water will be drained during diversions
Water permit	To take and use water for the purpose of mineral sand processing	Rule 55 WCRLWP: the take and use of water from Canoe Creek to operate the Wet Concentrator Plant is a restricted discretionary activity
Water permit	To take and use ground water for the purpose of mineral sand mining and processing	Rule 56 WCRLWP: to take and use groundwater intercepted during mining to pump run-of-mine material to the Wet Concentrator Plant.
Land use consent	Diversion of water	Rule 58 WCRLWP: five creeks across the SB will require diversion which is a discretionary activity
Discharge permit	To discharge water to the mining void	Rule 71 (discharge to water and land) WCRLWP: to discharge water to the mining void is a discretionary activity due to the augmentation of lime
Regional Air Quality Plan		
Discharge permit	To discharge dust to air from stockpiling and handling gravel, sand and soil	Rule 16: consent being sought as precautionary measure to authorise unanticipated dust emissions
Freshwater NES		
	Vegetation clearance within, or within a 10m setback from, a natural inland wetland	Section 45D(1)
	Earthworks within, or within a 10m setback from, a natural inland wetland	Section 45D(2)
	Earthworks outside a 10m, but within a 100m setback, from a natural inland wetland that will result in partial or complete drainage of the wetland	Section 45D(3)
	Diversion of water within, or within a 100m setback from, a natural inland wetland	Section 42D(4)

	Discharge of water into water within, or within 100m setback from, a natural inland wetland	Section 45D(5)
	Reclamation of bed of rivers	Section 57

^For completeness it is noted that the mining activity relies on a number of permitted activity rules in the district and regional plans.
*Rule under appeal.

2.2 The application relates to the following land parcels:

Legal description
Section 4-6 Block V Waiwhero Survey District contained in Record of Title WS2D/1085
Section 7-8 Block V Waiwhero Survey District contained in Record of Title WS2D/855
Lot 1 DP 3548 and Rural Section 2927 contained in Record of Title WS8C/143
Part Section 2928 Block V Waiwhero Survey District and Defined on DP 764 contained in Record of Title WS1A/1166
Lot 1 DP 2719 and Lot 2 DP 339364 contained in Record of Title 161879
Section 2929 and Part Section 2634 – 2635 Block V Waiwhero Survey District and defined on DP 764 contained in Record of Title WS2A/228
Rural Section 2930 contained in Record of Title WS1B/293
Rural Section 2931,2932,2933,3316 and Part Rural Section 2639 contained in Record of Title WS8B/528
Section 4033 Block V Waiwhero Survey District contained in Record of Title WS1A/892
Part Section 5 Block IX Waiwhero Survey District contained in Record of Title WS2B/591
Lot 1 DP 406050 contained in Record of Title 486401.

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3. Initial works

3.1 Initial works on the site will be undertaken prior to the commencement of any mining. These include:
(a) Bunding, planting (associated with noise bunds) and fencing; and
(b) Establishment of the mine starter pit.

3.2 A mine starter pit is required in each of the three sections to establish the initial dredge pond in which the floating dredge will operate. Separate starter pits are necessary because the sections are divided by physical features that will not be disturbed i.e. Granite Creek separates Sections 1 and 2, and Cargill Road separates Sections 2 and 3. These starter pits enable the dredge to begin operations independently within each section.

3.3 The floating dredge will be transported to each mine starter pit using conventional mining equipment transport methods in order to avoid adverse effects on the surrounding environment. This approach is consistent with the methodology proposed for transporting the dredge to the Application area and for its initial assembly.

3.4 The mine starter pit will be developed by excavating into the water table. An area of approximately 100m wide x 300m long, and up to 10m deep will be excavated using an excavator and trucks, removing approximately 270,000m^3 of material. This size allows for:

(a) A dredge pond (mine void) of approximately 100m x 100m;
(b) A 100m x 50m area behind the dredge for the deposition of tailings following processing; and
(c) A 100m x 100m area in front of the dredge pond at various stages of excavation, ready to be mined.

3.5 The first mine starter pit will be located in Section 1: Granite Creek North. Material extracted from the starter pit will be used for the construction of the noise control bunds adjacent to Lot 2 DP2178 and another near Warren Road, located along the eastern boundary. Both bunds will be approximately 3m high with a 4.8m crest. The Warren Road bund will extend approximately 280m. Constructing the bunds at this early stage enables associated planting to be carried out in advance and allows time for vegetation to establish. The location of the starter pit is shown in **Plan D**. The construction of both the starter pit and the Section 1: Granite Creek North bunds are anticipated to take approximately two months.

3.6 A similar approach will be taken for Sections 2 and 3, with a mine starter pit excavated prior to the commencement of mining in each section. For Section 2, material excavated from the starter pit will be used to construct an 'L-shaped' noise control bund on the northern side of Cargill Road. For Section 3, material excavated from the starter pit will be used to construct a noise control bund along the southern side of Cargill Road near 101 Cargill Road. Both bunds will be approximately 3m high with a 4.8m crest.

3.7 The location of the noise bunds are shown in **Plan E**. Any excess material not required for bund construction will be stockpiled for future processing and rehabilitation.

4. Indicative mining sequence and setbacks

4.1 Following construction of the mine starter pit, the dredge will extract ore in strips. The indicative mining sequence, showing the anticipated pattern and extent of mining over time, is shown in **Plan D**. Mining will generally progress in a north/ south direction, although there will be some mining in an east/west direction where the dredge turns to commence a new strip. **Plan D** also shows the location of each mine starter pit.

4.2 The indicative mine path is influenced by both ore grade distribution and the long-term rehabilitation of the site. Commencing mining in areas with higher ore grades provides an earlier return on investment for the company. Mining from the western (coastal) side and progressing eastward allows previously mined areas to be progressively rehabilitated back to existing ground levels while maintaining natural drainage gradients towards the coast. Land on the western side of the site will be rehabilitated to existing ground levels.

4.3 As mining advances inland, ground levels will be progressively lowered contributing to the formation of a constructed wetland as part of the final landform across Sections 1 and 2

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(Stages 1 and 2). To achieve the post-mining contours across all three Sections (Stages), material will be sourced from areas outside the mining disturbance area but within the wider application boundary. Approximately 110 hectares within the application area provide a readily accessible source of fill material. These areas will be selectively cut and regraded, with suitable material transferred over short haul distances, typically within approximately 100m, using bulldozer "cut and carry" methods. This material will be progressively redistributed into backfilled mining areas to recontour the landform, achieve stable final ground levels and integrate rehabilitated areas with the surrounding landscape.

4.4 Each mining strip will be approximately 100m wide and excavated to a depth of 10m below ground level noting that the depth of mining is dependent on the ore distribution. The coloured strips on **Plan D** represent the expected extent of mining for each year. The total disturbed land area at any one time will be 16ha. Disturbed land means the land within the application area that has been directly affected by mining or associated activities, including areas subject to vegetation disturbance, topsoil stripping, excavation and active mining in the mining void, tailings deposition, overburden placement, bund construction or areas undergoing progressive rehabilitation prior to the re-establishment of stable landform and 80% vegetative cover.

4.5 The dredge is expected to progress at an average rate of approximately 2,200 metres per year or approximately 166 metres per month or 6 metres per day (based on 26 working days in a month). This rate will yield 2,000,000 tonnes of raw material per year and is subject to variation depending on the depth of the ore body, the average grade of the ore encountered and the need to ensure that the total disturbed area for mining is no more than 16ha. Weather conditions can impact progressive rehabilitation, i.e., influencing the rate of growth of vegetative cover (see Section 7 for progressive rehabilitation and vegetation cover).

4.6 It is proposed to set mining back from key environmental features and boundaries as follows:

(a) 20m from the consent boundary;
(b) 20m from Granite Creek;
(c) 20m from Fagan Creek;
(d) 50m from Mean High Water Springs (MHWS);
(e) 20m from the proposed SNA PUN-049, which is adjacent to Section 2 (Granite Creek South);
(f) 20m from all private property boundaries not within the consent area; and
(g) 200m from dwellings other than where noise bunds are proposed.

4.7 These setbacks are shown on **Plan F**.

5. Mining methodology

5.1 Once the mine starter pit has been constructed, the following steps will be undertaken to enable the extraction of ore:

(a) Removal of pasture, small areas of farm vegetation and wildlife checks;
(b) Stripping of topsoil and overburden;
(c) Diversion of streams and drains;
(d) Extraction of run of mine material;
(e) Initial screening of run of mine material and deposit of waste material;
(f) Pumping of run of mine material to WCP.

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5.2 This process is illustrated by **Figures 1** and **2** below and discussed in detail in the following sections.

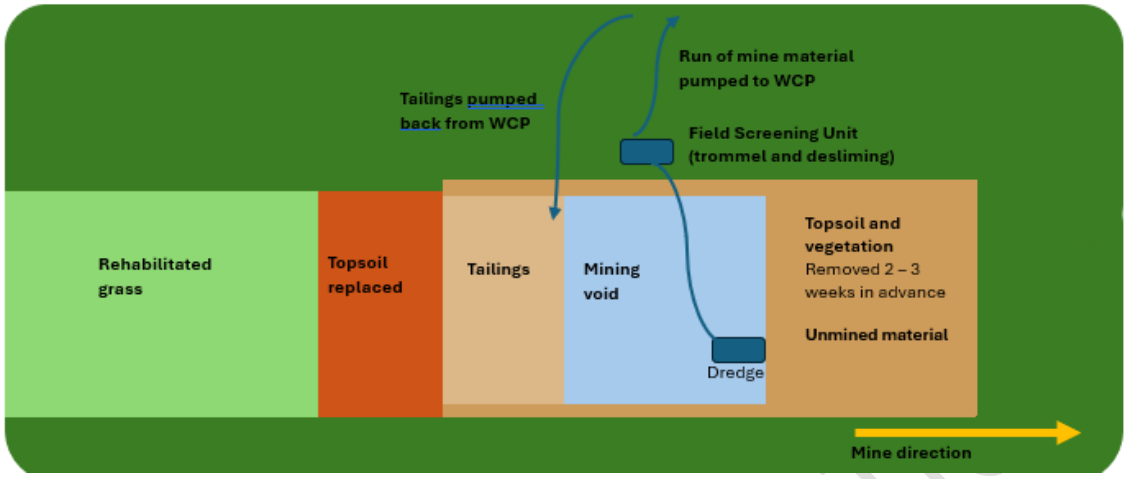

Figure 1: Schematic representation of the mining methodology in plan view

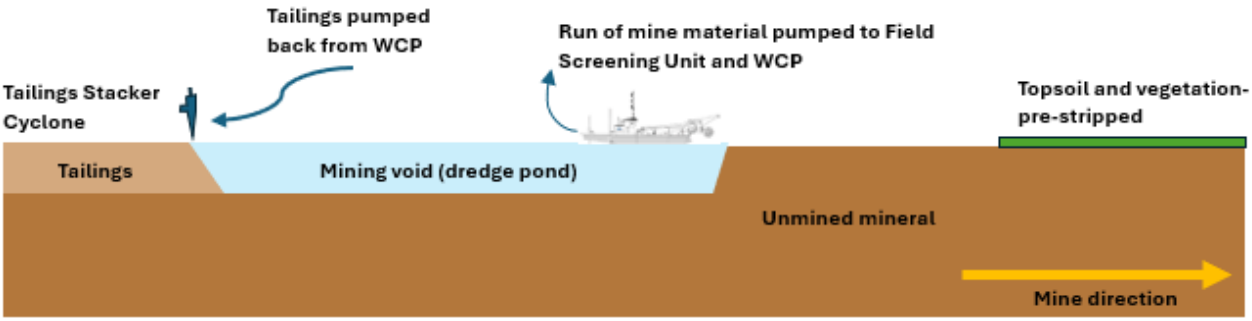

Figure 2: Schematic representation of the mining methodology in profile view

Archaeological Assessment

5.3 An archaeological assessment of the SB has been carried out. The SB was extensively dredged and modified in the 1930's and 1940's and then humped and hollowed for farming purposes. There are two recorded archaeological sites (find spots) within the mining disturbance area. The artefacts from both find spots have been removed and there is no evidence that further features or deposits relating to the site remain in situ. Earthworks on site will proceed under an archaeological authority.

Vegetation removal and wildlife checks

5.4 There are small areas of vegetation located around some creeks, drains and former dredge ponds, which will need to be removed at the same time as topsoil is removed (i.e., 2 – 3 weeks prior to mining). Some of that vegetation has been identified as potential habitat for lizards. In addition, open pasture can potentially be used by breeding birds. **Plan G** shows the waterbodies on site.

5.5 It is proposed to undertake regular surveys of areas scheduled for mining before and during the breeding season to identify any breeding behaviour in the area. Where those surveys identify that nesting is possible, birds will be discouraged from establishing nests through methods such as walkovers, visual cues, audible bird scarers and machinery placement. These actions will be undertaken more frequently and at a greater distance

from the mining front than in traditional mining operations, reflecting the operational requirements and movement patterns of the floating dredge. Where monitoring identifies the presence of Kororā (little blue penguin), relocatable fencing will be erected around the active mining area (including stripped area, mining void, tailings deposition area and contoured land awaiting resowing) to prevent penguin access and minimise risk of harm.

5.6 Lizard monitoring will be undertaken by a suitably qualified ecologist prior to mining an area of potential lizard habitat. If lizards are confirmed to be present, it is proposed to capture and relocate the lizards to suitable habitat as close as practicable to the site, but outside the mining disturbance area.

5.7 Prior to the commencement of any stream diversion or streamworks activities, native freshwater fish present within affected watercourses or wetland habitats will be salvaged and relocated. Similar to any lizards found, salvaged fish will be relocated to suitable habitat as close as practicable to the site but outside the mining disturbance area.

5.8 Once wildlife (if any) has been appropriately managed, any vegetation useful for rehabilitation will be removed. Where it can be, vegetation will be transferred and used as part of the progressive rehabilitation in the planting around creek mouths, diverted creeks or the constructed wetland.

Topsoil and overburden stripping

5.9 Once vegetation has been removed, topsoil (to approximately 0.2 - 0.6m deep) and overburden will be removed 2 – 3 weeks prior to mining, using an 85-tonne excavator and 40 tonne articulated trucks. The area of topsoil and overburden stripping is shown in Figure 1 above.

5.10 Some of the removed material will be used to create small 1m high safety bunds (to prevent vehicles from driving into the mining void and provide stormwater control) along either side of the mining void. The mining void is the area comprising the dredge pond, the area behind the dredge pond for deposit of tailings after processing, and the area in front of the dredge pond from which run of mine material is being extracted. The remainder of the material will be used for rehabilitation. Initially, that material will be stockpiled for later use, but once mining commences fully, it will be trucked to the rear of the mining void to be used as part of the progressive rehabilitation. The safety bunds provide the separation between stormwater and mine water (mine water being water that is being discharged back into the mining void).

5.11 The total area stripped of topsoil and overburden in advance of mining will be approximately 100m x 100m.

Stream diversions/ removal of drains

5.1 Diversions to, and reconstruction of the existing creeks will be required to enable mining Drainage channels across the site will be diverted to enable mining, and will be reconstructed where required to maintain catchment drainage patterns.

5.12 The specific creeks requiring diversion are shown in **Plan G** and are:

(a) Northern Creek;
(b) Central Creek;
(c) Clarke Creek;
(d) Wasabi Creek; and

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(e) Southern Creek.

5.13 Productive farming practices have resulted in a network of drainage channels developed across the site. As mining progresses, these drains will be diverted to avoid the active mining area.

Little Granite Creek runs along the eastern boundary of the site before joining Granite Creek. These two creeks, Little Granite Creek and Granite Creek, will remain undisturbed and are not proposed to be diverted as part of the mining operation. Canoe Creek and Fagan Creek will also remain unaffected by the activity.

5.14 The diversion methodology differs for each creek or artificial drain depending on their orientation, sequence of mining activities and future purpose (in regards to artificial drains these may be retired or a new 'creek' constructed to manage drainage).

(a) North–south oriented creeks and drains will be diverted into a previously mined area before mining reaches the creek or drain (except where mining is adjacent to the coastal setback boundary). This may require adjustments (widening or narrowing) of the mine path to facilitate this. A permanent reconstructed channel will be built in advance as part of the rehabilitation of the mined land, and the flow will be redirected into it in a single 'livening' event. Refer **Figure 3** for further detail.

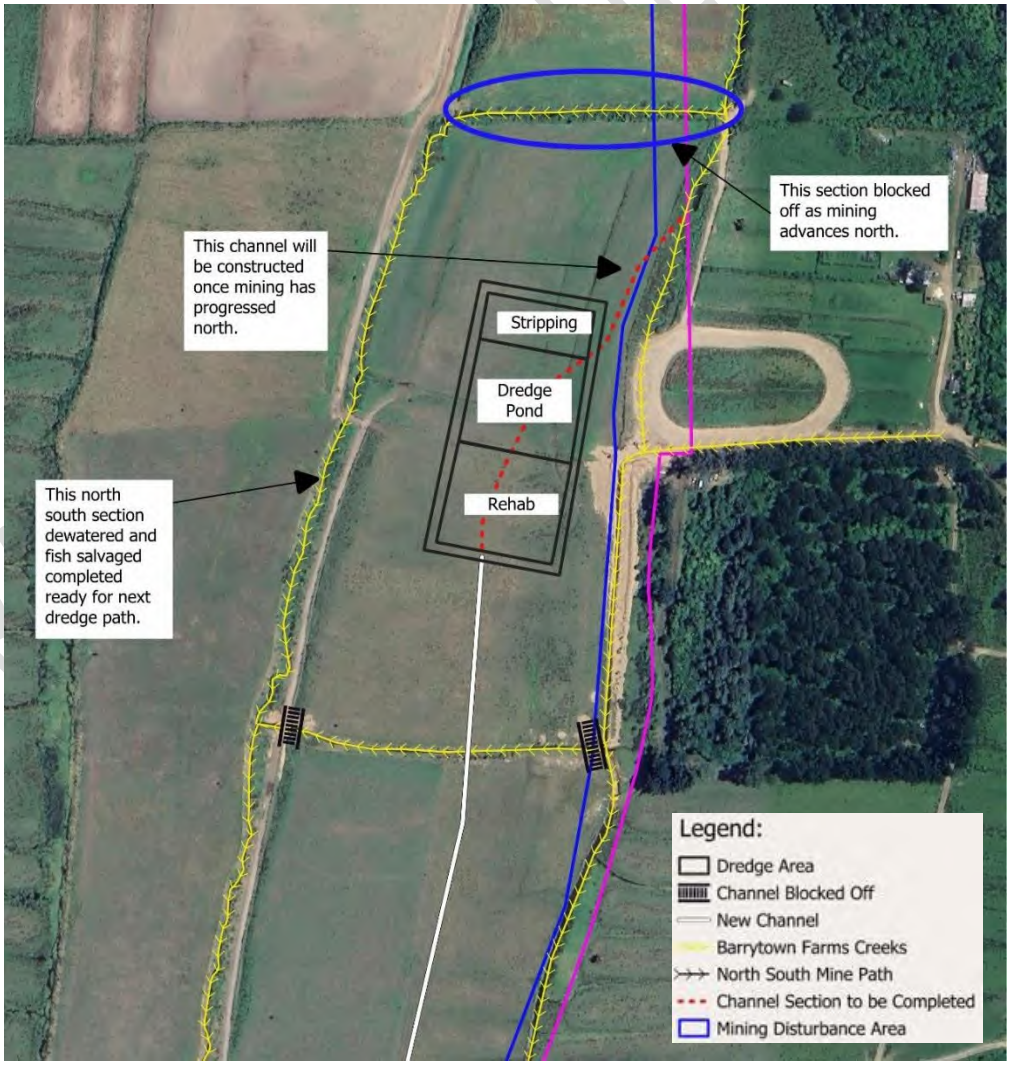
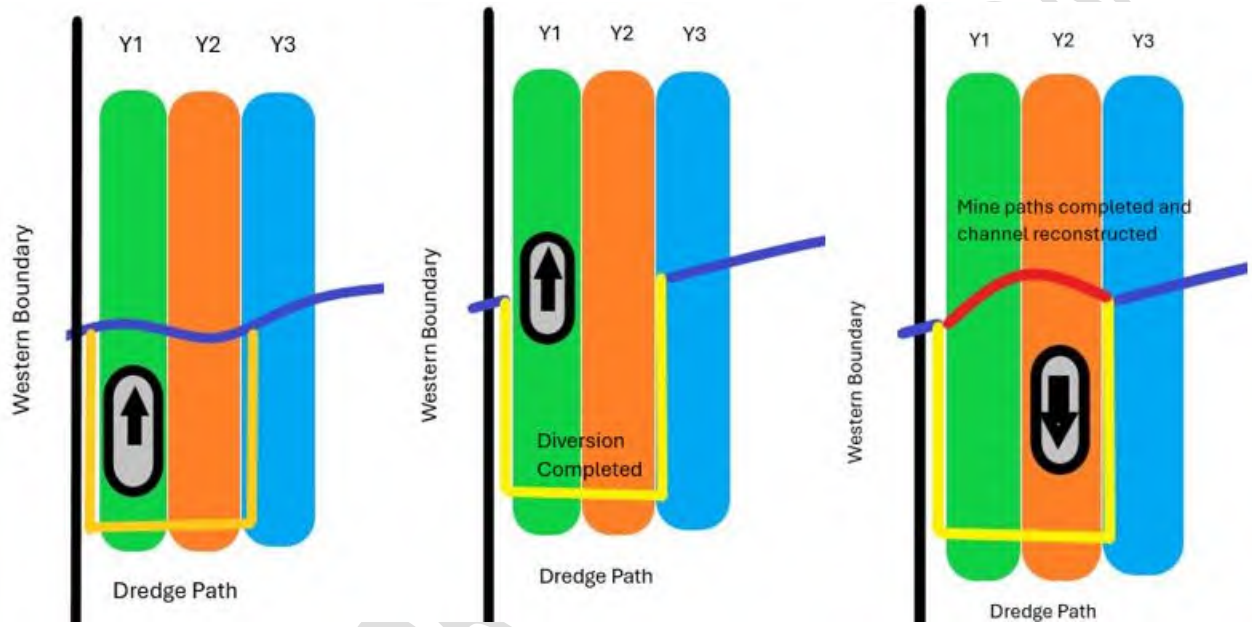


Figure 3: Diversion methodology for north south waterbodies

(b) East–west oriented creeks and drains will be diverted into previously mined areas (behind the mining void) and into the adjacent mine path (to the east as mining moves inland), prior to mining progressing through the creek or drain's existing alignment. This requires a temporary diversion of the creek or drain around the active mining area. Once mining has advanced beyond the alignment, a permanent reconstructed channel can be constructed and the creek, and where required drain, can be reinstated.

Creeks and drains will likely be disturbed several times, with temporary diversions occurring each time the active mining area intersects these waterbodies, potentially once per year for up to 3 months at a time per waterbody. Diverting the creek or drain around two sections of mine path at a time reduces the number of diversions required. Refer **Figure 4** for further detail.



As the dredge approaches the creek or drain, a temporary diversion (shown in yellow) is constructed behind the mining void.

The creek or drain is then diverted into this temporary channel, allowing the dredge to continue along its planned path.

Once the mining void has progressed beyond the proposed reconstructed alignment, the diversion is redirected into the newly rehabilitated channel (shown in red).

Figure 4: Diversion methodology for east west waterbodies

5.15 Fish relocation will be undertaken onsite as part of the diversion process as specified in 4.7.

5.16 The five creeks that will be diverted and mined are Northern Creek, Central Creek, Clarke Creek, Wasabi Creek and Southern Creek. Each of these creeks will be reinstated during progressive rehabilitation. **Table 1** identifies the creeks that are to be diverted, and their pre-mining and indicative post mining lengths. The diversion methodology to be applied has also been identified.

5.17 Some of the original artificial drainage channels may be reinstated, particularly if land contouring alone does not provide sufficient drainage. Creeks and drains will be connected to the constructed wetland area or re-established natural creek systems to support site hydrology and ecological function.

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Table 1: Creek extent pre and post mining

Creek	Length pre-mining (based on continually or intermittent flow extent)	Length post-mining (indicative but not less than the pre-ming length)	Diversion methodology to be applied
Northern Creek	1,088m	1,100m	East West
Central Creek	650m	700m	East West
Clarke Creek	680m	700m	North South
Wasabi Creek	727m	750m	North South / East West
Southern Creek	1,088m	1,100m	East West

Extraction of run of mine material

5.18 Following the removal of topsoil and overburden, the floating dredge can extract the run of mine material (**ROM**) from the newly stripped area from within the mine void without the use of other machinery.

5.19 The floating dredge will sit in a 1ha dredge pond, located in the mining void. The maximum depth of the mining void is 10m, which will maintain a natural water level approximating the ambient water table height. A picture of the type of floating dredge that will be used in the Project is shown in **Figure 5** below.

Figure 5: Floating dredge proposed to be used

5.20 The dredge has a suction cutter at the end of the dredge arm. The suction cutter will excavate the pit face by cutting into the bank and breaking down consolidated material. The loosened material will be drawn in through the suction head below water level, immediately mixed with water taken from the dredge pond to form a slurry and pumped to the field screening unit within the safety bund area.

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5.21 The dredge is capable of precise cutting and will cut slopes at approximately 1 vertical to 3 horizontal (1V:3H), which is consistent with industry standards for cutter suction dredging and provides for stable batters. The presence of water in the mining void provides sufficient pressure to ensure slope stability, as does the progressive tails deposition in the rear of the mining void. Safety bunds around the outside of the mining void will ensure that heavy machinery does not operate on the edge of the mining void, creating pressure on the slopes.

Initial screening of run of mine material and deposit of initial waste materials

5.22 The Field Screening Unit undertakes the initial screening of the ROM. Slurry passes through a trommel (a rotating cylindrical screen), which separates larger, coarser materials and debris (+2mm) from finer particles. Oversized material captured by the trommel is removed from the process stream to prevent damage or blockages in downstream equipment.

5.23 The slurry then enters the desliming circuit, which removes very fine silt and clay particles (referred to, when mixed with water, as "slimes"). By eliminating these particles, the desliming circuit improves the recovery of valuable heavy minerals and reduces the load on the WCP.

5.24 The large reject material from the trommel and the slimes will be returned to the rear of the mining void to be used in the progressive rehabilitation (see Section 7 for further discussion).

5.25 After screening and desliming, ROM is pumped as a slurry to the WCP for further processing.

6. Processing of run of mine material and transportation to market

6.1 Authorisations for further processing and transport are not being sought through this Fast-track application, as they have already been granted (or applications are being processed), as outlined in Sections 1.2 – 1.5. The resource consents and other permissions that have been obtained provide for a full mine to market process that results in finished product being exported to markets around the world. The following information is provided to explain the overall processing methodology and to place the proposed activities within the full operational context.

6.2 Following extraction, ROM will be processed in two stages. The first stage of processing will be undertaken on site at the WCP to extract Heavy Mineral Concentrate (HMC). The HMC will then be transported by truck to the MSP at Rapahoe to undergo the second stage of processing.

6.3 Consent for the MSP at Rapahoe was granted by the Grey District Council in October 2025.

6.4 Consent from the Grey District Council for the establishment, operation and maintenance of the WCP and access road is currently being processed and is expected to be granted prior to lodgment of this application. Consent for the earthworks component of this activity was granted by the West Coast Regional Council in February 2026.

Stage 1 processing - WCP

6.5 Mined ore will be pumped as a slurry from the mining void to the WCP, a fixed processing facility that receives material from mining activities across the resource area. At the WCP, valuable heavy minerals are separated from sand and silt using a water-based gravity

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separation process. This produces three material streams: HMC, middles and tails ('middles' and 'tails' are referred to generically as 'tailings' in this application).

6.6 Tailings are returned to the mining void as slurry, while clean water is managed and reused within the process. The HMC is dewatered to 10-15%, temporarily stored and transported off site by heavy vehicle for further processing at the MSP at Rapahoe.

Stage 2 processing - MSP

6.7 Processing at the MSP enables the extraction of concentrated garnet and ilmenite products.

6.8 The MSP has been strategically located at Rapahoe to ensure proximity to rail where product will be transported in containers to Lyttleton or Timaru Port for export to global markets. Waste material from the MSP (which has come from the SB) will be transported by heavy vehicle back to the WCP at the SB. That material will be deposited within a bunker at the WCP before it is pumped back to the mining void as a slurry to be used to backfill the mine pit for rehabilitation.

6.9 The MSP represents a critical component of the long-term viability and growth of the sand mining industry on the West Coast. The MSP provides significant value-add by enabling on-shore, and in-region, refinement of mineral products prior to export.

7. Management of processing water and stormwater

7.1 Water will be required for the processing of ROM at the WCP. Water used for processing, as well as stormwater captured on the WCP site, will be managed through a MWF located adjacent to the WCP.

7.2 The MWF will include lined treatment ponds and thickener tanks that enable sediment and fine particles to settle out of return water using biodegradable flocculants. Treated (clean) water will be recycled back into the processing system, while settled solids will be combined with tailings and returned to the mine pit as a slurry to support backfilling and rehabilitation.

7.3 The MWF is part of the ancillary infrastructure required to operate the WCP and will be authorised by the consent for the WCP.

Processing water

7.4 Processing water will be sourced from the existing water take location on the CB, unless further investigation identifies a practical alternative water source on the SB through future testing. Consent GDC-3154-23 / WCRC-2023-0046 authorises the abstraction of water for processing CB-mined material at the WCP for a 12 year duration. A new consent is being sought via this application to ensure the water take is available to the newly located WCP, and to support longer-term mining of the SB. It is proposed that the existing consent be surrendered as part of the grant of the new take. The approximate water take location on the CB is indicated on **Plan H**.

7.5 Water taken will be used to fill the ponds at the MWF, storing water for when it is required to be used for processing ROM at the WCP. The peak water take will occur when the WCP is restarted to process material from the SB or following maintenance or shutdowns. This is because the tanks and pipelines of the WCP must be filled with water prior to material being processed. During these periods, the full take of 63l/s will be required, likely over several days.

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7.6 Once processing is underway, water demand will significantly decrease. Water is recycled and reused throughout the plant, reducing the need for a continuous fresh supply. Only intermittent top-ups will be required to offset the water that remains in the HMC, and therefore lost from the site. It is estimated that approximately 10-15% of water drawn from the bore will be retained in HMC. This makes up the largest water loss within the system.

7.7 To compensate, make-up water will be drawn down at an average rate of 9.5l/s for the duration of processing. In practice, make-up water will be taken in short bursts of typically 15-20 minutes at a time, two to three times per day, at the peak rate of 63l/s.

7.8 Tailings will be mixed with water to form a slurry to be pumped back to the mine void. Tailings will be deposited at the rear of the pit by cyclone and the water will re-enter the mine void and rejoin the surrounding hydrological system.

7.9 The slurry circuit (the pumping of ROM to the WCP and tailings back to the mine void, all undertaken as a slurry) is considered to have a largely neutral effect on the water level in the mining void. The water that returns with the tailings help maintain, or even increase, water levels in the void, offsetting any lowering of the water table caused by the removal of the slurry from the mine void.

7.10 The MWF is designed to treat and temporarily hold process water before it is recycled for use in the WCP. After processing, excess water is treated via a thickener tank, which serves as the primary treatment stage. Fines and suspended sediment are separated from the water in the thickener tank. This water then flows into the forebay and ponds for further settling and storage. A flocculant may be added to enhance the settlement of fine particles. Fines and slimes collected in the thickener tank and forebay are pumped back to the mining void and mixed with coarse tailings for use in rehabilitation. Clean water is recycled back into the WCP for reuse in mineral separation processes or for transporting tailings as a slurry back to the mining void.

7.11 There is no discharge from the MWF treatment ponds to any surrounding water bodies. The only discharge is to the mining void.

7.12 If necessary to maintain capacity in the MWF excess water may be pumped back into the mining void to dissipate naturally.

7.13 It is possible that dissolved metals could be liberated and mobilised because of the mechanical processes of mineral separation and sand and slimes deposition during backfilling of the worked excavation. Lime augmentation (i.e. lime dosing) of tailings and slimes at the time of emplacement within the void, and the inclusion of lime boulders in creek reconstruction will mitigate these effects. Both groundwater and surface water quality and quantity monitoring will be undertaken across the site as set out in the Water Management, Monitoring and Mitigation Plan.

Stormwater

7.14 Stormwater captured within the mining disturbance area will be contained on site by the safety bunds constructed on either side of the mining void. It will either be allowed to infiltrate into the sandy subsoils, or directed to discharge into the mining void where there is sufficient capacity for the water to assimilate into the ground water.

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7.15 Stormwater generated in the WCP area, including runoff from roofs, hardstand areas, stockpiles, and processing surfaces, will be collected via a network of drains, bunds and sumps, and directed to the ponds at the MWF. To maintain operational capacity during high rainfall periods, treated stormwater may be pumped to the mining void to dissipate naturally.

8. Rehabilitation and mine closure

8.1 Rehabilitation of the SB will be undertaken in three stages:

(a) Mined land will be progressively rehabilitated as the mining void advances;

(b) Each section will be rehabilitated as it is completed and mining moves to the next section; and

(c) Final rehabilitation and mine closure will be undertaken once mining of the SB is fully completed.

Progressive rehabilitation of mining void

8.2 The total area of disturbed land is proposed to be limited to 16ha within the SB at any one time, for the purposes of mitigating potential effects relating to dust, landscape, visual and sedimentation/ water quality.

8.3 The 16ha limitation for the mining area means that the site will be progressively rehabilitated by filling the mining void with waste material as mining advances, replacing topsoil and re-grassing the mined area. The 16ha limitation is proposed to only apply to those disturbed areas with less than 80% vegetative cover and mined land will be removed from the disturbed area calculation once that level of vegetative cover has been reached. The disturbed area limits include contingency for any periods of slow growth that may occur (e.g. during winter or a cold wet spring).

8.4 Rehabilitation of the mining void will take place at the same time as mining occurs and is expected to be completed within 12 months of the conclusion of mining in that location. The waste material (known as "tailings") produced by the initial screening of raw material at the Field Screening Unit will be pumped back into the rear of the mining void immediately. Any tailings from the WCP will also be pumped back and deposited at the rear of the mining void. Waste material from the MSP that has been transported back to the SB will also be pumped from the WCP to the mining void and deposited with the tailings to assist with rehabilitating the landform.

8.5 The tailings will be deposited at the rear of the mining void using dewatering cyclones which assist in separating water from solids to create a more stable land surface suitable for rehabilitation. The water separated from the tailings as they are dispersed is discharged back into the mining void.

8.6 The material to be returned to the excavated area includes un-mineralised sand, clay slimes, and gravel and rock greater than 2mm. Tailings will be allowed to naturally beach (spread) out. The cyclone will be moved as required to distribute the tailings evenly across the area.

8.7 Tailings will then be levelled and contoured, as per a surveyed final landform design, with the use of excavators and bulldozers ready to receive the pre-stripped overburden and topsoil. This topsoil and overburden, as well as material from outside the mining disturbance area within the wider application area and the bunds as they are retired, will be spread out and used as a growing medium for rehabilitation of the site. Once overburden

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and topsoil are replaced, the land will be re-vegetated with grass and other vegetation that was removed prior to mining, where possible and appropriate.

8.8 Initial vegetative cover will be established as soon as practicable (potentially using hydroseeding) to minimise any erosion potential. This will be followed by the establishment of longer term, permanent pasture species.

Progressive rehabilitation of each section

8.9 As the mining of each section is completed, the section will be rehabilitated to its final landform which includes a proposed wetland of approximately 51.7ha on the eastern boundary of Sections 1 and 2, which will be constructed in stages (addressed in Section 7.17 below).

8.10 Approximately 5.6 million tonnes (equivalent to 2.6 million cubic metres at a bulk density of 2.2 g/cm^3) of HMC will be removed from the mining disturbance area over the life of the project for further processing and export., To achieve the proposed post-mining contours, material will be sourced from areas located outside the mining disturbance area, from the higher terrace, to be used as fill to reconstruct the final landform. When balanced against the available redistribution material, the final change in landform equates to an average reduction in land height of approximately 0.63m across the entire 408ha consent area.

8.11 The western boundary will be returned to its current ground level to minimise any effects from coastal hazards. Restoring this area to its natural elevation maintains the existing buffer between the active coastal environment and the inland mined area and future farmland. This helps to ensure that the rehabilitated land is not at increased risk from coastal hazards such as erosion or ponding from storm surge events.

8.12 The site is naturally wet and exhibits poor drainage, despite the presence of a humped and hollowed landform and an established network of creeks and drains throughout the area. Following mining activities, the site will be rehabilitated to improve drainage and soil conditions, enabling its return to more productive farmland use.

8.13 The final landform will be contoured to slope towards reestablished creeks to improve drainage and ensure the future productive use of the site. The five diverted creeks (Northern Creek, Central Creek, Clarke Creek, Wasabi Creek and Southern Creek – refer section 4.16 – 4.17) will be reconstructed along more natural, meandering paths, as opposed to their straight and rectified channels, to enhance ecological and hydrological values while maintaining current catchment drainage patterns. Post mining creek extent will ensure no loss of extent or value. Some existing drains may be reinstated if contouring alone is insufficient. Some modified humping and hollowing will be incorporated, though it is intended to be less pronounced than the existing humping and hollowing, and will include the raising of the low areas (hollows) above the water table to reduce sediment and nutrient runoff from future farming activity providing long-term ecological benefits and improved drainage across the site.

8.14 Fences, internal farm roads, bridges and culverts will be reinstated as required.

8.15 The anticipated final land contour is illustrated in **Plan I**.

8.16 A Work Programme will be submitted to the Grey District Council and West Coast Regional Council annually, which will specify rehabilitation works to be undertaken in each 12-month

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period. This will include a summary of the rehabilitation completed during the previous 12 months. This is standard practice for mining activities on the West Coast.

Proposed wetland

8.17 The proposed wetland will be constructed in two stages as follows:

(a) The first stage of the wetland will be constructed on Section 1: Granite Creek North, north of Granite Creek and south of the WCP, following completion of Section 1;

(b) The second stage of the wetland will be constructed on Section 2: Granite Creek South, north of Cargill Road and south of Granite Creek, following completion of Section 2.

8.18 The new wetland will be established along the eastern boundary, planted in native species and fenced from stock.

8.19 There will be an increase in the extent and integrity of wetland across the site due to the construction of the new wetland area. Indigenous biodiversity values are expected to increase at the site, including a net gain in wetland area and indigenous vegetation cover.

8.20 The proposed wetland is shown in **Plan J**.

Proposed planting

8.21 The Applicant has engaged Glasson Huxtable Landscape Architects to assess the potential landscape and visual amenity effects of the proposal. The Landscape Assessment identifies areas where current vegetation should be retained and additional planting, associated with the restoration of creeks and construction of the wetland area, is to be undertaken. These plantings have been designed both for ecological and landscape mitigation for the project and will have long term ecological benefits in terms of stream health and habitat for indigenous species.

8.22 Due to the distance of the mining activity from public viewpoints for the majority of its operation, bunding and planting works are restricted to managing the effects of noise. There are four noise bunds also proposed as set out in Section 7.23. Bunds will have an inward facing grassed slope with dense planting on the crest and outward facing slope.

8.23 Planting and bunding includes:

(a) Lot 2 DP2178 bund - 3m high with a 4.8m wide crest (24m width) approximately 500m long;

(b) Warren Road bund – 3m high with a 4.8m wide crest (24m width) approximately 900m long ;

(c) Cargill Road bund - at the eastern edge of the site stretching north – 3m high with a 4.8m crest (24m width) approximately 460m long;

(d) 101 Cargill Road bund – on the western boundary - 3m high with a 4.8m wide crest (24m width) approximately 440m long.

8.24 Retention of key vegetation has been identified at:

(a) Planting clusters near the WCP;

(b) Planting clusters along the eastern application area boundary north of Cargill Road;

(c) Planting patch adjacent to 101 Cargill Road; and

(d) Riparian vegetation adjacent to Granite Creek;

Closure sequence

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8.25 Final rehabilitation of Section 3 (Cargill Road) will occur following the completion of mining activities in this area.

8.26 As progressive rehabilitation will be undertaken across the SB there will be limited final contouring and blending required once mining is complete. Any final contouring/blending at the southern end of the mining disturbance area will use material from within the wider application area as required.

9. Plant and machinery

9.1 The following machinery listed in **Table 2** is likely to be required to undertake mining, pumping and rehabilitation of the site (although specific models may differ).

Table 2: Mining machinery list

Type	Supplier	Model	Number
Bucketwheel Cutter Suction Dredge	Neumann Contractors	Series 350	1
Dozer	Komatsu	D71PX-24	2
Grader	Komatsu	GD655-7	1
Integrated Tool Carrier	Hitachi	ZW220-5	3
Artic 6wd 45 Truck	Hitachi	B45E	3
Excavator (Long stick)	Hitachi	ZX890LCH	2
Excavator (30 or 40 tonne)	Hitachi	ZX345USLC	2
Field Screening Unit (trommel)	Bespoke		1

9.2 Additional mining equipment and vehicles will be used on site, including a variety of pumps (including land-based, floating and submersible) and light 4-wheel drive vehicles for the transport of mining personnel.

10. Site operation

10.1 This section describes how the site will be operated, in terms of hours of operation, site configuration, transport, lighting, dust management and hazardous substances use.

Hours of operation

10.2 Mining activities associated with the extraction of material will be undertaken during daylight hours only, consistent with the existing consent granted for the CB.

10.3 Hours of daylight are between 30 minutes before sunrise to 30 minutes after sunset[1].

10.4 Mining shall not occur between the hours of 0600 and 0700 within 500m of the dwellings located at:

(a) Lot 2 DP2178;
(b) 37, 41, 43 and 50 Warren Road;
(c) 64, 86 and 101 Cargill Road.

10.5 There will be no mining on Sundays.

[1] *Sunrise and sunset times can be found at* https://www.sunrise-and-sunset.com/en/sun/new-zealand/westport/2023/june

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Site configuration

10.6 Access tracks will be required within the mining area. These will be formed to provide light vehicle and machinery access for the preparation, mining and rehabilitation of various areas as mining progresses. These access tracks will move as mining progresses.

10.7 It is proposed to retain the existing access points for farming activities for the duration of the mining activity, to ensure that any ongoing farming traffic is kept separate from the mine traffic.

Vehicle movements

10.8 There are 57 full time staff proposed to be employed across the WCP and wider mine site at the SB. This includes 18 staff to be employed specifically for the mining activity.

10.9 Vehicle movements associated with mining activities are largely generated by the existence of the WCP adjacent to the SB. They will therefore be authorised by the WCP consent.

Lighting

10.10 Due to activities taking place during daylight hours only, only minimal lighting will be required on the mine site and at the mining void.

10.11 There will be limited fixed lighting in the mine area, which may include lighting around the pump to allow for the pump circuit to be checked overnight. Any fixed lighting in the mine area will be shrouded and adhere to the principles outlined below.

10.12 Lighting will not exceed 2.0 lux spill (horizontal and vertical) onto any adjoining property, measured at any point more than 2m inside the boundary of the adjoining property or the closest window on the adjoining property (whichever is the closest).

10.13 All lighting on site will adhere to the Australian Government's National Light Pollution Guidelines for Wildlife January 2023 (or subsequent revision), including but not limited to:

(a) Utilising the Seabird Light Mitigation Toolbox in Appendix G – Seabirds (Schedule 4);
(b) All fixed lighting shall be pointed downward and shielded to avoid light spill, with a lighting temperature of no more than 2000K, and be filtered to reduce blue and violet wavelengths;
(c) Lights shall only illuminate the object or area intended;
(d) Fixed lights shall be mounted as close to the ground as practicable;
(e) External lighting shall use the lowest intensity lighting as possible, while ensuring compliance with workplace health and safety requirements;
(f) External lighting shall be equipped with light minimising technology, including motion sensors or timers;
(g) Mobile lighting within the mine site will adhere to the above principles, including the dipping of headlights of vehicles operating on site.

10.14 Adherence to the above standards will minimise light spill, thereby preserving the natural character and dark night sky of the coastal environment. The measures proposed will also assist in avoiding the risk of adverse effects on the Westland Petrel Colony located approximately 5.5km north of the WCP location. These standards are consistent with the conditions of consent granted for the CB.

Noise

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10.15 Noise will be generated from the activities at the mining void including excavators and front end loaders to strip top soil and overburden, trucks to move material to the rear of the site, the dredge and field screening unit and the spreading of tails from the cyclone.

10.16 Noise generation has been taken into account in the design of the project. Hours of operation control the activity each day. Earthworks near dwellings will be minimised, and noise mitigation bunds will be constructed at four locations as outlined in Section 7.23.

10.17 The site will operate in accordance with a Noise Management Plan, which sets out the management techniques to be applied to ensure that the site operates in accordance with best practice and unnecessary noise generation is minimised by:

(a) Exhaust silencers fitted to all mobile plant;
(b) Power from the grid used in preference to diesel generators where possible;
(c) Vehicles and equipment maintained to avoid unnecessary noise and vibration;
(d) Trucking contractor behaviour expectations including following speed limit; restrictions, no unnecessary sounding of horns or revving of engines, avoidance of engine braking, vehicles to be properly maintained;
(e) Metal to metal contact avoided during the loading of trucks;
(f) No tonal reversing alarms;
(g) Site vehicles to follow speed limits and drive in consistent manner, no amplified music permitted inside vehicle cabs, horns to be used in emergency only;
(h) Access road and working surface maintained free from potholes and corrugations.

10.18 The following noise limits are proposed to apply at or within the notional boundary of any dwelling existing at the date consent is granted on any other site, except in relation to the four dwellings on Warren Road, three dwellings on Cargill Road and at Lot 2 DP2178:

(a) Daytime (0700-2200): 55 dB LAeq (15 min)
(b) Night-time (2200-0700): 45 dB LAeq (15 min) and 75 dB LAFmax
(c) when measured and assessed in accordance with the latest New Zealand noise standards: NZS 6801:2008 “Acoustics – Measurement of environmental sound” and NZS 6802:2008 “Acoustics -Environmental Noise”.

10.19 At some locations, extraction of ore can proceed between 0600 and 0700hrs (classified as night-time under the District Plan) while still complying with the 45 dB L_{Aeq} noise limit.

Dust Management

10.20 Some activities proposed to be undertaken have the potential to generate dust emissions. While the application site is within a high rainfall area, there are periods of dry weather.

10.21 As the mining activity is a wet process dust generating activities will be limited to times of overburden removal and rehabilitation and vehicle movements on site. These activities are intermittent (not always continuous) and can be managed with techniques outlined in the Dust Management Plan. Dust will be managed via visual inspections, use of water carts and other dust suppression techniques as required.

10.22 The Applicant has installed dust monitors on the perimeter of the mine site. These monitoring stations will remain in place for the duration of mining activities on site.

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Hazardous substances use, storage and management

10.23 The refuelling of machinery will be undertaken on site using a mobile fuel tanker with a centralised fuel store located at the WCP (40,000 litres). The proposed above ground tank will be authorised by the WCP consent.

10.24 Re-fuelling will be completed under direct supervision of the machine operator to minimise the risk of spills occurring. Refuelling will occur at least 20m away from waterbodies.

10.25 Mechanical repairs and servicing will occur at the WCP area. In the event of major mechanical break-down, machines may be taken to an off-site workshop. Spill kits and procedures will be available on site in the event of a fuel or oil spill occurring.

10.26 All waste oil and fuel containers will be removed from the site promptly.

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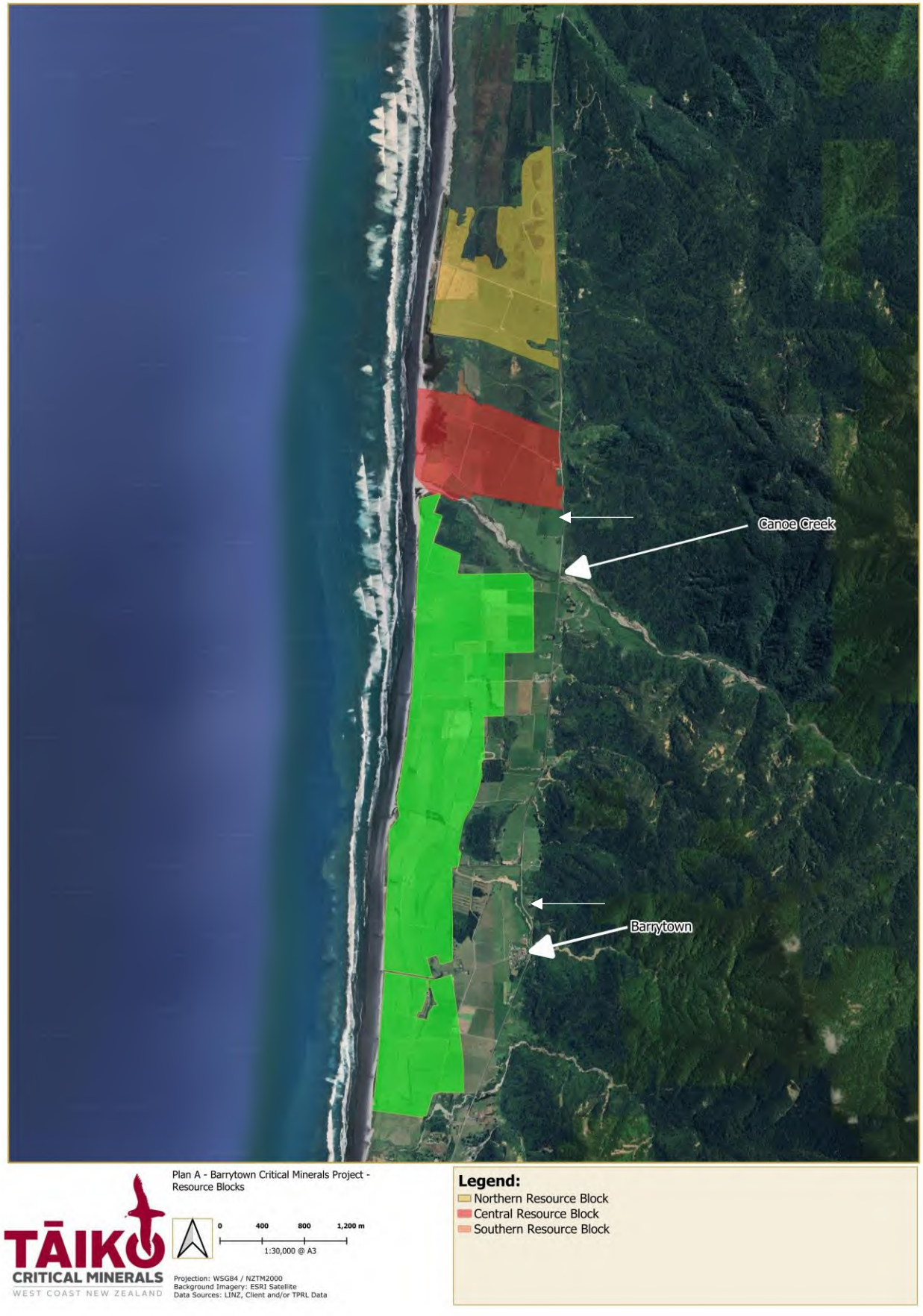
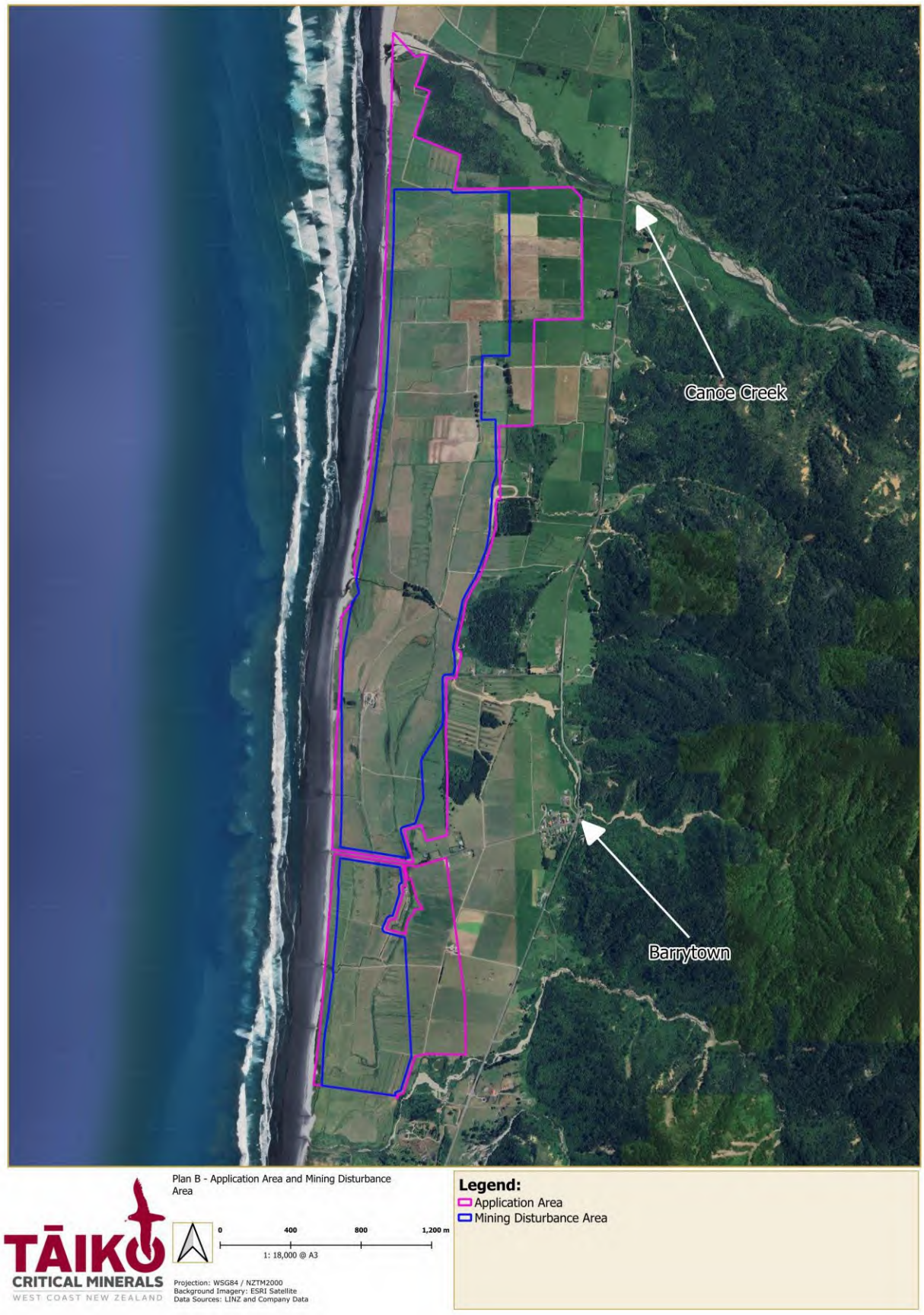
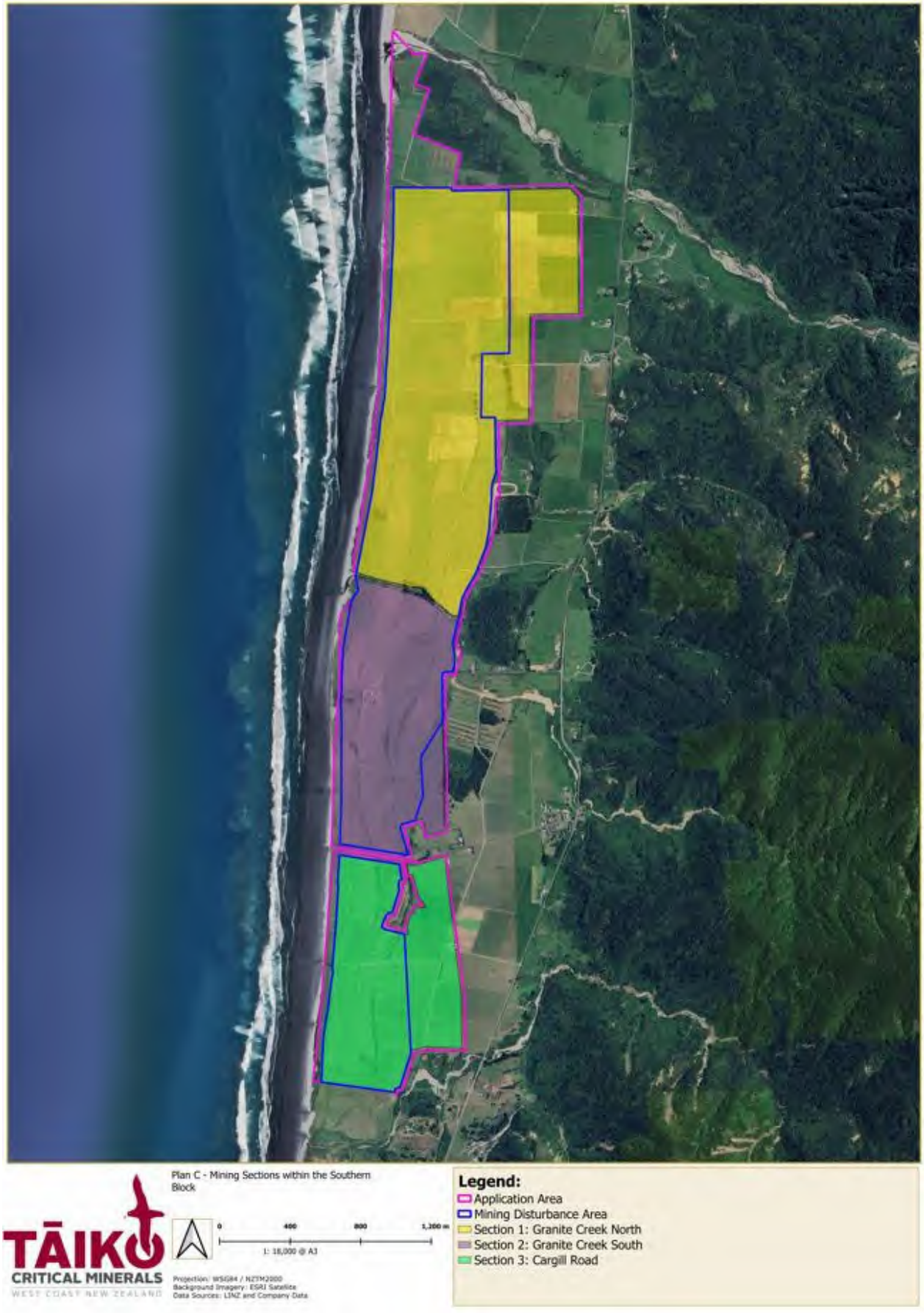
Plan A: Barrytown Critical Minerals Project – Resource Blocks



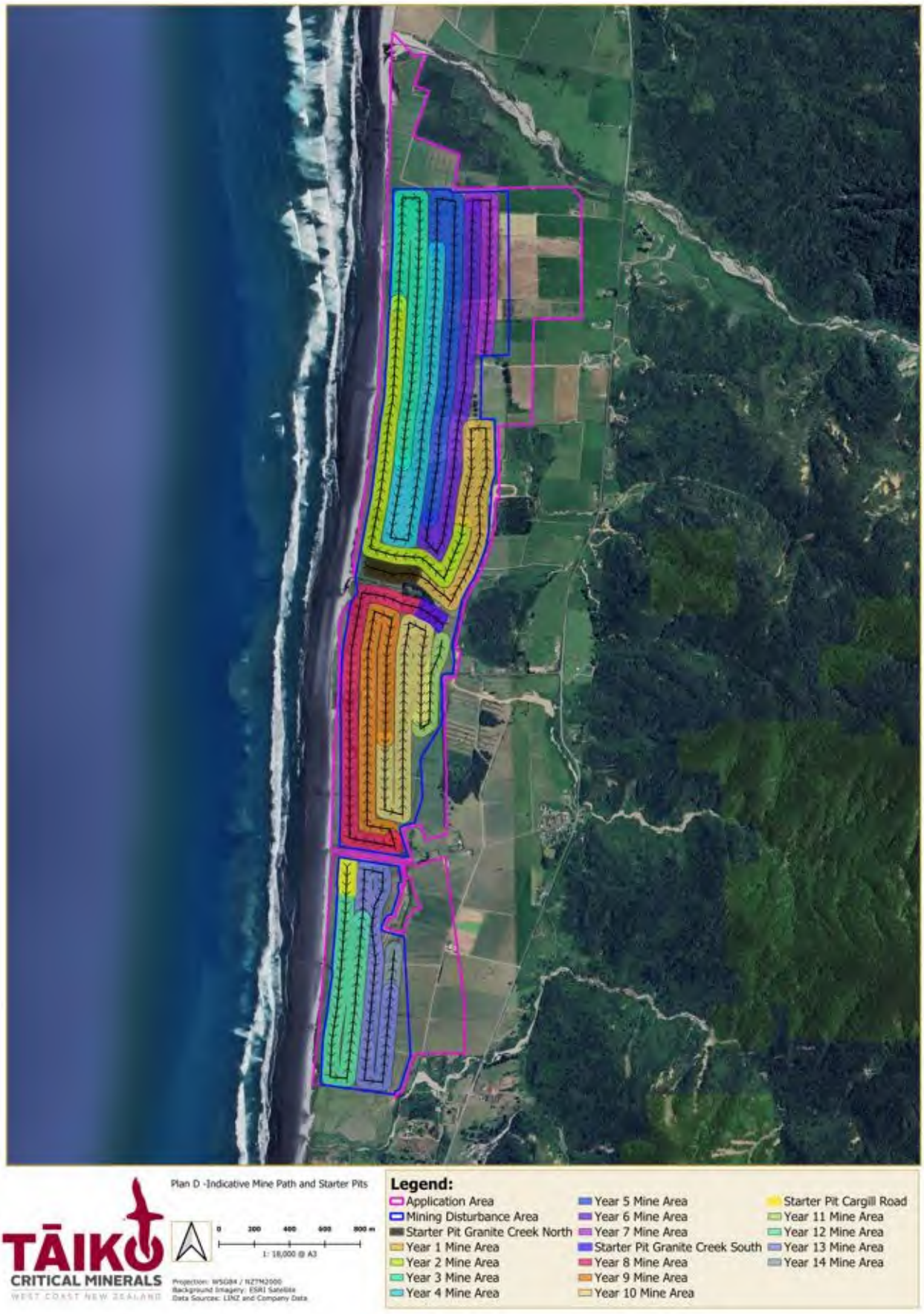
Plan B: Southern Block Application Area and Proposed Mining Disturbance Area



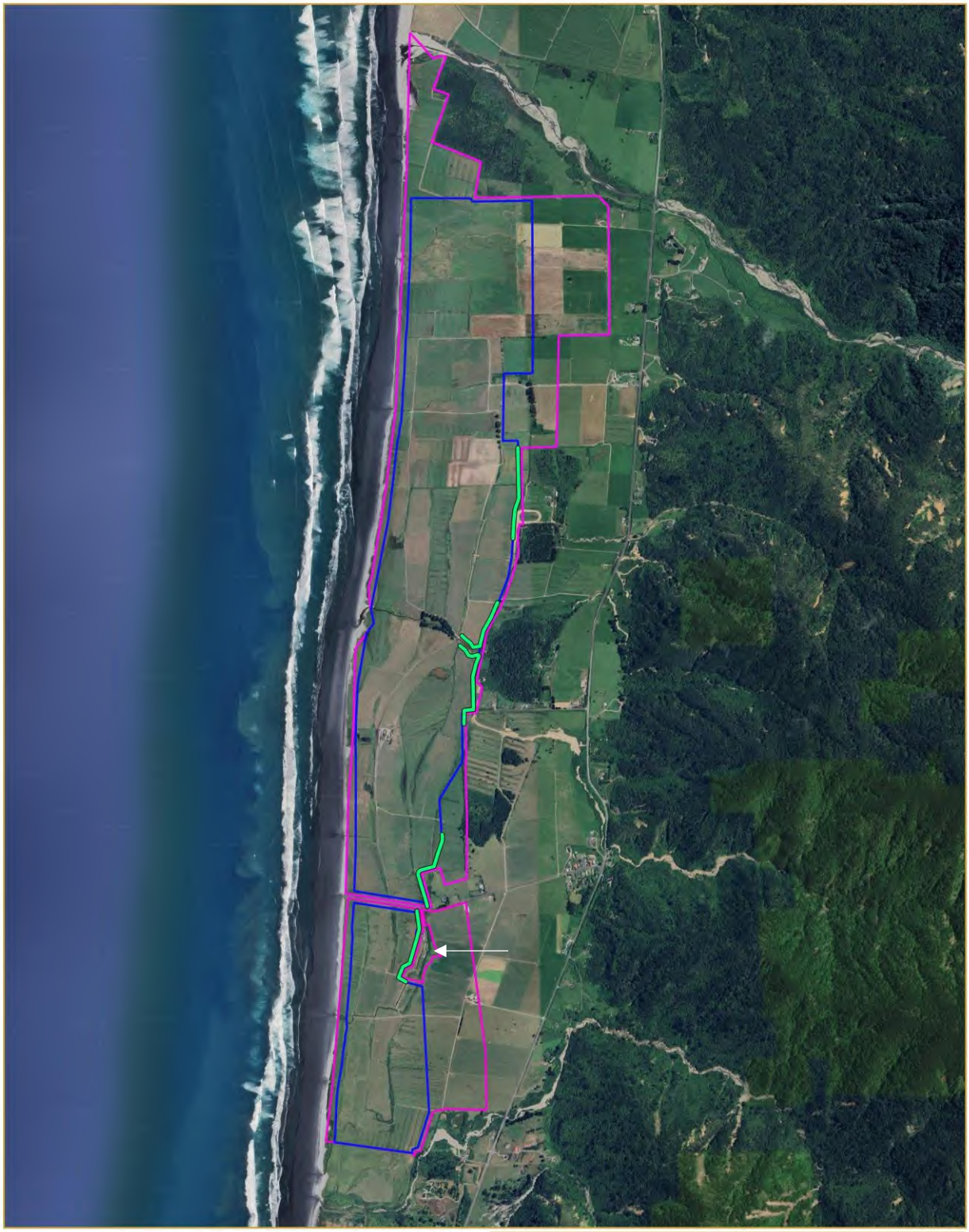
Plan C: Mining Sections within the Southern Block



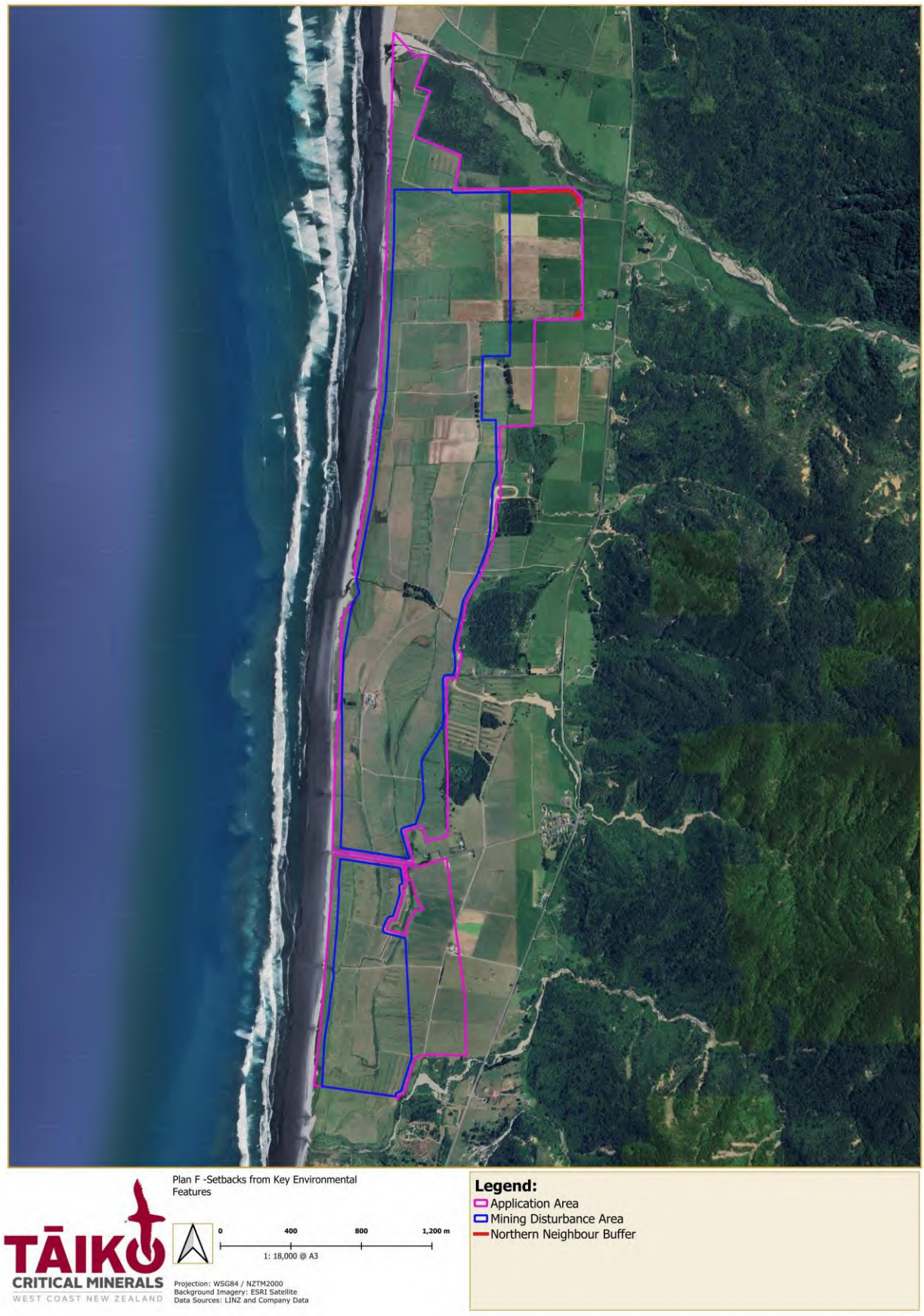
Plan D: Indicative Mine Path Including Mine Starter Pits



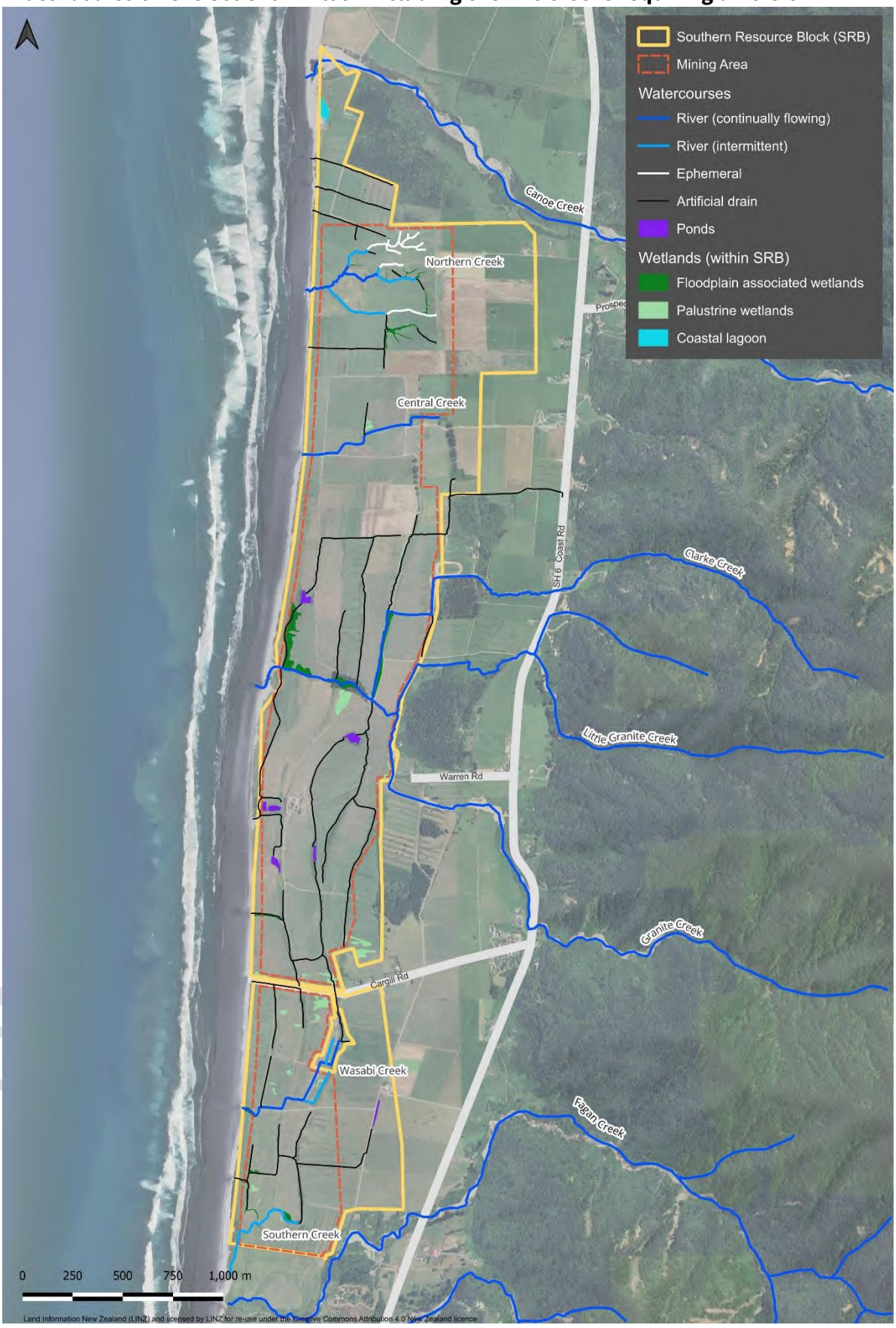
Plan E: Noise Bunds



Plan F: Setbacks From Key Environmental Features

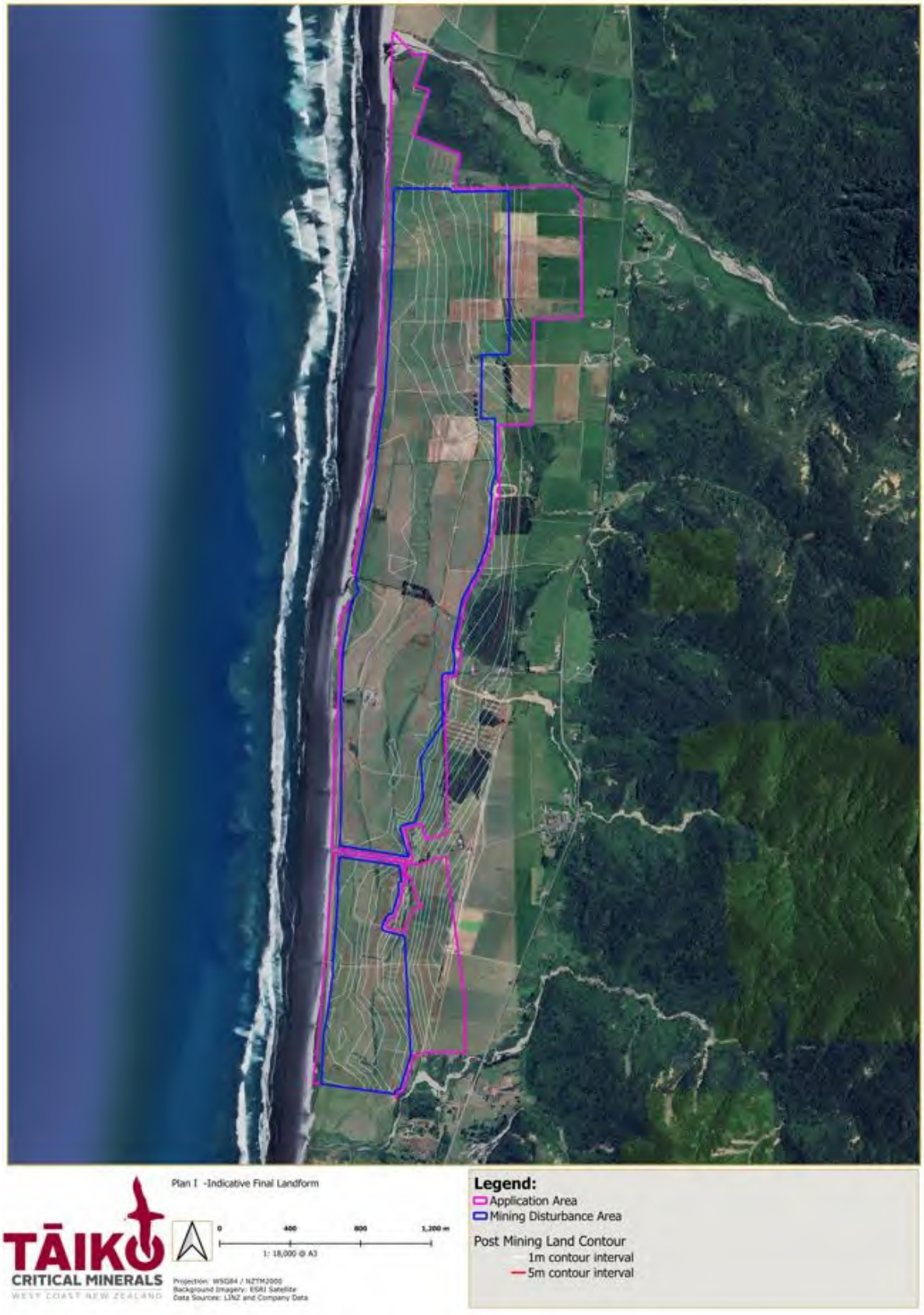


Plan G: Waterbodies on the Southern Block including the five creeks requiring diversion

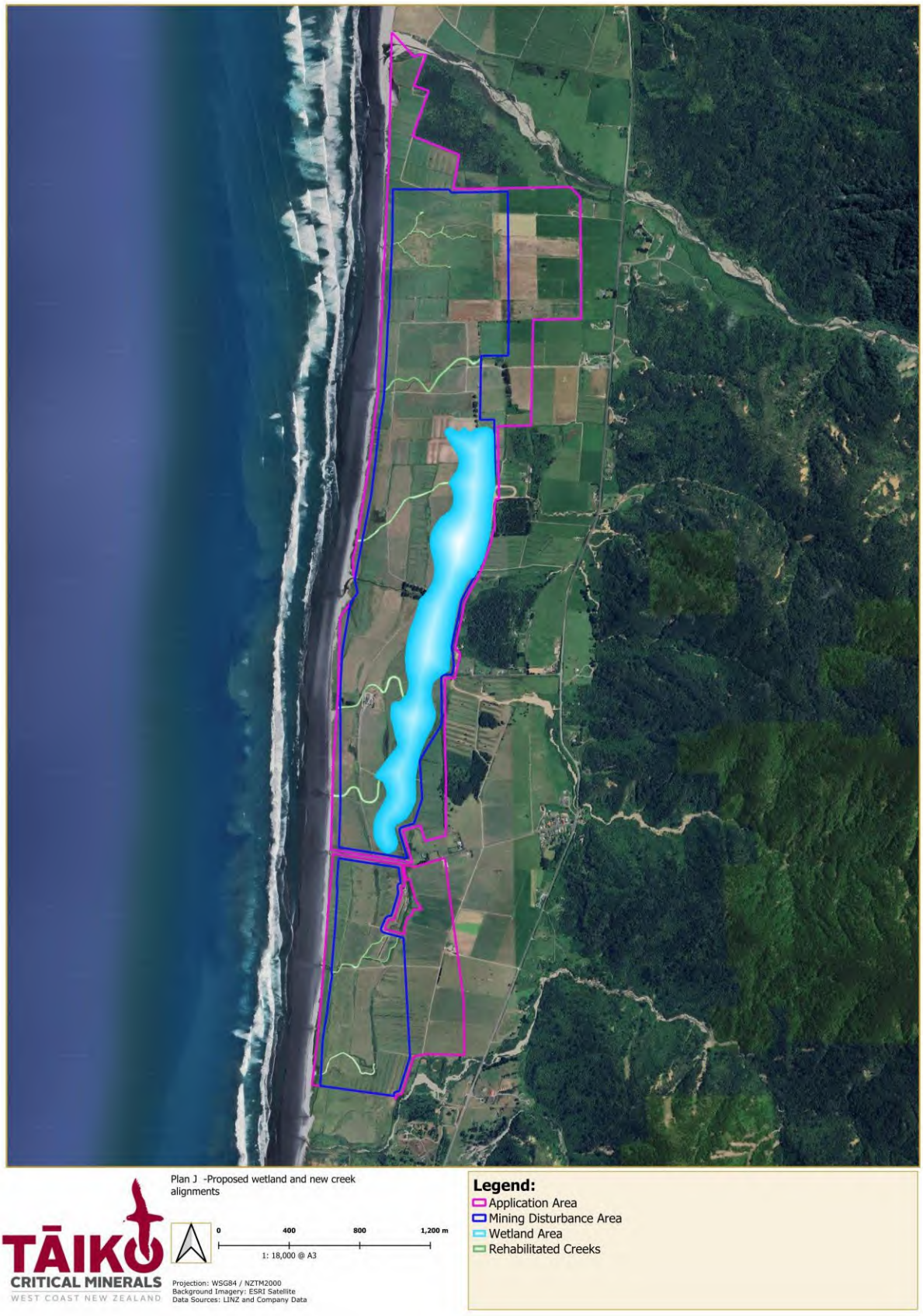


Plan H: Location of Water Take

Plan I: Indicative Final Land Contour



Plan J: Proposed Post-Mining Wetland and Watercourse Rehabilitation Layout



Appendix B

Proposed conditions

Barrytown Critical Minerals Project
Southern Block

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General Conditions for Grey District Council and West Coast Regional Council	
1.0 General	
1.1	The Consent Holder must carry out the mineral sand mining activities in general accordance with the application made through the Fast-track Approvals process, the Site Plan enclosed as Schedule 1 prepared by Tai Poutini Resources Ltd and the following management plans [to be inserted].
1.2	The Consent Holder must ensure all staff and contractors are made aware of, and have access to, the resource consent conditions prior to the commencement of mining. A copy of the resource consent conditions must also be readily available on-site.
1.3	All actual and reasonable costs incurred by the Consent Authorities in monitoring, enforcement and administration of this resource consent must be met by the Consent Holder.
1.4	a. Within 2 months of the commencement of these consents, the Consent Holder must appoint an Accountable Person to be responsible for ensuring compliance with all conditions of these consents. The Accountable Person must be based on-site for a minimum of 4 hours per day, for three days per week. The Accountable Person must: i. Review, submit and ensure compliance with all management plans listed in the conditions of these consents; ii. Ensure there is another person who can provide cover in the event they are sick or unavailable, and to provide for succession ('Nominated Cover Person'); iii. Be the point of contact between the Consent Holder, the Consent Authorities, the Community Liaison Group and the community generally, and pro-actively engage with these parties as required under these consents; iv. Deliver on reporting requirements required by the conditions of these consents. b. The Consent Authorities must be advised of the name and contact details of the Accountable Person and the Nominated Cover Person when they are appointed. In the event that the Accountable Person or Nominated Cover Person change, the Consent Authorities must be notified. A sign must be erected at the property boundary adjacent to the site access road, which provides the name and contact details of the Accountable Person and Nominated Cover Person required to be appointed under sub-clause a
2.0 Notification	
2.1	For monitoring purposes, the Consent Holder must notify the Consent Authorities of the following: a. The intended commencement date of works on-site at least 15 working days prior to commencement of works on-site; and b. The intended completion of final mine closure rehabilitation activities at least 15 working days prior to works ceasing on-site.
3.0 Review of Conditions	
3.1	Pursuant to Section 128(1) of the Resource Management Act 1991, the Consent Authorities may review any of the conditions of these consents by serving notice on the Consent Holder

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	within a period of 60 working days, commencing on each anniversary of the date of commencement of these consents for any of the following purposes: a. To deal with any unanticipated adverse effect on the environment which may arise from the exercise of the consents which is appropriate to deal with at a later stage. b. To assess the appropriateness of imposed monitoring parameters, monitoring regimes and monitoring frequencies and to alter these accordingly. c. To ensure that any management plan required by conditions gives effect to conditions of these consents. d. If the information made available to the Consent Authorities by the applicant for the purposes of applying for consent contained material inaccuracies and the effects of the exercise of the consent are such that it is necessary to apply more appropriate conditions.
4.0 Bond Conditions	
4.1	The Consent Holder must provide and maintain in favour of the Consent Authorities (the West Coast Regional Council and the Grey District Council [jointly for their respective interests]) a bond or bonds related to mine closure activities required by these consents.
4.2	The payment of the bond quantum by the Consent Holder, as required by Condition 4.5 must either be: a. A bond in favour of the Consent Authorities for the guarantee sum in a form and executed by a surety acceptable to the Consent Authorities; or b. A cash bond deposited with and held in a bank account by the Consent Authorities.
4.3	Where a bond is guaranteed in accordance with Condition 4.2 a., the guarantor must bind itself to pay up to the bond quantum for the carrying out and completion of all obligations of the Consent Holder under the bond.
4.4	The bond (as set at any time under Condition 4.1) must be held or remain in full force and effect throughout the term of these consents until all conditions under these consents have been performed unless otherwise agreed by the Consent Authorities.
4.5	a. The bond quantum must be $300,000. b. The method for arriving at the bond quantum does not limit the scope of the bond, which is set by Condition 4.1.
4.6	The provisions of Section 109 of the Resource Management Act 1991 must apply to any bond, or bonds, required pursuant to the above and must not be limited by the details of the bond instrument.
4.7	The amount of the bond may be inflation adjusted annually, if requested by the Consent Authorities, by the movement of the CPI relative to the CPI at the date when the bond is first provided.
4.8	The Consent Holder must not exercise these consents:

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	a. Until the bond required by Condition 4.1 has been fully executed by the Consent Holder and guarantor, or has been deposited with the Consent Authorities, or b. In respect of any inflation adjusted bond referred to in Condition 4.7, after 30 working days have expired from the date the Consent Holder was notified of the terms of the inflation adjusted bond by the Consent Authorities unless the inflation adjusted bond has been executed with the Consent Authorities by the Consent Holder and guarantor, or has been deposited with the Consent Authority; or c. In respect of any bond sum changed or reviewed pursuant to Sections 127 or 128 of the Act, after thirty 30 working days have expired from the date the Consent Holder was notified of the decision of the changed or reviewed bond by the Consent Authorities unless the changed or reviewed bond has been executed with the Consent Authorities by the Consent Holder and guarantor, or has been deposited with the Consent Authorities, or d. If, during the term of these consents, the whole or any part of the bond is required to be used for the carrying out and completion of all obligations of the Consent Holder under the bond, unless the full bond has been executed with the Consent Authorities by the Consent Holder and guarantor, or has been deposited with the Consent Authorities.
4.9	The Consent Holder must complete such work requested in respect of which any bond or deposit is held, within the time period nominated by the Consent Authorities' written request.
4.10	If the consents are transferred in part or whole to another party or person, the bond must continue until any outstanding work at the date of transfer is completed to ensure compliance with the conditions of these consents, unless the Consent Authorities are satisfied adequate provisions have been made to transfer the liability to the new Consent Holder.
4.11	In the event of any such transfer of the consents, the Consent Holder must ensure that the transfer provides a replacement bond to the Consent Authorities on the terms required by the Bond Conditions.
4.12	The Consent Holder must meet the costs of providing any bond, or bonds, including the costs of the bond and any substitute bond. ***Advice Note:*** • *The Consent Authority will release the bond upon the closure of the mine if all conditions of consent have been complied with to the satisfaction of the Consent Authorities.*
5.0 Annual Work Programme	
5.1	At least 20 working days prior to mining activities commencing and thereafter on or before the anniversary date of the mining activities commencing, the Consent Holder must submit a programme of work ("Annual Work Programme") for certification by the Consent Authorities detailing: a. The proposed works to be carried out over the next 12 months including: i. Equipment to be used; ii. Areas of topsoil and overburden stripping and stockpile locations; iii. New areas of land disturbance that will be mined; iv. Access tracks;

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	v. Drilling or prospecting sites and other tracks to be constructed; vi. Native freshwater fish capture and relocation plan and any other wildlife management required (lizards and birds); vii. Proposed location, and relocation, of the penguin fence; and viii. Any other site works within the consent area. b. The approximate open volume of the mining void at the start of the year including the depth of excavations and the area of the mining void. c. Extent of creek diversions and reclamations. d. The progressive rehabilitation works to be carried out over the next 12 months including: i. Areas of unrestored land (i.e. any land not finally topsoiled and revegetated) at the beginning of the 12-month period; ii. The area that will be fully rehabilitated during the forthcoming 12-months; iii. Maximum slope angles, bench heights and widths of recontoured ground, if applicable; iv. Rehabilitation methods and techniques including replacement of topsoil and vegetation cover with seed collection and plant procurement details; d. Description of measures to prevent adverse effects on natural waterbodies, including drainage works within the consent area, and the collection and treatment of site run-off; e. Measures to ensure soil conservation; f. A description and analysis of any unexpected adverse effects that have arisen as a result of activities within the last 12 months, the steps taken to address those adverse effects and measures implemented to avoid a repeat occurrence of them.
5.2	The following plans, reports and results of monitoring must also be submitted as part of the Annual Work Programme: a. A detailed plan or aerial photograph showing: i. The open working area at the start of the year; ii. Proposed mine path for the forthcoming year including haul and access roads; iii. Rehabilitated ground behind the mining void area; iv. Location of existing and intended topsoil or overburden dumps and their dimensions; v. Location of natural surface water bodies; vi. Proposed diversions of water bodies, location of fish diversions and reclamations of creeks; vii. Location of present and intended drainage works and settling ponds; and viii. Any other site works within the consent area. b. A Site Specific Erosion and Sediment Control Plan in accordance with Condition 18.2. c. Results of surface water quality, surface water flows, and groundwater level monitoring from the previous 12 months in the form of an Annual Hydrological and Water Quality Report required by Condition 24.5. d. Any proposed updates to management plans submitted in accordance with the respective conditions of consent.

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	e. Results of any previous dust monitoring required by Condition 26.3.
5.3	The Consent Holder must provide the Consent Authorities with any further information, which the Consent Authorities may reasonably request after considering any Annual Work Programme. This information must be provided within 5 working days of any request from the Consent Authorities.
6.0 Management Plans	
6.1	At least 20 working days prior to undertaking any activities authorised by these consents, the Consent Holder must submit the following management plans to the Consent Authorities for certification: a. Noise Management Plan b. Avian Management Plan c. Lizard Management Plan d. Native Freshwater Fish Capture and Relocation Plan e. Dust Management Plan f. Rehabilitation Management Plan g. Water Management Plan h. Erosion and Sediment Control Plan i. Landscape Planting Plan j. Lighting Management Plan Advice Notes: • These are collectively referred to as 'Management Plans'. • Where a plan requires the input of an appropriately qualified professional, the Consent Authorities may engage an appropriately qualified person to peer review the plan as part of the certification process.
6.2	a. The purpose of the Management Plans is to implement the relevant conditions of these consents. All Management Plans must include (where relevant): i. The purpose/objective of the plan; ii. Reference to the conditions of these consents that the management plan implements; iii. How each of the relevant conditions have been given effect to; iv. Procedures for implementing the relevant plan; v. Plan auditing check lists; vi. Monitoring programmes and/or monitoring protocols; vii. Feedback mechanisms for adaptive management, including circumstances in which a material change to the management plan would be required; viii. An organisational chart showing staff and contractor positions and responsibilities for plan implementation; ix. Relevant training and induction procedures and training schedules; and x. Reporting procedures and format for providing the results of any monitoring or surveys required by the plan. b. Where plans require the input of an appropriately qualified professional, the Consent Holder must engage an appropriately qualified person to prepare the Plan.
6.3	Site activities must not commence until the Management Plans listed in Condition 6.1 have been certified by the Consent Authorities.

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6.4	a. If the Consent Holder has not received a response from the Consent Authorities within 20 working days of the date of submission of a management plan under Condition 6.1, the management plan must be deemed certified. b. If the response from the Consent Authorities is that they are not able to certify the management plans, the Consent Holder must consider any reasons and recommendations provided by the Consent Authorities, amend the management plan accordingly, and resubmit the management plan to the Consent Authorities.
6.5	The Consent Holder may amend a management plan at any time to take into account: a. Any positive measure/s to ensure the stated objectives of the management plan are achieved; b. Any changes required to further reduce the potential for adverse effects as a result of actions identified in the Annual Work Programme; and c. Any required actions identified as a result of monitoring to address a. or b. Where the preparation of a management plan required the input of an appropriately qualified person, any amendment to that management plan must also be undertaken by an appropriately qualified person. Advice Note: • *Some management plans have ongoing annual review requirements which are required in order to manage effects. These specific review requirements are stipulated in the relevant conditions of this consent.*
6.6	Any amended management plan must be provided to the Consent Authorities within 20 working days of its review, for recertification in accordance with Condition 6.1. Advice Note: • *The Consent Authorities may engage an appropriately qualified person to peer review the amendments.*
6.7	A management plan may only be amended in a way that is consistent with, and does not contravene, the conditions of these resource consents.
6.8	A copy of the latest version of the certified Management Plans must be kept on site at all times and all personnel must be made aware of each Plan and their responsibilities under each Plan.
6.9	Subject to any other conditions of these consents, all activities must be undertaken in accordance with the latest version of the certified Management Plans.
7.0 Method of Operations	
7.1	a. The mine boundaries must be clearly marked on the ground as per Schedule 1 before any earthworks take place, with the following setbacks applied: i. 20m from the consent boundary; ii. 20m from Granite Creek iii. 20m from Fagan Creek;

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	iv. 50m from the mean high water spring v. 20m from the proposed SNA PUN-049; vi. 20 from all private property boundaries not within the consent area as shown on Schedule 1; vii. 200m from dwellings other than where noise bunds are proposed.
7.2	The maximum area of site disturbance must not exceed 16.0 hectares at any one time. Advice Note: • *The disturbed area includes the stripped area ahead of mining, mining void and active rehabilitation areas.*
7.3	a. The Consent Holder must strip soil material ahead of mining operations and stockpile it for progressive and final mine closure rehabilitation purposes. b. Stockpiled soil must be protected from erosion caused by water and wind as far as practicable.
7.4	The Consent Holder must not bury any topsoil or soil material suitable as a growing medium or remove it from the site.
8.0 Hazardous Substances	
8.1	a. Refuelling, lubrication and mechanical repairs of equipment and storage of hazardous substances and dangerous goods must be undertaken in such a manner that ensures spillages of hazardous substances or dangerous goods onto the land surface or into a waterbody do not occur, including that refuelling must not occur outside the mining area or within 20 metres of a water body. b. Any accidental discharge of greater than 20 litres of fuel, oil or hazardous substances must be reported immediately to the Consent Authorities along with details of the steps taken to remedy and/or mitigate the adverse effects of the discharge.
8.2	All contractors and/or operators transporting or storing more than 20 litres of fuel, oil or hazardous substances must carry spill kits to contain any fuel, oil or hazardous substances discharges on-site.
8.3	A list of all hazardous substances and dangerous goods stored or used on site must be maintained on site at all times showing the location of the storage and use.
8.4	The Consent Holder must undertake quarterly systematic testing of the heavy minerals concentrate from within the active mining area to confirm that the concentrate remains below the acceptable level of radioactivity concentration limits as specified in Schedule 2 of the Radiation Safety Act 2016. Copies of the independent test results must be submitted to the Consent Authority within 10 working days of receipt of the results. Advice Note: • *If material meets the criteria in Schedule 2 of the Radiation Safety Act 2016, the extraction, processing and transport of heavy minerals concentrate will require a Source Licence under this Act, and may possibly require a radiation safety plan as per section 18 of the Act.*

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8.5	In the absence of any extant and current New Zealand Code of Practice for handling naturally occurring radioactive materials, the Consent Holder must carry out all activities on site in accordance with the Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing Code of Practice and Safety Guide published by the Australian Radiation Protection and Nuclear Safety Agency. Advice Note: • *The Code of Practice within this consent condition requires that if radiation levels exceed 1Bq/g, the relevant authority must be notified, which differs from state to state. In the New Zealand context, the relevant body to notify is the Office of Radiation Safety.*
8.6	a. The Consent Holder must maintain radiation monitoring devices in the locations specified in the Dust Management Plan. Data from the radiation monitoring devices must be collected and analysed once every three months. Copies of the test results must be submitted to the Consent Authorities with 10 working days of receipt of the results. b. If the radiation monitoring devices record radiation levels exceeding the equivalent of 1 mSv (millisievert) above background levels over 12 months (i.e., the sum of results from the past four device readings at each location minus background levels established prior to the activity commencing), then the Radiation Safety Act 2016 applies, and the Consent Holder must: i. inform and consult the Office of Radiation Safety, New Zealand Ministry of Health; and ii. carry out all activities on site in accordance with the Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing Code of Practice and Safety Guide published by the Australian Radiation Protection and Nuclear Safety Agency (or any subsequent revision).
9.0 Rehabilitation and Rehabilitation Management Plan	
9.1	The Consent Holder must carry out progressive rehabilitation, to achieve the following requirements: a. Reinstatement of productive pasture; b. Reinstatement of existing creek and drainage patterns to reflect pre-mining catchment areas ensuring no loss of extent, with appropriate riparian planting, in accordance with the Rehabilitation Management Plan; c. Construction of wetland and riparian areas in accordance with the Rehabilitation Management Plan;
9.2	At the completion of mining (final mine closure), the mine area must be fully rehabilitated, by reinstating the productive pasture in general accordance with the Rehabilitation Management Plan. The objectives of the Rehabilitation Management Plan are: a. To create a final landform with a similar contour and profile at final mine closure as that which existed prior to mining but with improved drainage across the site; b. To establish vegetation cover on all areas disturbed by mining activity; c. To protect freshwater values associated with natural waterways in accordance with the Rehabilitation Plan; and

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	d. To construct and establish a permanent wetland area that contributes to ecological enhancement, hydrological function and landscape integration at final mine closure. Advice Notes: • *Final mine closure is the completion of all mining and progressive rehabilitation works.* • *All Management Plans are required to adhere to the requirements of Condition 6.0.*
9.3	The Rehabilitation Management Plan must include the following: a. A programme of progressive rehabilitation of the pre-mining landform, adhering to maximum disturbed area limits. b. The original and final mine closure land contours. c. Contouring of all post-mining landforms. d. Establishment of pasture cover over all disturbed land. e. Restoration of diversion discharge channels. f. Construction and planting details for the constructed wetland area. g. Erosion and sediment runoff control measures. h. Removal of equipment; and i. Post-mining weed and pest control requirements.
9.4	If for any reason active mining ceases for more than 6 months, operational stockpiles must be removed and the stockpiled material returned to the mining area, and all disturbed areas must be rehabilitated as required by the conditions of these consents within 12 months from the date of the last mining activity.
10.0 Complaints and Non-Compliance	
10.1	The Consent Holder must maintain a complaints register for all aspects of operations in relation to these consents. The register must be available to the Consent Authorities at all times and must detail: a. the date, time and type of any complaint; b. the cause of the complaint; and c. any action taken in response to the complaint.
10.2	Upon receipt of any complaint, the Consent Holder must promptly investigate the complaint, take action to remedy or mitigate the cause of the complaint and within 24 hours inform the Consent Authorities of the details of the complaint and any action taken.
10.3	Complaints which may infer non-compliance with the conditions of these consents, must be referred to the Consent Authorities within 48 hours of their receipt.

10.4	a. The Consent Holder must immediately notify the Consent Authorities upon becoming aware of any non-compliance with the conditions of these consents b. Within 5 working days thereafter the Consent Holder must provide written notification to the Consent Authorities which explains the cause of the non-compliance, and if the cause was within the control of the Consent Holder, steps which were taken to remedy the non-compliance and steps which will be taken to prevent any further occurrence of non-compliance with the conditions of these consents. Advice Note: • *This consent condition does not replace the compliance and enforcement responsibilities of the Consent Authorities.*
Grey District Council Conditions	
11.0 Hours of Operation	
11.1	a. Mining, overburden and topsoil stripping, bund development and any related activities must not operate during the hours of darkness. For the purpose of this condition, hours of darkness are between 30 minutes after sunset to 30 minutes before sunrise. b. Mining shall not occur between the hours of 0600 and 0700 within 500m of the dwellings located at Lot 2 DP2178, 23, 37, 41, 43 and 50 Warren Road, and 64, 67, 86 and 101 Cargill Road. c. Mining shall not be undertaken on Sunday. Advice Notes: • *Sunrise and sunset times can be found at https://www.sunrise-and-sunset.com/en/sun/new-zealand/greymouth* • *In addition to Condition 12.1, further restrictions on noise are contained in Conditions 13.1 – 13.4 Noise.*
11.2	Mining shifts must operate only during the hours of daylight.
12.0 Noise	
12.1	The consent holder shall ensure that all operational mining activities on site do not exceed the following noise limits at or within the notional boundary of any dwelling: a. Daytime 0700 to 2200 55 dB L_{Aeq}(15 min) b. Night-time 2200 to 0700 45 dB L_{Aeq}(15 min) and 75 dB L_{AFmax} when measured and assessed in accordance with the latest New Zealand noise standards: NZS 6801:2008 "Acoustics – Measurement of environmental sound" and NZS 6802:2008 "Acoustics -Environmental Noise". Advice Note: • *'Notional boundary' is defined as a line 20 metres from any side of a dwelling or the legal boundary where this is closer to the dwelling.*

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12.2	Construction activities must be conducted in accordance with NZS 6803: 1999 "Acoustics - Construction Noise" and must comply with the "typical duration" noise limits contained within Table 2 of that Standard. Advice Note: • *Construction activities include the formation of access roads, bunds, land contouring and planting. For the avoidance of doubt, overburden stripping and topsoil removal associated with mining operations must not be considered construction activities.*
12.3	The Consent Holder must prepare a Noise Management Plan (NMP) to control day-to-day noise emissions from the site. This NMP must be submitted to the Consent Authority for certification 10 working days prior to commencement of the commencement of on-site works. As a minimum, the NMP must include: a. The person responsible for implementing the NMP b. Applicable noise conditions relating to noise c. Training of staff relating to how to minimise noise and vibration d. Mining risk analysis for noise generation e. Method for handling noise complaints f. Noise monitoring methodology, including frequency, duration, and location. Advice Note: • *All Management Plans are required to adhere to the requirements of Condition 6.0.*
12.4	a. The Consent Holder must engage a suitability qualified and experienced acoustic consultant to undertake compliance noise monitoring within 30 days of mining or processing operations occurring and thereafter at 3 monthly intervals for the first 12 months of the mining operation. Thereafter, compliance noise monitoring must be undertaken on an annual basis. b. All noise monitoring must be submitted to the Consent Authority within two weeks of completion of each monitoring event. c. If compliance with Condition 13.1 is not achieved, the Consent Holder must: i. investigate the reasons for non-compliance and within 20 working days implement additional mitigation measures to achieve compliance with those noise limits. ii. submit a report to the Consent Authority within 30 working days of the relevant monitoring event detailing the additional mitigation measures that were implemented. d. If additional mitigation measures are implemented, the Consent Holder must engage a suitability qualified and experienced acoustic consultant to undertake further compliance noise monitoring within 10 working days of any mitigation measure being implemented to determine the effectiveness of that mitigation.

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	e. If compliance with Condition 13.1 is still not achieved the Consent Holder must repeat the requirements of c. and d. until compliance is achieved.
12.5	Mining operations must utilise the best practicable option to minimise noise at all times. This includes: a. Replacement of worn machinery parts, maintenance of mufflers, lubrication of moving machinery to avoid squeaks and squeals, and appropriate operation of all equipment. b. Vehicles or equipment must not be fitted with tonal reversing alarms. c. Where reversing alarms are required, broadband reversing alarms must be used.
13.0 Avian Management	
13.1	a. Prior to and during each breeding season, the Consent Holder shall undertake regular surveys of all areas scheduled for mining to identify any bird breeding or nesting activity. Where surveys indicate that nesting is likely to occur, the Consent Holder shall implement appropriate deterrence measures, including walkovers, visual cues, audio bird scarers, and strategic placement of machinery, to discourage birds from establishing nests. Advice Note: • *Conditions relating to the Avian Management Plan are Conditions 13.7 – 13.9.*
13.2	Staff, contractors and visitors associated with the mining activity must not be permitted to bring dogs to the site at any time, except for conservation purposes.
13.3	a. The Consent Holder must deploy wildlife cameras at low spots and creek mouths along the coastal edge of the mine disturbance area as required to monitor for Kororā at locations likely to experience activity as determined by a suitably qualified ecologist and set to record for at least 10 nights every month. b. The cameras must be equipped with motion sensors and be installed by a suitably qualified ecologist. c. Imagery must be reviewed for wildlife interactions at least weekly by a suitably qualified ecologist, retained for a minimum of 6 months, and be made available to the Consent Authority or the Department of Conservation on request.
13.4	a. Any interactions with wildlife recorded as a result of the monitoring requirements in the Avian Management Plan including the wildlife cameras required by Condition 13.3, must be reported to the Consent Authority and the Department of Conservation on a weekly basis from 1 November to 31 January each year, and on a monthly basis from 1 February to 31 October. b. Footage must be made available to the Department of Conservation and the consenting authority as set out in Condition 13.3.
13.5	a. The Consent Holder must engage a suitably qualified expert to carry out annual penguin surveys of Pakiroa beach and the mine area using a certified conservation dog within 500m of the mining disturbance area to detect the presence of Kororā.

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	b. The first survey must be conducted within the first 12 months of the commencement date of the resource consent, and at least two annual surveys must be completed before mining commences. c. If penguins or burrows are detected the location must be mapped and the Consent Holder must undertake the following management actions: i. If penguins are detected using the mining area to access other habitats, any existing access ways must be maintained and/or works affecting that accessway must be completed in the period April – June (outside the breeding and moult period). ii. Any potential penguin burrows identified must be investigated, including use of a burrowscope, to determine whether Kororā are using them. iii. Where any penguin burrows are compromised by mining (i.e. there are direct effects), replacement artificial burrows or nest boxes must be installed at a rate of 2:1. Any additional nest boxes provided must be located within the vegetated coastal foreshore habitat associated with any identified accessways. iv. If penguins are found within the application site, a specific Penguin Management Plan must be developed by a suitably qualified and experienced ecologist on behalf of the applicant in consultation with the West Coast Penguin Trust. The West Coast Penguin Trust must be reimbursed for reasonable time and expenses associated with consultation on the Penguin Management Plan. v. Any deceased penguins found on or near the mine site must be provided to the Department of Conservation for necropsy. ***Advice Note:*** • *If a certified conservation dog is unavailable or unable to complete the survey, human surveys and increased camera monitoring will be undertaken in accordance with the advice of a suitably qualified ecologist.*
13.6	a. The Consent Holder must erect and maintain a moveable penguin fence around the perimeter of the mining areas identified in the current Annual Work Plan to deter Kororā from entering hazardous areas. b. The penguin fence must be comprised of geosynthetic mesh to a height of at least 900mm above ground and buried at least 300mm below the ground and with posts no greater than 4m apart. c. The fence installation must be certified by a suitably qualified ecologist as preventing the ingress of Korora to the active mine disturbance area. d. The certification must be supplied to the Consent Authority prior to mining commencing. e. Upon completion of all mining activities and associated site rehabilitation, all penguin fencing must be removed. Advice Note: • *The requirement to erect a penguin fence only applies if Kororā are detected within 500m proximity of the active mining disturbance area. If no Kororā are detected within 500m of the active mine disturbance area a penguin fence is deemed unnecessary.*

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13.7	The Consent Holder must conduct activities on site in general accordance with an Avian Management Plan (AMP) prepared by a suitably qualified ecologist or ornithologist. The objectives of the AMP are: a. To ensure adverse effects on the threatened and at risk birds present in the vicinity of the site and any other threatened and at risk species detected by subsequent monitoring are avoided. b. To ensure significant adverse effects on important bird habitats adjoining the mining site and the coastal margin are avoided. c. To ensure safe ongoing use of the site and its environs by the birds which currently occur in the area. Advice Note: • *All Management Plans are required to adhere to the requirements of Condition 6.0.* • *Threatened or at-risk bird species refers to the Conservation Status according to the Department of Conservation's Threatened Classification System.*
13.8	The AMP must detail: a. A description of the site and surrounding avian habitats b. A description of the threatened and at risk indigenous birds likely to be present in these habitats and which species require specific mitigation measures c. A description of the mitigation measures that are required to be implemented to avoid effects on threatened and at risk indigenous birds . d. A procedure for managing and responding to Westland Petrel or other wildlife being found on the mine site; e. Details of the penguin fence described in condition 13.6. f. A description of the monitoring requirements to assess the effectiveness of the AMP.
13.9	The AMP must be reviewed annually by the Consent Holder. Any proposed amendments to the AMP must be submitted to Council for certification and must: a. Achieve the AMP's objectives including avoiding effects on any threatened or at-risk indigenous bird species; b. Comply with the conditions of this resource consent; c. Have been reviewed by an appropriately qualified and experienced ecologist or ornithologist; d. Have been provided in advance to Te Rūnanga o Ngāti Waewae and the Buller/Kawatiri (for Tāiko) and the Greymouth (for other wildlife) office of the Department of Conservation for comment (and feedback received collated and submitted with the amendments to be provided to Council); and

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	e. Follow the certification process set out in Condition 6.1. Advice Note: • *Any disturbance or relocation of avifauna may require a permit from the Department of Conservation under the Wildlife Act (1953).*
13.10	a. The Consent Holder must engage a suitably qualified expert(s) to undertake all monitoring of avian species from the commencement of consent until at least one year following the cessation of mining activities on this site. b. The monitoring must be carried out in accordance with the monitoring requirements in the AMP.
13.11	An annual bird management report must be provided to the Consent Authority, Te Rūnanga o Ngāti Waewae, the Buller/Kawatiri and Greymouth offices of the Department of Conservation in Westport, the West Coast Penguin Trust, Paparoa Wildlife Trust, the Community Liaison Group and Waka Kotahi NZ Transport Agency Environment and Sustainability Team (via: environment@nzta.govt.nz), no later than 30 June each year. The report must include the following matters: a. The timing and duration of any mining within 100m of the proposed SNA Site PUN-049; b. Results of seasonal bird surveys at the site; c. Timing of nest detection surveys and observations relating to nesting or other behaviours observed within the area to be mined; d. Efforts to deter any attempts at nesting within the area to be mined and the outcome of those efforts; e. Species attempting to nest within the area to be mined (including threatened and at risk species); f. Date of first nesting attempts (if any) for threatened and at risk species within the area to be mined; g. Number and location of nesting attempts by threatened and at risk species within the area to be mined; h. Outcome of individual nesting attempts by threatened and at risk species within the area to be mined; i. Results of annual kororā surveys on Pakiroa Beach, the implications for mine operations and any management actions undertaken; j. Number, dates and location of any mining operation vehicle strikes or near misses involving the Westland Petrel or Korora; k. Autopsy outcomes for any dead Westland Petrel or Kororā collected; l. The findings of any lighting audits undertaken during the year and steps taken to resolve any issues identified;

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	m. A summary of any revisions made to the AMP and the reasons for the changes; n. The date and duration of any operational shut-downs; and o. The results of the quarterly walk-through surveys of birds using the lagoon area.
14.0 Lizard Management	
14.1	The Consent Holder must conduct activities on site in general accordance with a Lizard Management Plan (LMP) prepared by a suitably qualified ecologist. The objective of the LMP is to avoid, remedy or mitigate adverse effects on indigenous lizards present within the project area.
14.2	The LMP must include (but is not limited to): a. Survey of lizard species and habitats within the site; b. Methods for lizard capture, salvage, and relocation; c. Identification of release sites and habitat enhancement measures; d. Timing of works to minimise impacts on lizards; e. Monitoring and reporting requirements; f. Contingency procedures if lizards are discovered during works.
14.3	Site works must not commence until the Consent Authority has certified the LMP.
15.0 Native Freshwater Fish Management	
15.1	The Consent Holder must conduct activities on site in general accordance with a Native Freshwater Fish Capture and Relocation Plan (NFFCRP) prepared by a suitably qualified freshwater ecologist. The objective of the NFFCRP is to avoid, remedy or mitigate adverse effects on native fish present within the project area.
15.2	This NFFCRP must detail how native fish will be salvaged and relocated prior to streamworks commencing and must include but not be limited to: a. Methodologies to capture fish within the impact streams and wetland habitats, or justification there is no habitat for native fish present at the time of earthworks; b. Fishing effort; c. Details of the relocation site; d. Storage and transport measures including prevention of predation and death during capture; e. Euthanasia methods for diseased or pest species,
15.3	Streamworks must not commence until the Consent Authority has certified the NFFCRP.

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16.0 Landscape Mitigation and Rehabilitation	
16.1	a. As soon as practicable following the commencement date of this consent, and prior to the commencement of mining, the Consent Holder must construct bunds and complete planting and fencing in accordance with the "Landscape Mitigation Package" prepared by Glasson Huxtable Landscape Architects dated February 2026, REV C (Schedule 2).
16.2	New bunds are to be constructed 3.0 metres high and 24 metres wide with an inward facing grassed slope and dense planting on the crest and outward facing slopes. While primarily required for noise mitigation, the bunds will also provide visual screening. Bunds are to be located: a. On the western boundary of Lot 2 DP2178. b. Near the bottom of Warren Road (with a separation at Granite Creek). c. On the northern side of Cargill Road at the eastern boundary. d. On the southern side of Cargill Road, alongside the western boundary of 114 Cargill Road. The above areas are illustrated within the "Landscape Mitigation Package" prepared by Glasson Huxtable Landscape Architects dated February 2026, REV C (Schedule 2).
16.4	Vegetation to be retained includes: a. The stand of Old Man Pines and the large cluster of vegetation near the consented WCP. b. Clusters of vegetation along the eastern application area boundary north of Cargill Road. c. The patch of vegetation adjacent to 101 Cargill Road. d. The stand of Old Man Pine and other riparian vegetation adjacent to Granite Creek. The above areas are illustrated within the "Landscape Mitigation Package" prepared by Glasson Huxtable Landscape Architects dated February 2026, REV C (Schedule 5).
16.5	Plant species selection, grades, spacing, densities and quantities, along with the planting methodology must adhere to the guidance provided in the Landscape Planting Plan to be prepared under condition 6.0.
16.6	The Consent Holder must source plants required for mitigation and rehabilitation planting from within the Punakaiki Ecological District or North Westland Ecological Region in order of preference. Where this is unable to be achieved, the Consent Holder must notify the Consent Authority and work with the Consent Authority and a suitably qualified Landscape Architect or Ecologist to determine an appropriate alternative plant source.
16.7	The wetland construction, Granite Creek riparian planting, and creek and drainage riparian planting must be undertaken and managed in accordance with the Landscape Mitigation Package" prepared by Glasson Huxtable Landscape Architects dated February 2026, REV C (Schedule 2) and the further details to be provided in the Landscape Management Plan and Rehabilitation Plan to be prepared under condition 6.0.
16.8	The Rehabilitation Management Plan must include:

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	a. A description of the site; b. A description of the riparian planting required by Conditions 16.5; c. A final wetland design that, when the planting required in Condition 16.6 achieves an area of at least 50ha with the following habitats: i. At least 5.2ha of shallow marsh with an average depth of 0.4m ii. At least 2.8ha of mid-depth water with an average depth of 1m iii. At least 5.3ha of deep open water with an average depth of 2m iv. At least 15.3ha of flaxland and dry edge vegetation v. At least 5.3ha of Carex Rushlands vi. At least 15.6ha of Raupo vii. At least 4.1ha of raised islands d. Wetland construction methodology, including details of the pre-mining and post-mining areas of the constructed wetland; e. Site preparation requirements for the wetland and riparian planting; f. Planting methodology for planting and establishment of the wetland and riparian areas; g. Monitoring and maintenance requirements to ensure the survival and ecological functioning of the constructed wetland, including pest and weed control; h. A timeline for the planting which aligns with conditions 16.1 to 16.7.
16.9	The Landscape Management Plan must include: a. Detailed planting areas (m2 amounts) for areas such as bunds and screening planting not covered by the Rehabilitation Plan. b. Plant species (common name and botanical name), grades, spacing/densities and quantities. c. Planting specifications (with a particular focus on planting methodology and maintenance). d. Staging of planting (pre-mining, during mining and post mining). e. Typical planting and fencing details.
16.10	Each plant shall be of nursey stock and be of good form that is true to species. Plants shall be healthy, vigorous and free of disease, injury, parasites or insects and not root bound.
16.11	All new planting areas required by this consent including wetlands and riparian areas shall be fenced off with stock proof post and wire fencing immediately following planting.
16.12	All planting must be maintained for the duration of the consent. Maintenance includes weeding, spraying, staking, watering, fertilising, trimming, pest removal and plant replacement. The aim is to have plants which are vigorous and thriving, thereby providing effective screening and rehabilitation.
16.13	Any plants that are dead, diseased, fail to thrive or are damaged must be replaced with the same or similar plant species within the following planting season.

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16.14	The existing mature flax and raupo located within the site will be utilised where possible for direct vegetation transfer associated with the constructed wetland.
17.0 Lighting	
17.1	Fixed lighting must not exceed 2.0 lux spill (horizontal and vertical) of light onto any adjoining property, measured at any point more than 2m inside the boundary of the adjoining property or the closest window on the adjoining property whichever is the closest.
17.2	Lighting must be designed in a manner which adheres to the Australian Government's National Light Pollution Guidelines for Wildlife January 2023 (or subsequent revision); including but not limited to: a. All fixed lighting must be directed downward, shielded to avoid light spill outside of permitted limits, operate primarily in the yellow orange spectrum, and be filtered to reduce blue and violet wavelengths; b. Lights must only illuminate the object or area intended; c. Fixed lights must be mounted as close to the ground as practicable while still achieving site lighting requirements; d. External lighting must be minimised on the seaward side of buildings to minimise light spill toward the coast; and e. External lighting must use the lowest intensity lighting possible, while ensuring compliance with workplace health and safety requirements.
18.0 Accidental Discovery Protocol	
18.1	Immediately following the discovery of material suspected to be a taonga, kōiwi or archaeological site the following steps shall be taken: a. All works on the site will cease immediately at that place and within 20m around the site. b. Immediate steps will be taken to secure the site to ensure the archaeological material is not further disturbed. c. The contractor/works supervisor/owner will notify the Rūnanga, Council and the Area Archaeologist of Heritage New Zealand. In the case of kōiwi (human remains), the New Zealand Police must be notified. d. The Rūnanga and Heritage New Zealand will jointly appoint/advise a qualified archaeologist who will confirm the nature of the accidentally discovered material. e. The contractor/works supervisor/owner will also consult the Rūnanga on any matters of tikanga (protocol) that are required in relation to the discovery and prior to the commencement of any investigation. f. If kōiwi (human remains) are uncovered, in addition to the steps above, the area must be treated with utmost discretion and respect, and the kōiwi dealt with according to both law and tikanga, as guided by the Rūnanga. Remains are not to be moved until such time as Rūnanga, NZ Police and Heritage New Zealand have responded.

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	g. Works in the site shall not recommence until authorised by the Rūnanga, Heritage New Zealand (and the NZ Police in the case of kōiwi). h. All parties will work towards work recommencing in the shortest possible timeframe while ensuring that any archaeological sites discovered are protected until as much information as practicable is gained and a decision regarding their appropriate management is made, including obtaining an archaeological authority under the Heritage New Zealand Pouhere Taonga Act 2014 if necessary. Appropriate management may include recording or removal of archaeological material. i. Although bound to uphold the requirements of the Protected Objects Act 1975, the contractor/works supervisor/owner recognises the relationship between Ngāi Tahu whānui, including its Rūnanga, and any taonga (Māori artefacts) that may be discovered. Where Rūnanga so request, any information recorded as a result of the find such as a description of location and content, is to be provided for their records.
General Conditions to Apply to all West Coast Regional Council Consents	
20.0 Method of Mining	
20.1	The consent holder must only carry out mining activities within the mining area shown on the attached map titled "Tāiko Fast-track Application" prepared by Tai Poutini Professional Services Ltd dated [*insert date here*] attached as Schedule 1.
20.2	The maximum combined surface area of un-rehabilitated disturbed land in the application area must not exceed 16.0 hectares at any one time.
20.3	The mining and associated activities under this consent must not cause or induce erosion or slope instability outside the mining area (during operations), or the application area as part of final rehabilitation.
21.0 Erosion and Sediment Control Plan	
21.1	The Consent Holder must operate in general accordance with the Erosion and Sediment Control Plan labelled 'Barrytown Mineral Sand Operation Erosion and Sediment Control Plan and Water Management' (ESCP) prepared by Ridley Dunphy Environmental Ltd, dated [*insert date here*]. The objectives of the ESCP are: a. To use established guidelines and practices to minimise sedimentation of waterbodies adjacent to the mining area; b. To assist with compliance with the water quality parameters in Condition 24.
21.2	A Site Specific Erosion and Sediment Control Plan (SSESCP) must be prepared and reviewed annually and submitted to the Consent Authority with the Annual Work Programme, reflecting the water management measures proposed for construction and mining for the following 12 months, and adhering to principles of the Erosion and Sediment Control Plan in Condition 21.1 above. The SSESCP must include: a. Location of the work; b. Contour information; c. Erosion and Sediment Controls (ESCs);

	d. Chemical treatment requirements, design and details; e. Internal catchment boundaries; f. Details of earthworks and ESC construction methods; g. Contingency measures; h. ESC design details; i. A programme for managing non-stabilised areas; j. The identification staff who will manage ESCs; k. The identification of staff who monitor compliance with consent conditions; l. A chain of responsibility for managing erosion and sediment control issues; and m. Methods and procedures for decommissioning ESCs (if applicable).
22.0 Water Management Plan	
22.1	The Consent Holder must operate the mine in general accordance with a Water Management Plan (WMP) prepared by a suitably qualified hydrologist. The objectives of the Water Management Plan are: a. The rate of take of water from Canoe Creek gallery is not greater than 10% of Canoe Creek's MALF. b. The groundwater level in the mining void will not be manipulated to materially lower or raise pond water levels beyond 20% of baseline dredge pond water depth. c. Pumping of groundwater will be minimised by avoiding dewatering and associated water table lowering while excavating saturated material within the void down to the economic mineral grade limit or maximum reach depth of the dredge. d. Water pumped from the void will be conveyed to the WCP. Water will be ordinarily pumped back to the dredge pond tailings zone to achieve the hydrological effect management goals and the objective in ii above. e. The quality of any groundwater that could enter surface water or coastal water or Wasabi Springs will be monitored to confirm that it meets standards which are consistent with Hydrological effects goal III in 6.1 of the Water Management Plan. f. Detailed design information for the water management system shall be issued to WCRC for review and comment at least 16 weeks prior to the start of mining operations. Design information will include design drawings of the infiltration trenches and basin. g. The rate of take of water will be monitored in accordance with the Resource Management (Measurement and Reporting of Water Takes) Regulations and the pumping rate will be restricted to 63 L/s instantaneous rate, and 5,400 m^3/d or 62.5 L/s on a daily basis. The maximum rate of take is anticipated to be required for infrequent periods of up to 7 days. It is also anticipated that the long-term abstraction rate would be less at 9.5 L/s.

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	h. The rehabilitated mine area will provide for the establishment of a large wetland complex in the east of the former mining area. Advice Note: • *All Management Plans are required to adhere to the requirements of Condition 6.0.*
22.2	The WMP must include a description of the water management methods for the site, including: a. A description of the baseline monitoring and the receiving environment; b. The proposed mine disturbance area; c. A description of all site activities with the potential to cause hydrological impacts; d. The water management actions that will be implemented to avoid hydrological effects, including: i. The water treatment train, including settling infrastructure; ii. The return of limed water to the mining void; e. Operational water level and water quality monitoring requirements for the duration of the activity; f. Groundwater level thresholds and actions to be taken should these thresholds be exceeded; g. Surface water body flow threshold for Canoe Creek and actions to be taken should that threshold be exceeded; h. Actions to be taken if water quality thresholds are exceeded; i. Final Rehabilitation requirements to avoid adverse hydrological impacts on waterbodies post-mining; j. Audit checklists; k. An organisational chart showing staff and contractor positions and responsibilities for plan implementation; and l. Relevant training and induction procedures and schedules.
22.3	The WMP must be updated on an annual basis and must be submitted to the Consent Authority for certification in accordance with condition 6.0. The annual update is required to: a. reflect the proposed mining operations for the following 12 months; and b. provide any additional or amended monitoring and mitigation requirements in order to reduce the potential for adverse hydrological and/or water quality effects.
Conditions to Apply to WCRC Discharge Permit	

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23.0 Method of Discharge during mining activity

23.1 During mining, treated mine water is only permitted to be discharged directly to the mining void, and from the Mine Water Facility, if:

a. metal and metalloid water quality parameters in Table A below are complied with at the sites shown in Schedule 3; and
b. the non-metal water quality parameters in Table B below are complied with at the sites shown in Schedule 3 (as required by Condition 23.2) and the locations defined in Table B.

Table A - metals and metalloids

Parameter	Threshold mg/L	Dependency
Aluminium	0.62[B]	Hardness, pH, Dissolved Organic Carbon
Arsenic	0.013	As arsenic (V)
Boron	0.94	NA
Cadmium	0.0002[D]	Hardness
Chromium	0.0033[D]	Hardness, as chromium (III)
Copper	0.0039[E]	Hardness, pH, Dissolved Organic Carbon
Iron	1.0	As total fraction
Lead	0.0034[D]	Hardness
Manganese	1.9	NA
Nickel	0.011[D]	Hardness
Zinc	0.008[D]	Hardness

[A] dissolved fraction, unless stated

[B] at hardness = 25 g/m^3, pH = 7.0, Dissolved Organic Carbon = 1.0 g/m^3

[C] 95%-ile trigger value

[D] at hardness = 30 g/m^3

[E] at hardness = 25 g/m^3, pH = 7.0, Dissolved Organic Carbon = 2.0 g/m^3

Table B – Non-metals

Parameter	Threshold	Notes/Monitoring Location
Turbidity	20 NTU	Applies to discharges to Northern Creek, Central Creek, Granite Creek downstream, Unnamed Creek north of

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			Cargill Road, Wasabi Creek and Southern Creek, shown in Schedule 3.
	Visual clarity	Conspicuous visual change	In the receiving water bodies of Northern Creek, Central Creek, Granite Creek downstream, Unnamed Creek north of Cargill Road, Wasabi Creek and Southern Creek as shown in in Schedule 3.
		Relevant NPS-FM (2020) attribute state for visual clarity	No change in the attribute states of the receiving surface water bodies, as an annual median and a 95%-ile, versus the baseline states. See advice note b below. Monitoring locations are Northern Creek, Central Creek, Granite Creek downstream, Unnamed Creek north of Cargill Road, Wasabi Creek and Southern Creek shown in Schedule 3.
	Dissolved Reactive Phosphorus (DRP)	Relevant NPS-FM (2020) attribute state	No change in the attribute states of the receiving surface water bodies, as an annual median and a 95%-ile, versus the baseline states. See advice note b below. Monitoring locations are Northern Creek, Central Creek, Granite Creek downstream, Unnamed Creek north of Cargill Road, Wasabi Creek and Southern Creek shown in Schedule 3.

Advice Notes:

- *Water quality monitoring conditions to establish the ability to discharge under this condition are contained in Condition 24.0 below.*
- *The attribute state for visual clarity and DRP must be either*
  - *a) defined via at least 12 months of baseline monitoring in Northern Creek, Central Creek, Granite Creek downstream, Unnamed Creek north of Cargill Road, Wasabi Creek and Southern Creek; or*
  - *b) assumed to be of pristine water quality (A Band).*
- *In the case of a), the monitoring data and attribute state assessment must be submitted to WCRC for approval at least 4 weeks prior to the start of mining operations.*

23.2	The Consent Holder must ensure that discharges to surface and groundwater do not contain any contaminants other than suspended sediments, naturally occurring elements and metals, and water treatment chemicals in accordance with Conditions below: a. The use of any water treatment chemical(s) is/are permitted provided they are used in accordance with its Material Safety Data Sheet(s) (MSDS). b. The Consent Holder must notify the Consent Authority in writing and provide the respective MSDS of any water treatment chemical(s) used in accordance with the above condition before it is used.
23.3	The Consent Holder must take all practicable measures to prevent uncontaminated stormwater entering the mine workings and disturbed areas to reduce the volume of water

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	passing through the mining pond/settling pond system, and to improve the efficiency of the water reticulating system.
24.0 Water Monitoring	
24.1	The Consent Holder must carry out water monitoring at the locations shown in the ESCP and Water Management Plan, and as listed in the table below:

Location	**Parameter(s)**	**Frequency**
Canoe Creek @ State Highway 6	Flow	Hourly
Canoe Creek Gallery	Flow Level	Hourly 6 Hourly
Discharges to mining void @ Mine Water Facility near Wet Concentrator Plant	Flow	Continuous, Automated
Northern Creek	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others)
Central Creek (WCP)	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others)
Clarke Creek upstream	Monitoring Suite A* Visual clarity Flow	Quarterly (metals) Monthly (Others) Hourly
Little Granite Creek upstream	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others)
Granite Creek upstream	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others)
Granite Creek downstream of mining	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others) Hourly
Unnamed creek north of Cargill Road	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others)
Wasabi Creek	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others)
Wasabi Springs	Monitoring Suite A* Visual clarity Flow	Quarterly (metals) Monthly (Others) Hourly
Southern Creek	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others)

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	PZ 1	Water level and Monitoring Suite A*	6 hourly Quarterly (metals)
	PZ 2	Water level and Monitoring Suite A*	6 hourly Quarterly (metals)
	PZ 3	Water level and Monitoring Suite A*	6 Hourly Quarterly (metals)
	PZ 4	Water level and Monitoring Suite A*	6 Hourly Quarterly Metals

*Monitoring Suite A includes the following water quality indicators:

Dissolved metals	***Others***
Aluminium (Q)	EC (M)
Arsenic (Q)	pH (M)
Boron (Q)	Turbidity (M)
Cadmium (Q)	TSS (M)
Chromium (Q)	Hardness (Q)
Copper (Q)	Sulphate (Q)
Iron (Q)	Amm-N (M)
Nickel (Q)	NO_3-N (M)
Lead (Q)	Dissolved Reactive Phosphorus (M)
Manganese (Q)	
Zinc (Q)	

The Clarke Creek, Little Granite Creek and Granite Creek upstream observation locations must be upstream of the mining disturbance area.

Downstream monitoring sites will be located within the 50m buffer between MHWS and the mining disturbance area.

24.2	Notwithstanding Condition 24.1, all discharges associated with the mining operations authorised under these consents must not cause any of the following effects within any receiving waterbody measured at the downstream water quality monitoring sites in Condition 24.1: a. Any conspicuous oil or grease films, scums or foams, or floatable or suspended materials,

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	b. Any conspicuous change in the colour or visual clarity, c. Any emission of an objectionable odour, d. Any significant adverse effects on aquatic life, or e. The rendering of fresh water unsuitable for consumption by farm animals.
24.3	Sampling required under the conditions of this consent must be undertaken and analysed by suitably qualified personnel and the results supplied to the Consent Authority annually as part of the annual works programme.
24.4	An Annual Hydrological and Water Quality Report must be submitted to the Consent Authority with the Annual Work Programme in accordance with Condition 5.2 for review and evaluation of compliance. The report must be prepared by a suitably qualified and experienced person and include the following information: a. A summary of the monitoring undertaken over the preceding 12 months. The summary must: i. Reference the specific consent conditions under which the monitoring has been undertaken to show how the conditions have been complied with; ii. Provide tables of the water quality data collected in accordance with Condition 24.1. b. Discussion and evaluation of the monitoring data in relation to the relevant conditions including a summary of compliance with conditions; c. A summary of the actions that have been undertaken in response to any exceedance(s) of water quality limits; d. Records of the visual inspections that have been undertaken in accordance with Condition 24.1, 24.2 and condition 24.3.
24.5	a. The Consent Holder must engage a suitably qualified aquatic ecologist to carry out annual macroinvertebrate and fish surveys in Northern Creek, Central Creek, Clarke Creek, Granite Creek, Wasabi Creek and Southern Creek. b. The proposed survey methodology, including the locations where macroinvertebrate (taxa number and composition) and fish sampling will be undertaken, the timing of the sampling, the methods that will be used to undertake the sampling, the name of the authorised person who will undertake the monitoring and reporting methods must be submitted to the Consent Authority 20 working days prior to the survey being undertaken, for the Consent Authority to certify the survey methodology. Advice Note: • *If the Consent Authority refuses to certify the survey methodology, it is expected to give reasons in writing.* • *If the Consent Holder refuses certification the Consent Holder must resubmit the survey methodology for certification addressing any concerns of the Consent Authority.* • *Surveys must not be undertaken until certification is achieved.*

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	• *The results of the survey must be submitted to the Consent Authority within 10 working days of the results being received.* • *The surveys required by this condition are to inform baseline information about aquatic biota present within the waterbodies around the consent area and monitor long term trends in species diversity and prevalence.*
24.6	a. Macroinvertebrate monitoring required by Condition 24.5 must be conducted using Protocol P2 and C1 from the Ministry for the Environment Macroinvertebrate Guidelines and the samples must be analysed by an aquatic ecologist experienced in macroinvertebrate sampling and identification. b. Monitoring must be undertaken on a day on which there has been no major flood event in the preceding week. Whenever practicable, sites that have been sampled in the past must be used.
Conditions to Apply to West Coast Regional Council Air Discharge Permit	
25.0 Dust Management Plan	
25.1	The Consent Holder must operate the site in general accordance with a Dust Management Plan. The objective of the Dust Management Plan is to detail the best practicable option to avoid dust nuisance being caused by mining works and to mitigate any such effects should they occur.
25.2	The Dust Management Plan must include: a. Potential sources of dust that may be created during the mining project. b. Sensitive receptors in the vicinity of identified potential sources of dust for targeted dust management. c. Dust management and mitigation methods. d. Dust monitoring methods. e. Training of staff in relation to dust management; and f. Methods for managing complaints regarding discharges of dust g. Keeping of compliance records.
25.3	Vehicles travelling within the site on unsealed roads must not exceed 15 km/hr on site at all times.
25.4	If wind measured at the meteorological station on the Central Block site exceeds 20km/hr, the Consent Holder must: a. Limit activities that generate dust downwind of sensitive receptors identified in the Dust Management Plan; b. Conduct frequent visual inspections of exposed earthwork areas; and

	c. Assess the need for additional controls such as increased water application rates.
26.0 Air Quality Management and Monitoring	
26.1	There must be no offensive or objectionable discharge of dust into air from the minerals extraction, processing and loading operations that result in an adverse effect beyond the legal boundary of the site. Advice Note: • *For the purpose of Condition 28.1 the Consent Authority will consider an effect that is offensive or objectionable to have occurred if an Enforcement Officer of the Consent Authority deems it so having regard to:* *a. The frequency, intensity, duration, amount, effect and location of the suspended or particulate matter; and/or* *b. Receipt of complaints from neighbours or the public: or* *c. Relevant written advice or a report from an Environmental Health Officer of a territorial authority or health authority.*
26.2	a. The Consent Holder must install, operate and maintain [X] Dust Deposition Gauges in the locations shown in the Dust Management Plan. b. Dust recorded in the gauges must not exceed a value of 4g/m^2/30 days above background levels. c. Dust deposition gauges will operate as follows: i. Commissioned and run to collect 1 year of baseline data prior to mining commencing in respective block ii. Decommissioned 1 year after rehabilitation has been completed. iii. Gauges in the vicinity of Warren Road will be operational throughout the activity. Advice Note: • *Background levels are to be determined by data collected prior to the commencement date of this consent.*
26.3	a. If a breach of Condition 26.3.b is detected, the Consent Holder must notify the Consent Authority within two working days of the breach being detected. b. The Consent Holder must investigate possible reasons for the breach and take all necessary steps to achieve compliance in the following 30-day period.
Conditions to Apply to WCRC Water Take Permit	
27.0 Groundwater abstraction outcomes	
27.1	Mine void and water table exposure and associated mitigation measures must achieve the following outcomes: a. The hydrological responses to mining activity ensure that quality of water discharged to receiving waters will not cause adverse impacts on stream ecology or visual clarity; b. The pre-mining surface drainage patterns are restored such that the catchment areas for Clarke Creek, Granite Creek and other smaller creeks are not changed significantly;

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	c. The contouring and surface drainage installed during mine rehabilitation does not increase the rate of groundwater drainage at the site.
28.0 Diversions	
28.1	The consent holder must not commence any streamworks activity until it has obtained certification from the West Coast Regional Council for the Rehabilitation Management Plan. Advice Note: • *The Rehabilitation Management Plan is to include information on the finalised streamworks for the site. The Native Freshwater Fish Capture & Relocation Plan is to provide information on native fish relocation.*
28.2	The Rehabilitation Management Plan must include, but is not limited to, including the following streamworks information: a. Specific erosion and sediment control works for the streamworks; b. Details of construction methods (such as reclamation, diversion, channel clearance removal and construction of structures); c. Monitoring and maintenance requirements; d. Details relating to the management of exposed areas.
28.3	The Rehabilitation Management Plan must include, but is not limited to, including the following native fish relocation information: a. The timing, duration and methodologies used for fish capture and transportation; b. Specific measures for ensuring fish elsewhere in the catchment do not enter the works area; c. A description and assessment of the quantum and availability of suitable aquatic quality habitat at the relocation site; and d. The names, experience and qualifications (including any necessary permits) of those involved in undertaking the fish relocations.
28.4	The sediment and erosion controls at the site of the works must be inspected on a regular basis and within 24 hours of each rainstorm event that is likely to impair the function or performance of the erosion and sediment controls. A record must be maintained of the date, time and any maintenance undertaken in association with this condition which must be forwarded to the Consent Authority on request.
28.5	Creek and drainage construction and riparian planting must be undertaken onsite and in accordance with the approved Rehabilitation Management Plan to ensure: a. New creek and drainage channels will be constructed to: i. Ensure no loss of extent; ii. Have a meandering pattern; iii. Be formed to include run and pool habitat, and instream features including riffles and woody debris; iv. A mix of rocky and silt bottomed beds;

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	b. Riparian planting will be undertaken to: i. 5m for Granite Creek ii. Minimum of 3m for all other reconstructed creeks as shown in the Rehabilitation Management Plan; iii. Stock proof fencing erected on the outside of all riparian planting areas; iv. The Consent Holder shall ensure the on-going maintenance of any riparian planting for a period of no less than two years. This shall include on-going monitoring and eradication of woody weed species which may establish including blackberry and gorse.
28.6	a. Upon two years following permanent diversion of creek or drain flow to the new channel and completion of riparian planting, fish and macroinvertebrate surveys will be undertaken to confirm recolonisation. b. Where monitoring concludes recolonisation has not occurred, a Further Offset Works Plan shall be prepared and submitted to the Consent Authority within 2 months following the monitoring undertaken. c. The Consent Holder must implement any additional works required by the Further Offset Works Plan within 6 months following the approval by the Consent Authority or during the next planting season (whichever is appropriate to the measure adopted).
29.0 Canoe Creek water take	
29.1	The instantaneous surface water take from Canoe Creek must not exceed 63 litres per second.
29.2	The Consent Holder must undertake monitoring of the surface water take from Canoe Creek at 15 minute intervals and supply this information electronically to the Consent Authority every day, or at the interval instructed in writing by the Consent Authority. **Advice Note:** *The resource Management (Measurement and Reporting of Water Takes) Amendment Regulations 2020 applies to this water take.*
29.3	The Consent Holder must maintain auditable records and provide data in the format of date, time and rate that is suitable for electronic storage.
29.4	a. The Consent Holder must maintain the measurement device(s) in good working order so as to maintain a measurement accuracy of within ± 5% for a fully pressurised pipe or ± 10% for a partially pressurised pipe. b. The Consent Holder must provide the Consent Auhtority within initial written verification of accuracy from a suitably qualified person that the measurement device measures the volume of water to within ± 5% for a fully pressurised pipe or ± 10% for a partially pressurised pipe, and thereafter every five years for the term of the consent.
29.5	The Consent Holder must provide the following information to the Consent Authority no later than the ten working days prior to the water being taken under this consent: a. The type of measurement device(s) used to undertake the continuous monitoring together with the manufacturer's statement for that device; and b. The location of the measurement device(s) in relation to the water take point(s).

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29.6	Upon notice to the Consent Holder the Consent Authority may require the Consent Holder to cease water abstraction for a period not exceeding 48 hours, in order to undertake monitoring of natural water flows.
29.7	A fish screen on any direct surface water take must be maintained to ensure, as far as practicable, that eels, fish and fry are prevented from passing through the intake or being trapped against the screen.
29.8	The 12-year water take consent under WCRC-2023-0046 is to be offered for surrender upon commencement of this consent.

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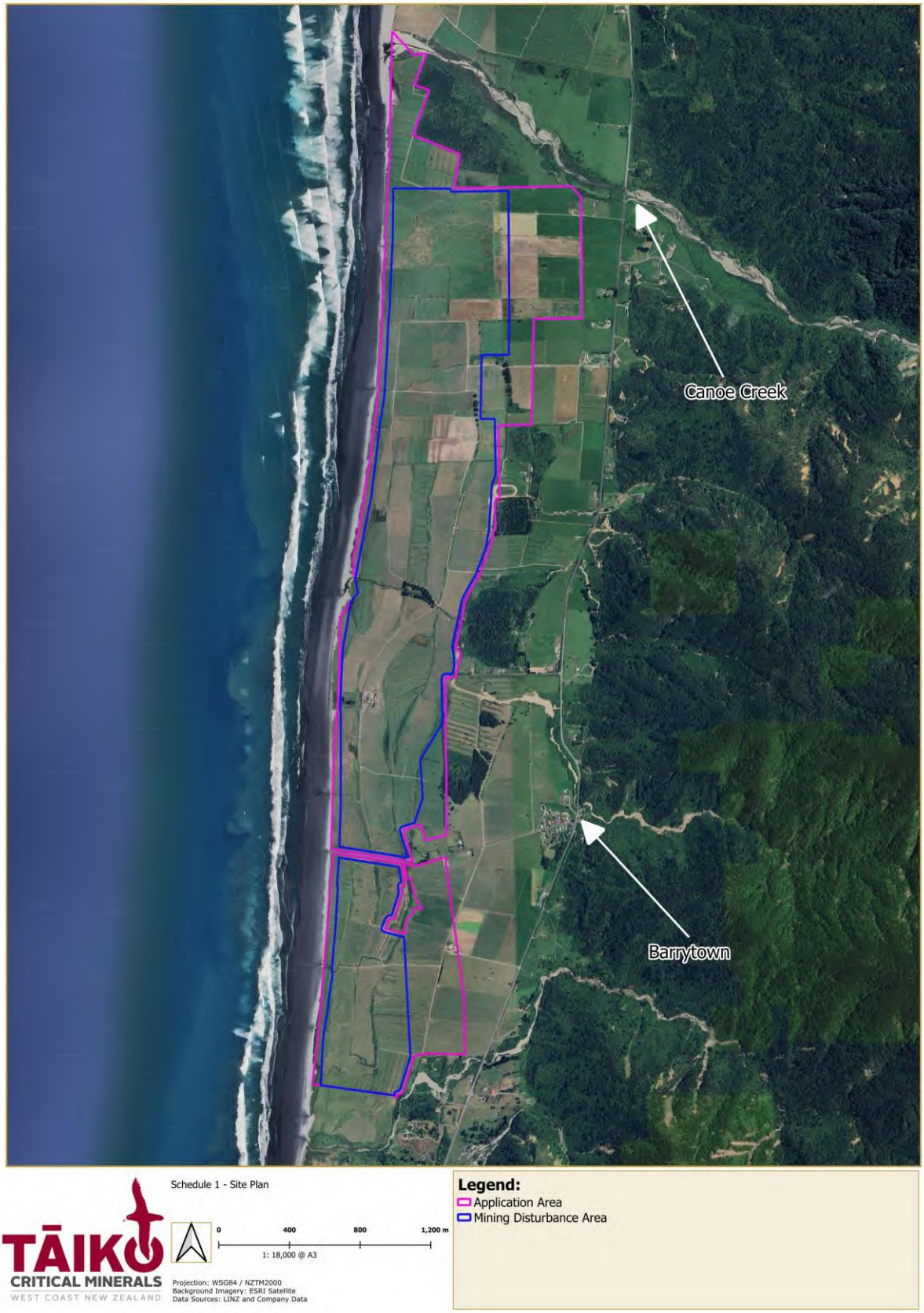
Schedule 1 – Site Plan



Schedule 2 – Landscape Mitigation Package

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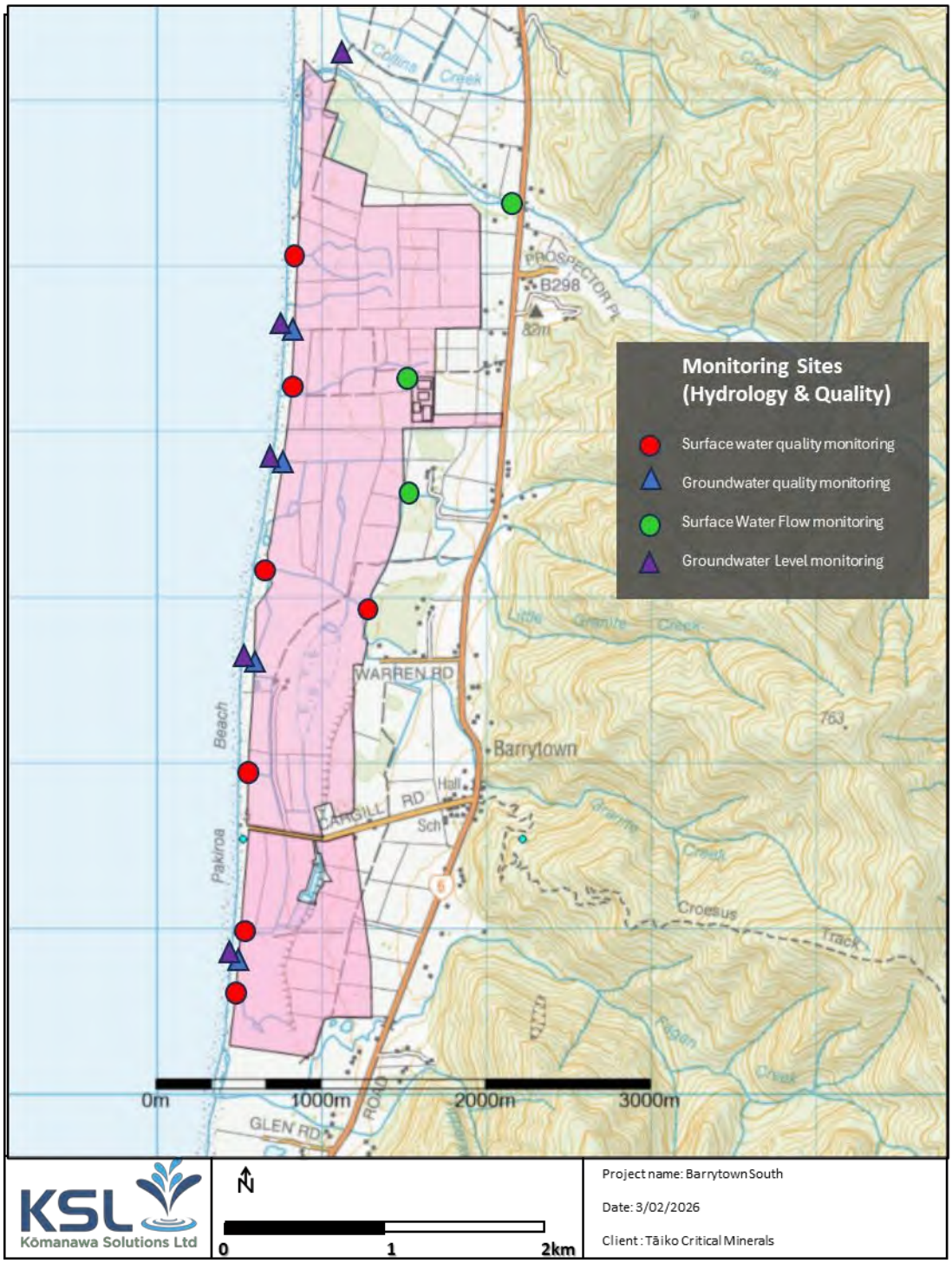
Schedule 3 – Monitoring Sites



Appendix C

Draft landscape mitigation package

GLASSON HUXTABLE
LANDSCAPE ARCHITECTS

BARRYTOWN MINERAL SANDS PROJECT: SOUTHERN RESOURCES BLOCK

LANDSCAPE MITIGATION PACKAGE

MARCH 2026 - REVISION C

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4.0 LANDSCAPE MITIGATION - PRE-MINING SECTION 2: SOUTH OF GRANITE CREEK 7
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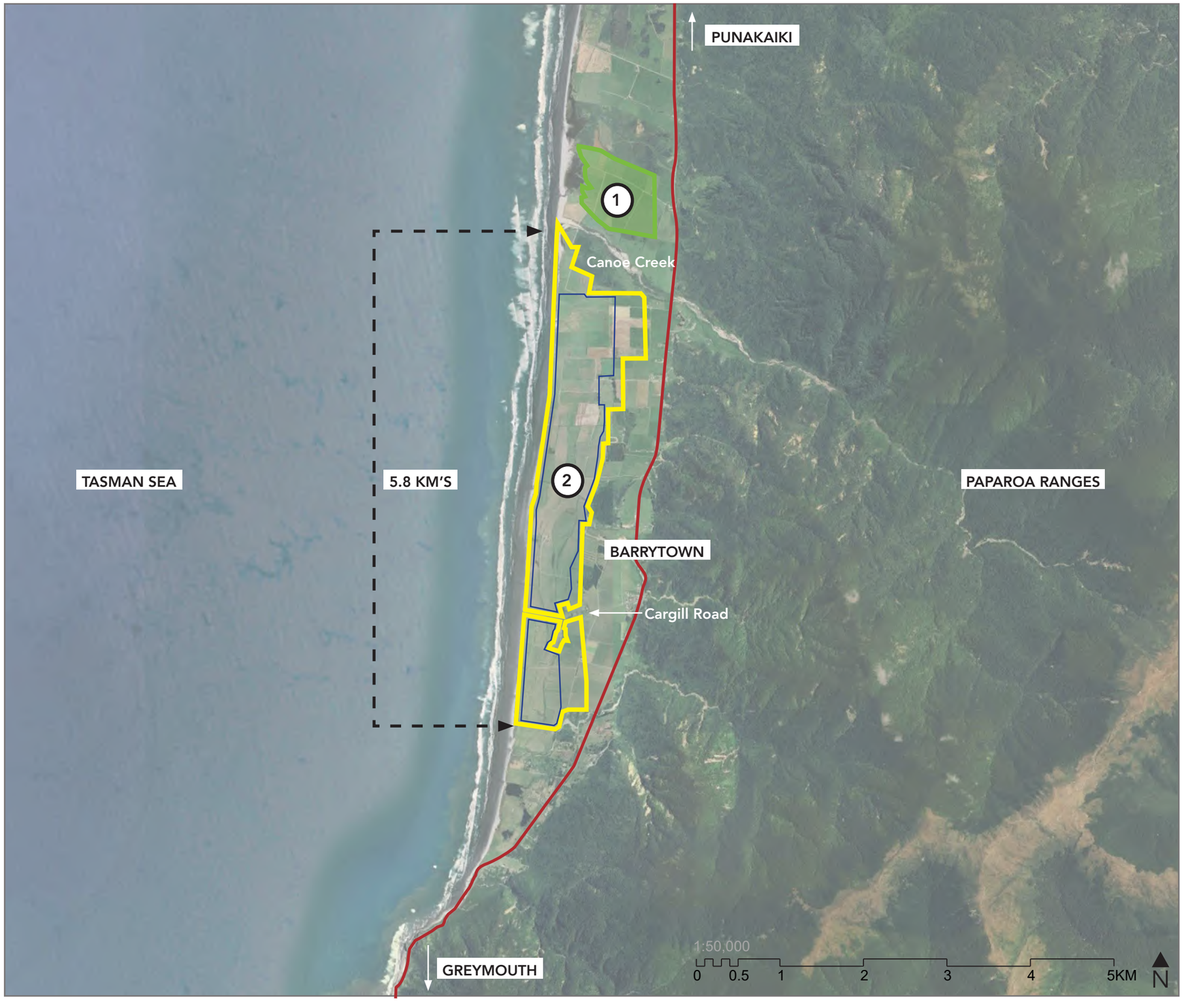
1.0 PROPOSED MINING AREA



KEY

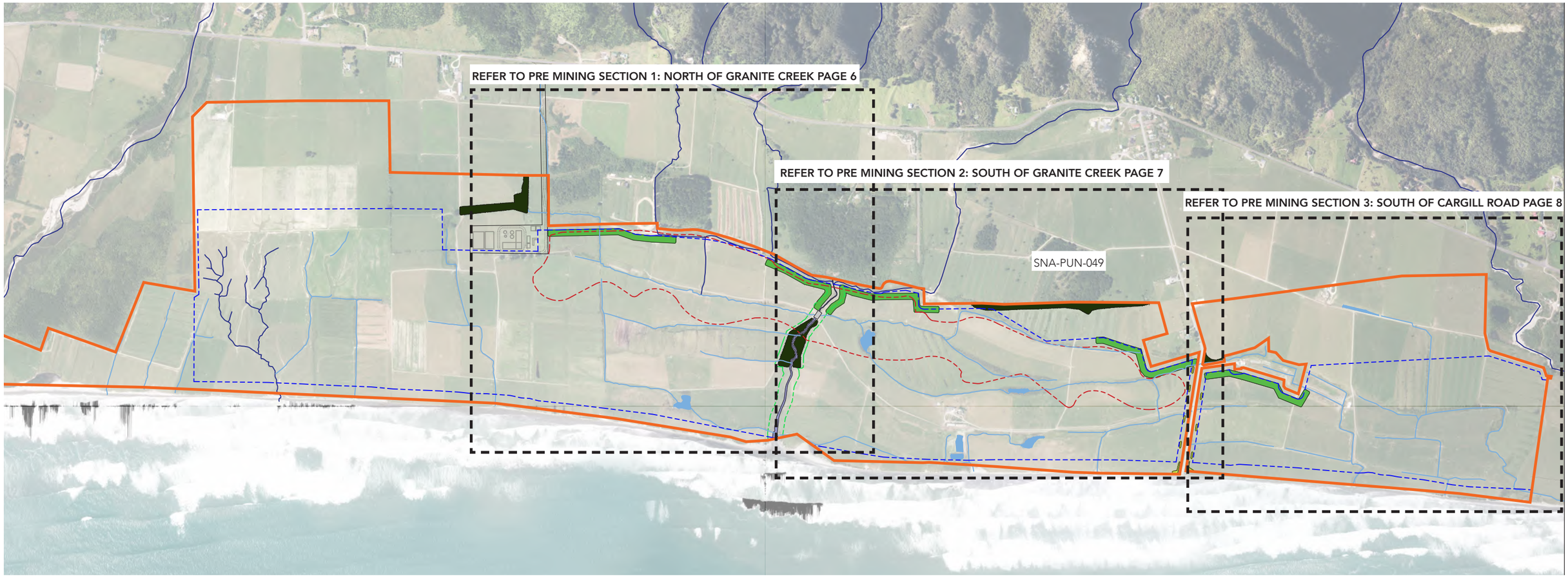
- PREVIOUS APPLICATION AREA (CONSENTED)
- PROPOSED CONSENT AREA
- PROPOSED MINING DISTURBANCE AREA
- COAST ROAD/ STATE HIGHWAY 6

1 **CENTRAL BLOCK (CB)**
A favorable decision for the CB Mineral Sands Project was delivered by commissioners in April 2024 but was subsequently appealed. A successful resolution was reached in October 2024.
This area is not part of this application.

2 **SOUTHERN BLOCK (SB)**
This area is part of this Fast Track application and includes the mining disturbance area.

LANDSCAPE MITIGATION - PRE-MINING

2.0 LANDSCAPE MITIGATION - PRE-MINING KEY PLAN



KEY

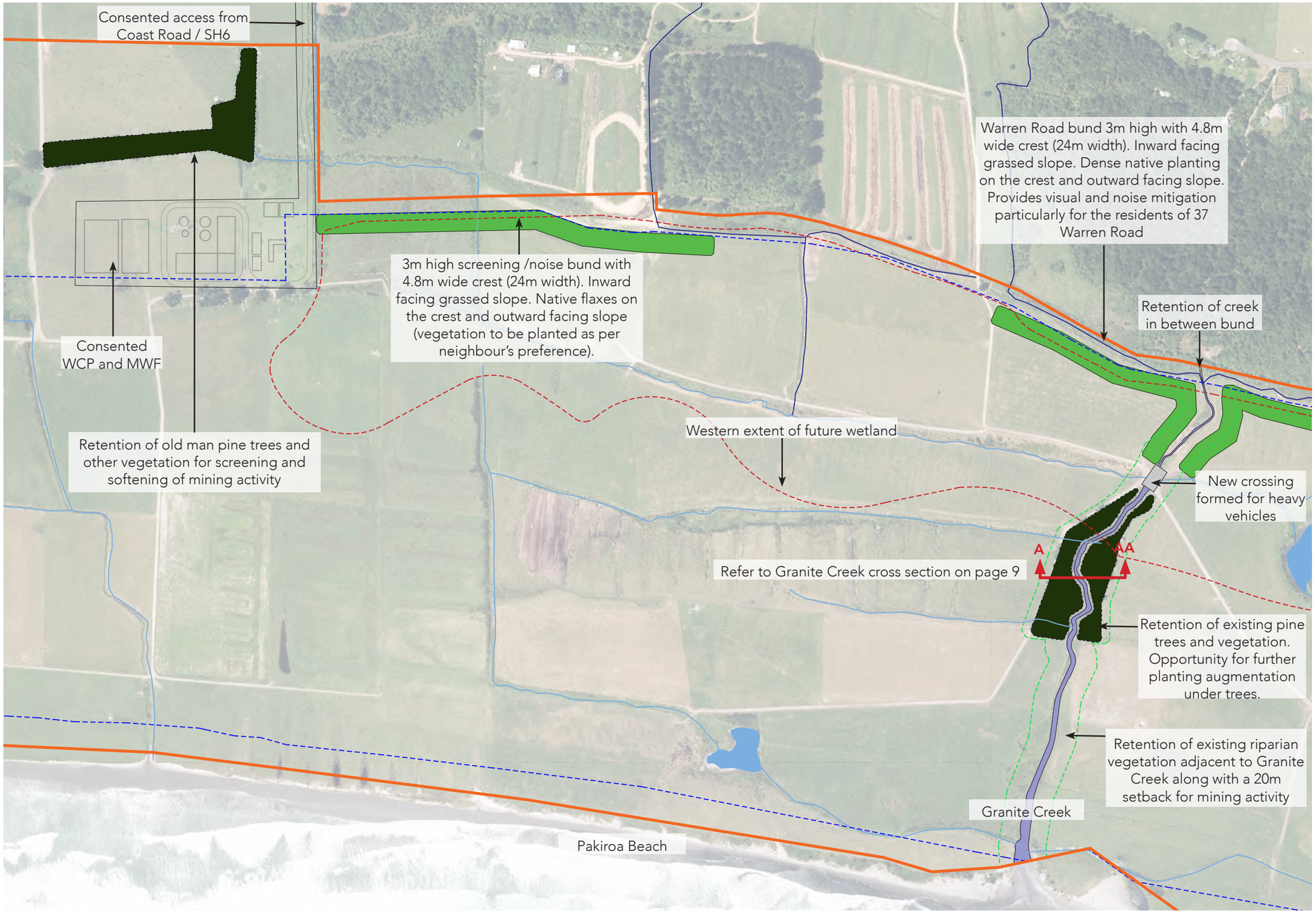
- New Native Vegetation
- Retention of Key Vegetation Areas
- New Planted Bunds (For noise and visual purposes)
- Granite Creek (To be retained)
- Consent Area
- Mining Disturbance Setback (Typically 20m Wide Unless Indicated Otherwise)
  - 20m from SNA-PUN-049
  - 20m from private property boundaries outside SRB
  - 20m from Granite Creek
  - 50m from MHWS
- 20m Setback from Granite Creek
- Existing River
- Existing Drain
- Future Wetland Area

1:15,000

0 100 500 1000 1500M N

Note:
The aim of this Pre-Mining Key Plan is to set out the different landscape areas to undergo landscape mitigation prior to mining commencing. Each of the black boxes refers to an individual sheet (page). These pages correspond with the Mining Sections (stages) outlined in the Project Description accompanying the application.

3.0 LANDSCAPE MITIGATION - PRE-MINING SECTION 1: NORTH OF GRANITE CREEK



KEY

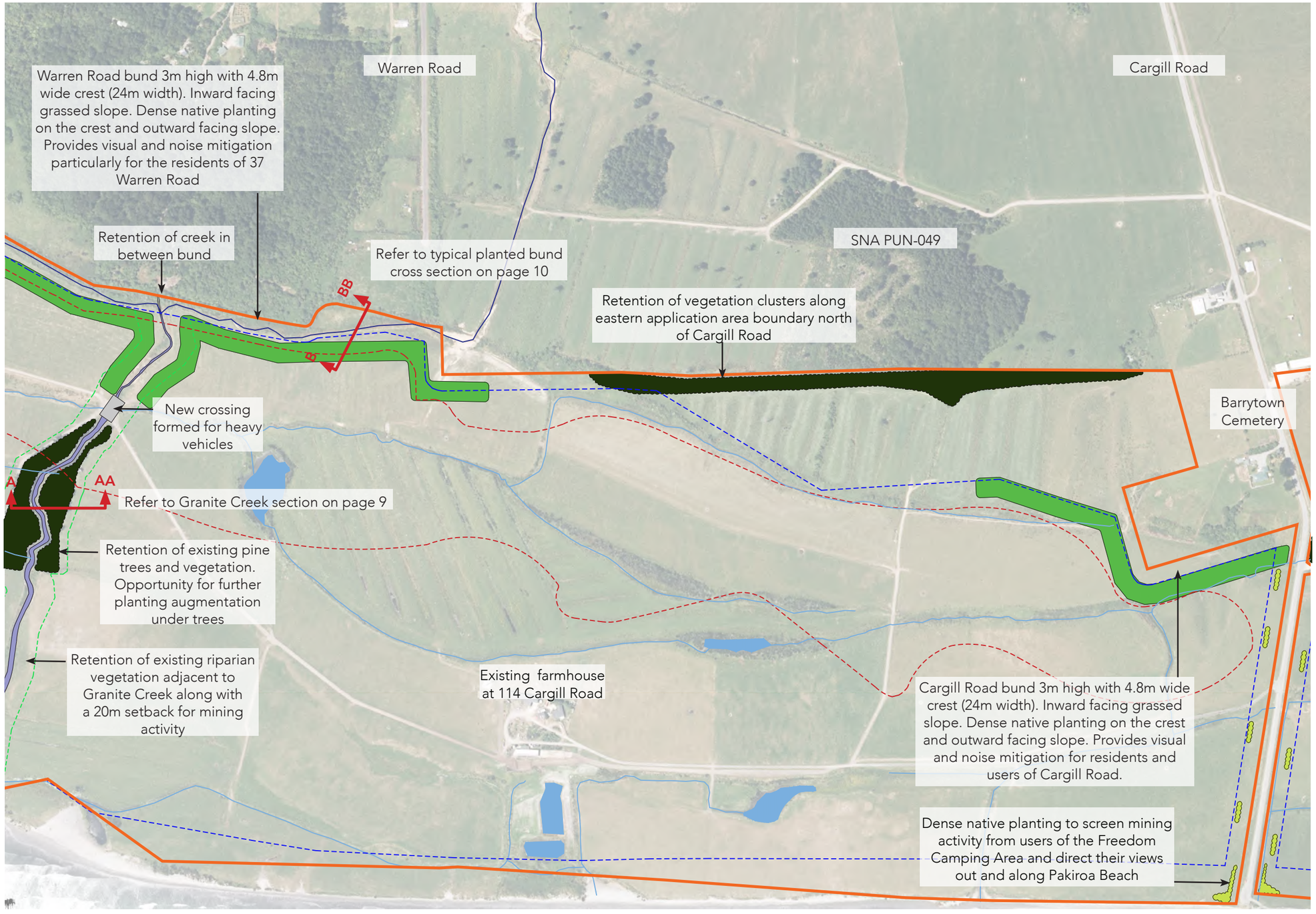
- Retention of Key Vegetation Areas
- Granite Creek (To be retained)
- New Planted Bunds (For noise and visual purposes)
- Consent Area
- Mining Disturbance Setback (Typically 20m Wide Unless Indicated Otherwise)
  - 20m from SNA-PUN-049
  - 20m from private property boundaries outside SRB
  - 20m from Granite Creek
  - 50m from MHWS
- 20m Setback from Granite Creek
- Existing River
- Existing Drain
- Future Wetland Area

1:5,000

0 50 100 200 300 400 500M N

3.0	LANDSCAPE MITIGATION	PRE-MINING SECTION 1: NORTH OF GRANITE CREEK	PROJECT NUMBER 2410	REVISION C	SCALE 1:5000@A3 1:2500@A1	DESIGN: GHLA DRAWN: EM APPVD: NC	DATE 3/03/2026

4.0 LANDSCAPE MITIGATION - PRE-MINING SECTION 2: SOUTH OF GRANITE CREEK



KEY

- New Native Vegetation
- Retention of Key Vegetation Areas
- Granite Creek (To be retained)
- New Planted Bunds (For noise and visual purposes)
- Consent Area
- Mining Disturbance Setback (Typically 20m Wide Unless Indicated Otherwise)
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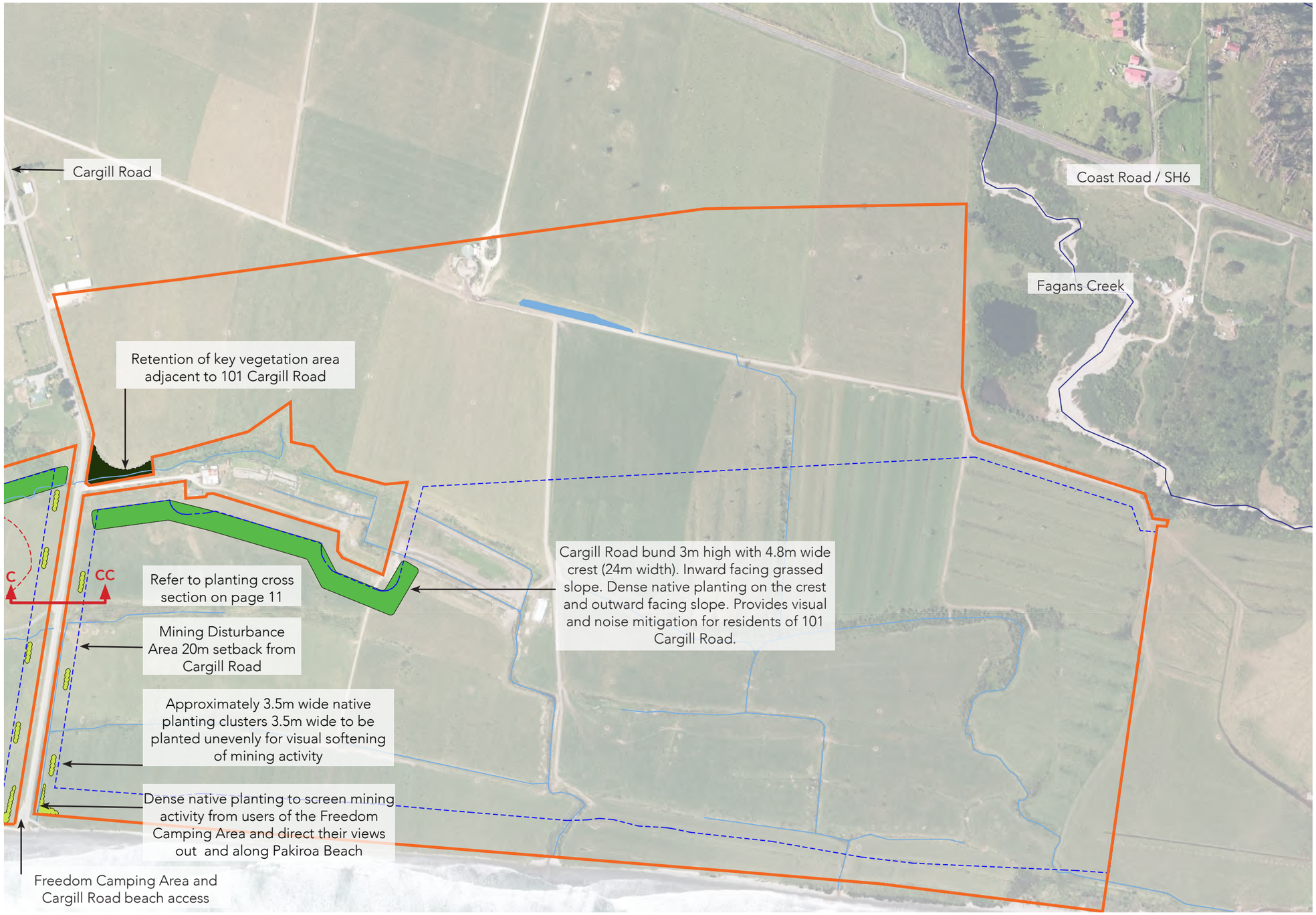
  - 20m from Granite Creek
  - 50m from MHWS
- 20m Setback from Granite Creek
- Existing River
- Existing Drain
- Future Wetland Area

1:5,000

0 50 100 200 300 400 500M N

4.0	LANDSCAPE MITIGATION	PRE-MINING SECTION 2: SOUTH OF GRANITE CREEK	PROJECT NUMBER 2410	REVISION C	SCALE 1:5000@A3 1:2500@A1	DESIGN: GHLA DRAWN: EM APPVD: NC	DATE 3/03/2026

5.0 LANDSCAPE MITIGATION - PRE-MINING SECTION 3: SOUTH OF CARGILL ROAD



KEY

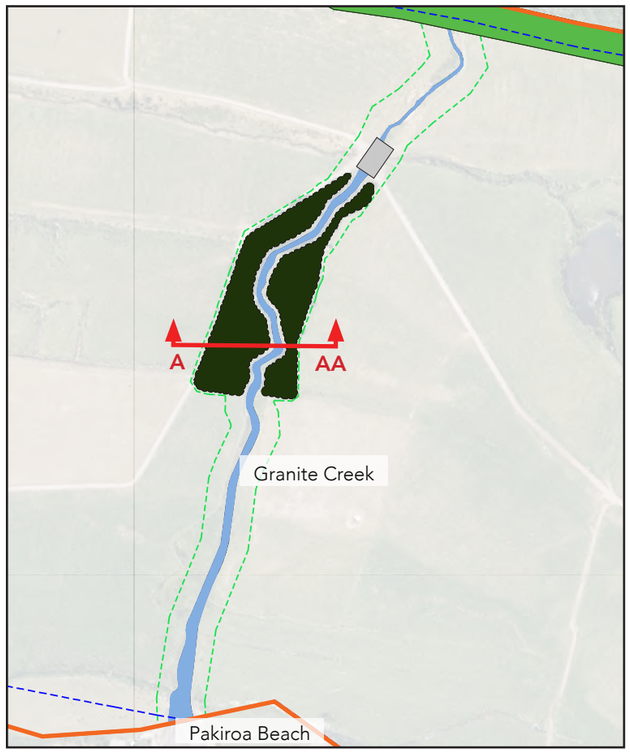
- New Native Vegetation
- Retention of Key Vegetation Areas
- New Planted Bunds (For noise and visual purposes)
- Consent Area
- Mining Disturbance Setback (Typically 20m Wide Unless Indicated Otherwise)
  - 20m from SNA-PUN-049
  - 20m from private property boundaries outside SRB
  - 20m from Granite Creek
  - 50m from MHWS
- 20m Setback from Granite Creek
- Existing River
- Existing Drain

1:5,000

0 50 100 200 300 400 500M N

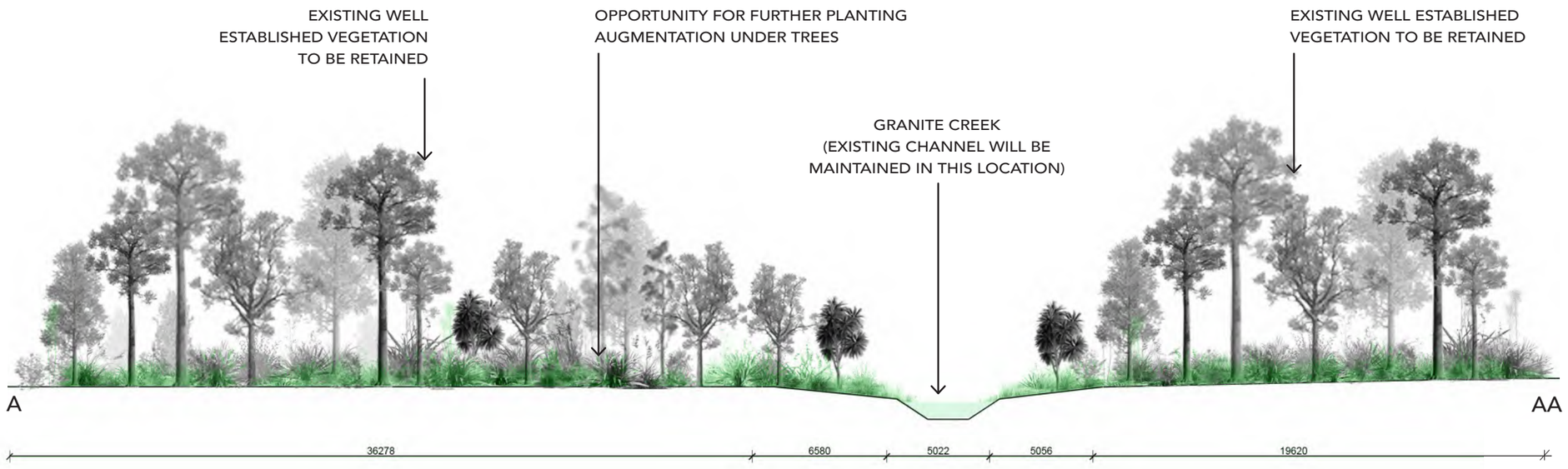
5.0	LANDSCAPE MITIGATION	PRE-MINING SECTION 3: SOUTH OF CARGILL ROAD	PROJECT NUMBER 2410	REVISION C	SCALE 1:5000@A3 1:2500@A1	DESIGN: GHLA DRAWN: EM APPVD: NC	DATE 3/03/2026

6.0 LANDSCAPE MITIGATION - PRE-MINING GRANITE CREEK



KEY PLAN - PRE MINING SECTION 1 FROM PAGE 6

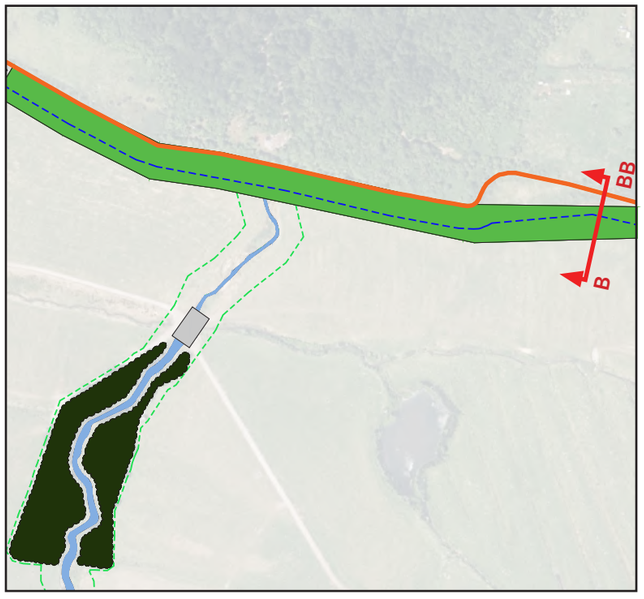
Existing planting adjacent to Granite Creek (to be retained)



SECTION A-AA_GRANITE CREEK SECTION - VEGETATION TO BE RETAINED
SCALE 1:250

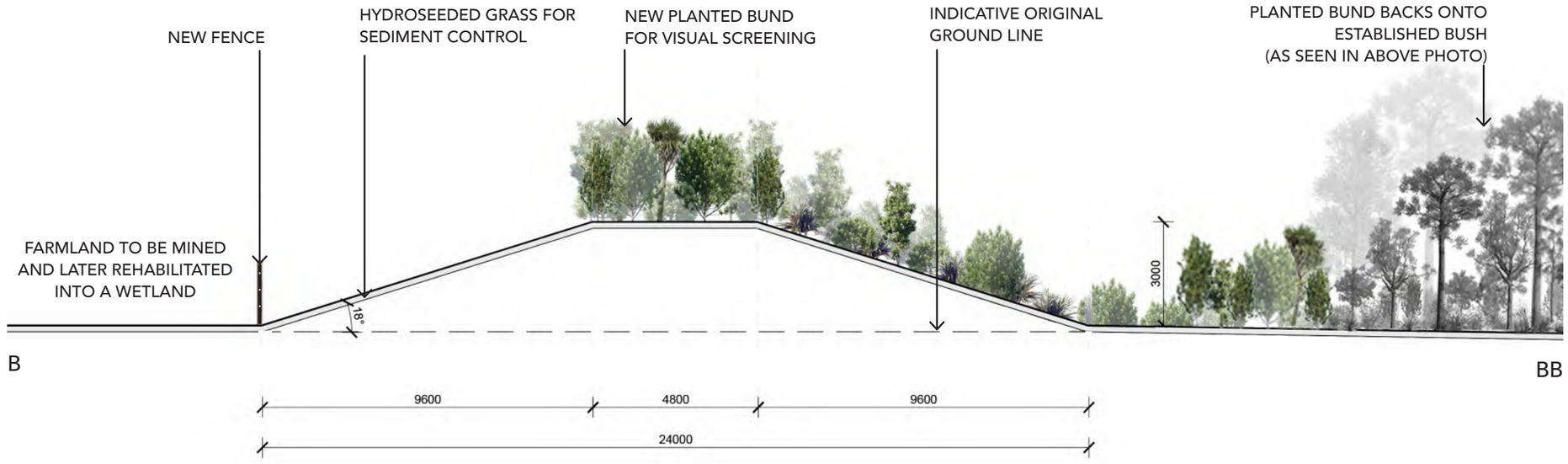
6.0	LANDSCAPE MITIGATION	PRE-MINING GRANITE CREEK	PROJECT NUMBER 2410	REVISION C	SCALE 1:250 @ A3	DESIGN: GHLA DRAWN: EM APPVD: NC	DATE 3/03/2026

7.0 LANDSCAPE MITIGATION - PRE-MINING PLANTED BUNDS



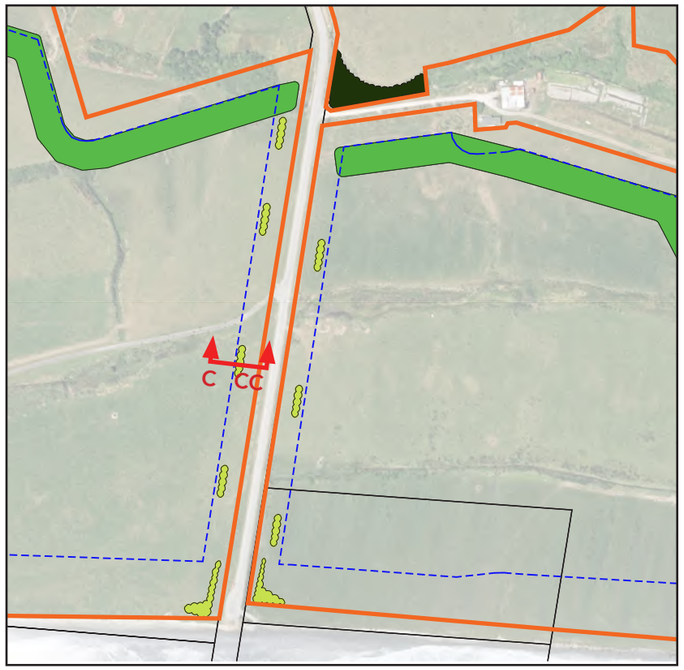
KEY PLAN - PRE MINING SECTION 2 FROM PAGE 7

Existing farm environment and adjacent bush, near where the new Warren Road planted bund will be located



B-BB BUND _ TYPICAL 3M HIGH BUND
SCALE 1:150

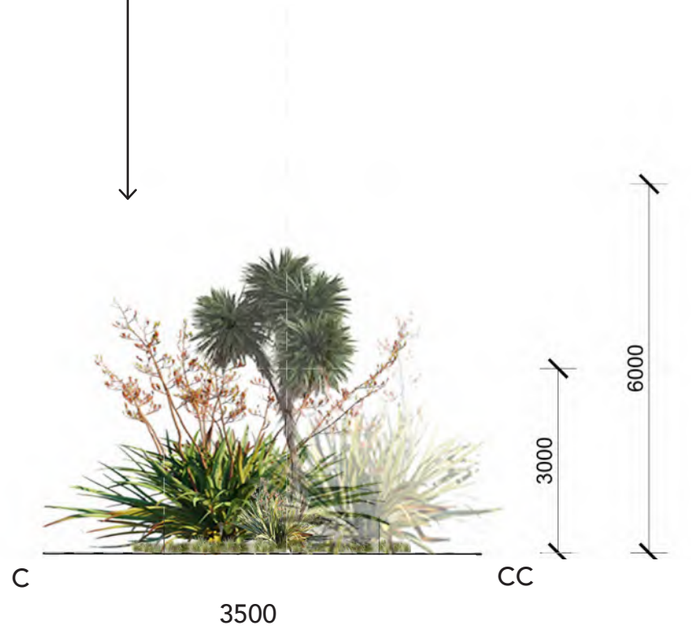
8.0 LANDSCAPE MITIGATION - PRE-MINING CARGILL ROAD NATIVE PLANTING



KEY PLAN - PRE MINING SECTION 3 FROM PAGE 8

INDICATIVE CLUSTER SCREENING PLANTING - PLAN
SCALE 1:100

MULTIPLE ROWS OF STAGGERED VISUAL SCREENING FOR SOFTENING OF MINING ACTIVITIES
(Mixture of flax and small trees).

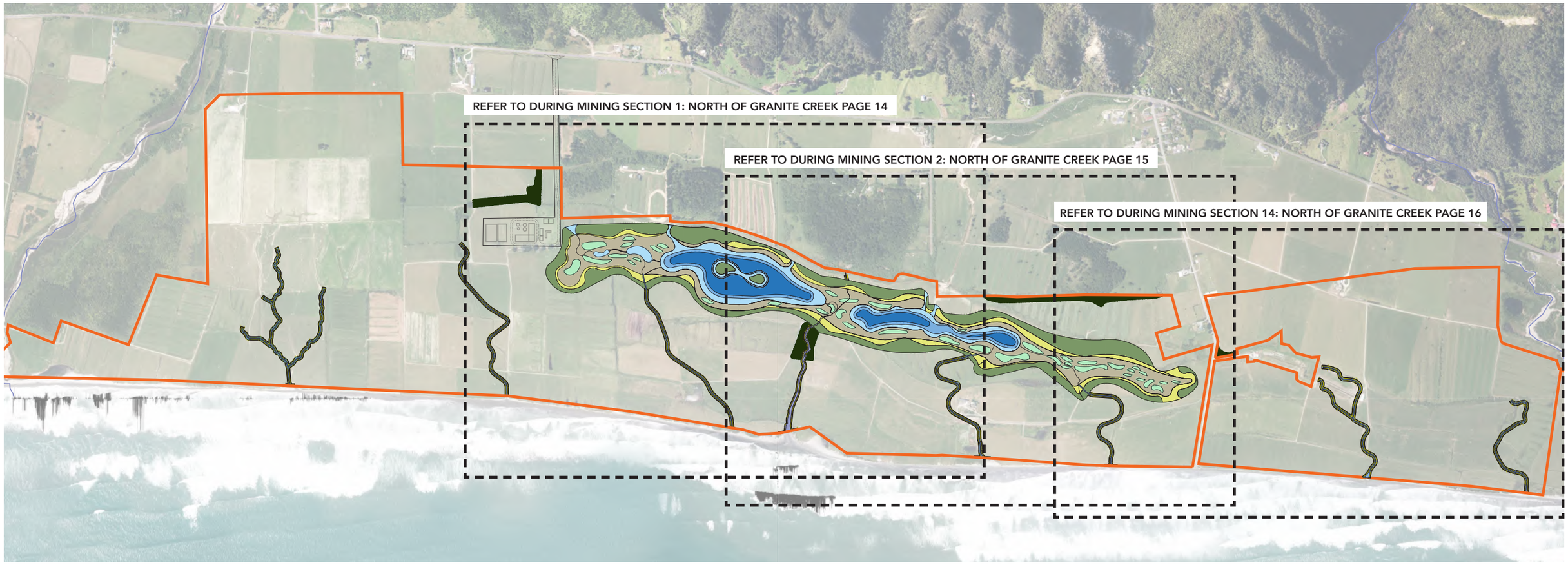


INDICATIVE CLUSTER SCREENING PLANTING - SECTION C-CC
SCALE 1:100

Note:
The section shows a typical design for the clusters of planting that will be implemented along Cargill Road within the 20 metre setback area. The aim is to screen and soften some of the mining activity when it comes closest to Cargill Road. This is balanced with the desire to maintain some views up and down the coast and not create a 'tunnel' effect along Cargill Road.

LANDSCAPE REHABILITATION - DURING MINING

9.0 LANDSCAPE REHABILITATION PLAN - DURING MINING KEY PLAN



KEY

- Shallow Marsh - Average Depth 0.4m
- Mid-depth Water - Average Depth 1m
- Deep Open water - Average Depth 2m
- Flaxland and Dry Edge Vegetation
- Carex Rushlands
- Raupo Wetland
- Raised Islands
- Riparian Planting
- Existing Planting to be Retained
- Consent Area

1:15,000

0 100 500 1000 1500M

N

Note:
The aim of this During Mining Key Plan is to set out the different landscape areas to be rehabilitated into a large wetland and smaller riparian margins during mining. Each of the black boxes refers to an individual sheet (page). These pages correspond with the Mining Sections (stages) outlined in the Project Description accompanying the application. The end goal is to have a well functioning large connected wetland of about 53.7 hectares in size.

10.0 LANDSCAPE REHABILITATION PLAN - DURING MINING SECTION 1: NORTH OF GRANITE CREEK

Refer to cross sections DD and EE on page 17 for further planting details

DD

D

EE

E

Warren Road

Connects to wetland plan on page 15

Realigned and rehabilitated waterbody after mining has passed through area

Granite Creek (existing alignment to be retained)

Pakiroa Beach

KEY

- Shallow Marsh - Average Depth 0.4m
- Mid-depth Water - Average Depth 1m
- Deep Open water - Average Depth 2m
- Flaxland and Dry Edge Vegetation
- Carex Rushlands
- Raupo Wetland
- Raised Islands
- Riparian Planting
- Existing Planting to be Retained
- Consent Area

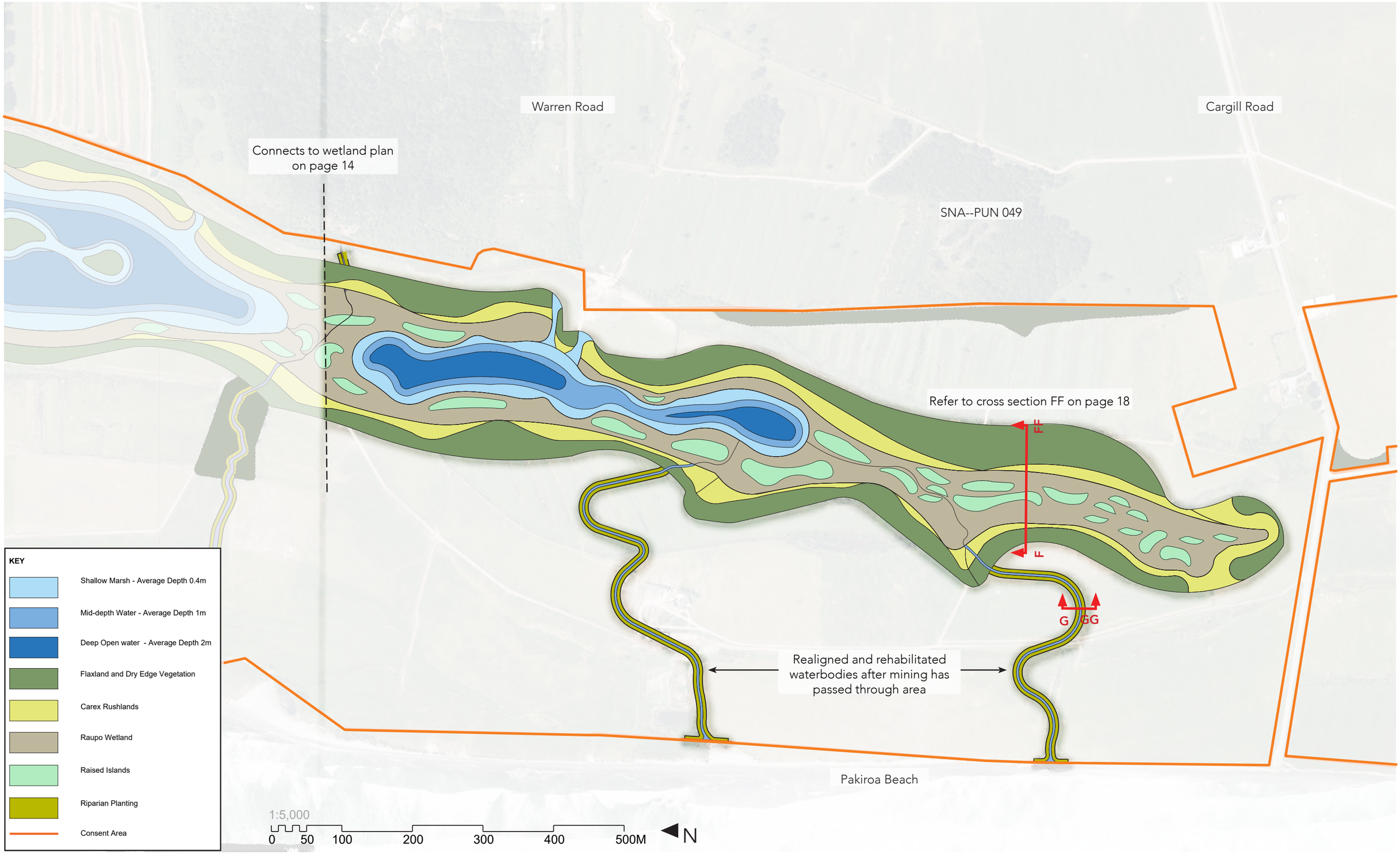
1:5,000

0 50 100 200 300 400 500M

N

10.0	LANDSCAPE MITIGATION	DURING MINING SECTION 1: NORTH OF GRANITE CREEK	PROJECT NUMBER 2410	REVISION C	SCALE 1:5000 @ A3	DESIGN: GHLA DRAWN: EM APPVD: NC	DATE 3/03/2026	14

11.0 LANDSCAPE REHABILITATION PLAN - DURING MINING SECTION 2: SOUTH OF GRANITE CREEK

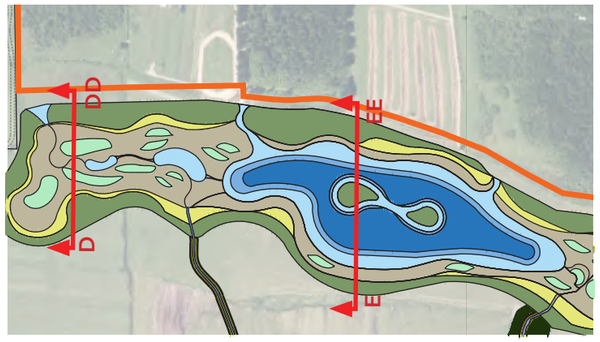


11.0	LANDSCAPE MITIGATION	DURING MINING SECTION 2: SOUTH OF GRANITE CREEK	PROJECT NUMBER 2410	REVISION C	SCALE 1:5000 @ A3	DESIGN: GHLA DRAWN: EM APPVD: NC	DATE 3/03/2026

12.0 LANDSCAPE REHABILITATION PLAN - DURING MINING STAGE 3: SOUTH OF CARGILL ROAD

12.0	LANDSCAPE MITIGATION	DURING MINING SECTION 3: SOUTH OF GRANITE CREEK	PROJECT NUMBER 2410	REVISION C	SCALE 1:5000 @ A3	DESIGN: GHLA DRAWN: EM APPVD: NC	DATE 3/03/2026

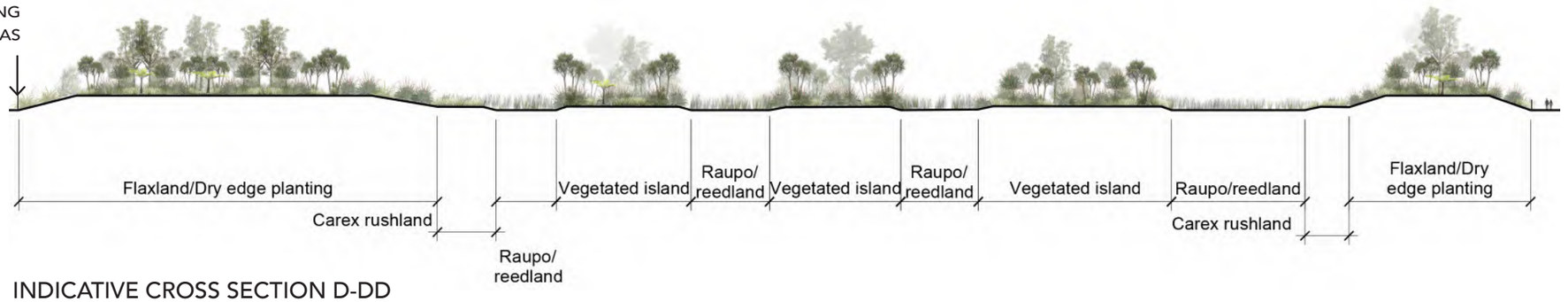
13.0 LANDSCAPE REHABILITATION - DURING MINING SECTION 1: NORTH OF GRANITE CREEK



KEY PLAN - DURING MINING SECTION 1 FROM PAGE 13

Note:
The design and layout of the well functioning large connected wetland has been informed by Landscape Architects, Ecologists and Hydrologists working together.

NEW STOCK PROOF FENCING ON THE OUTSIDE OF ALL THE PLANTING AREAS

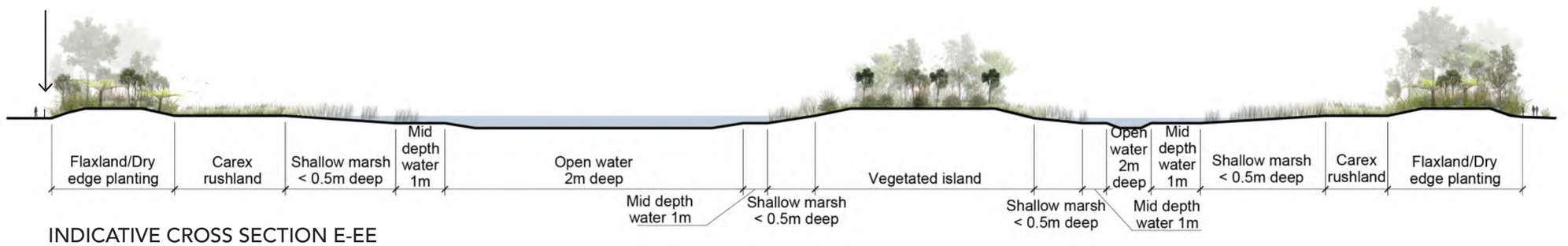


INDICATIVE CROSS SECTION D-DD

1:750

0 5 10 20 30 45 60M

NEW STOCK PROOF FENCING ON THE OUTSIDE OF ALL THE PLANTING AREAS



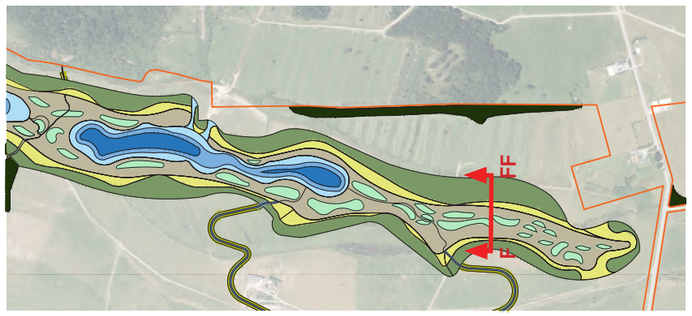
INDICATIVE CROSS SECTION E-EE

1:1,000

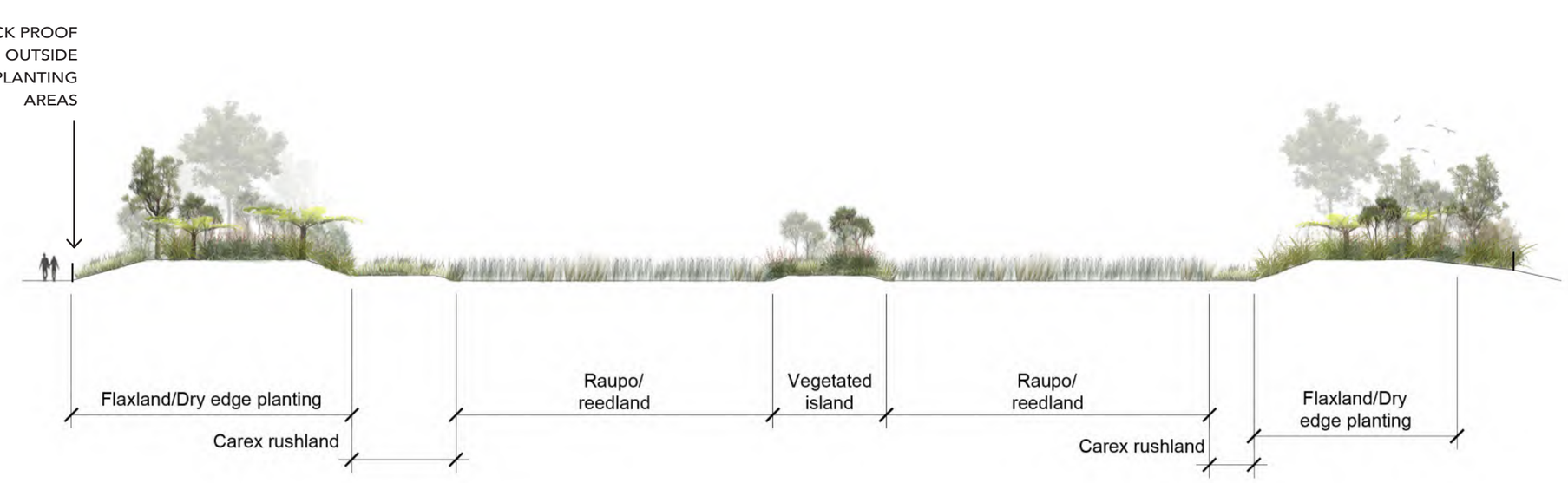
0 10 20 30 40 50 60 70 80 90 100M

13.0	LANDSCAPE MITIGATION	DURING MINING SECTION : NORTH OF GRANITE CREEK	PROJECT NUMBER 2410	REVISION C	SCALE AS SHOWN	DESIGN: GHLA DRAWN: EM APPVD: NC	DATE 3/03/2026

14.0 LANDSCAPE REHABILITATION - DURING MINING SECTION 2: SOUTH OF GRANITE CREEK



KEY PLAN - DURING MINING SECTION 2 FROM PAGE 13

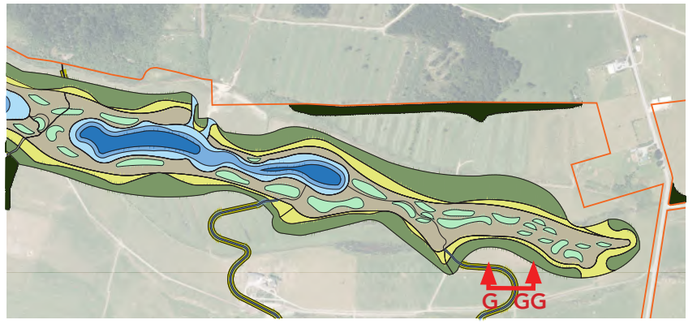


INDICATIVE CROSS SECTION F-FF

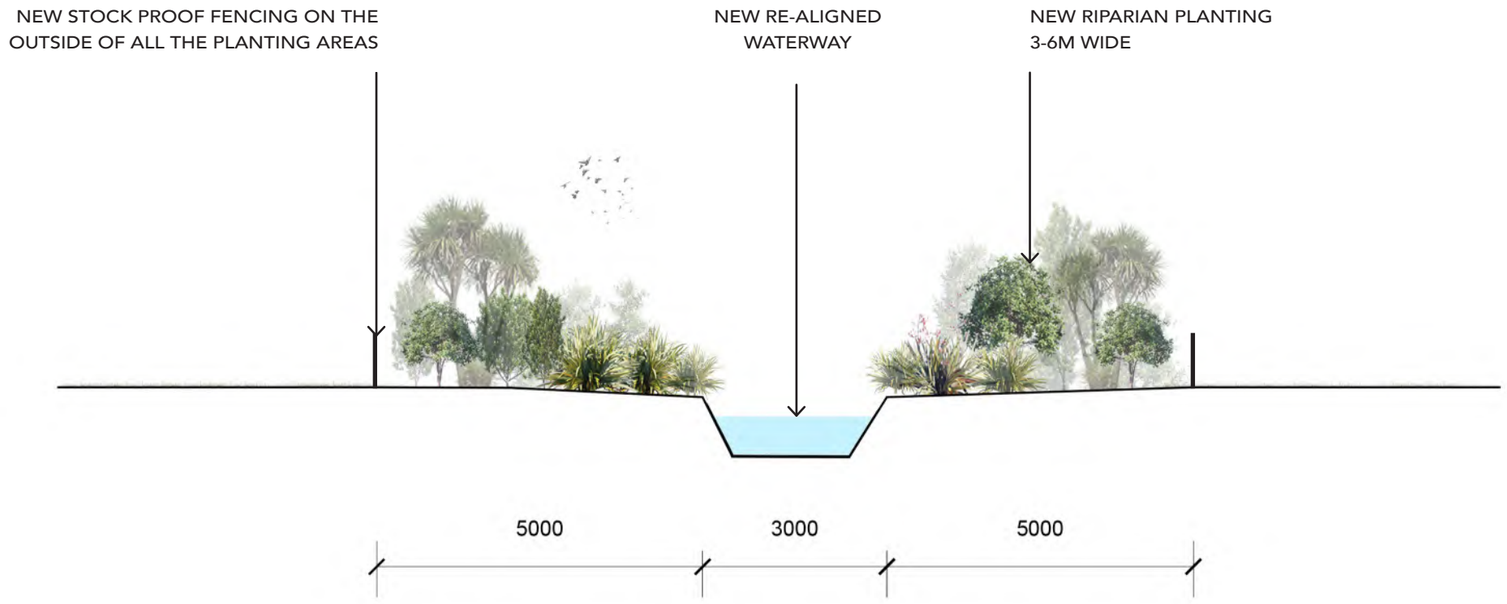
1:500

0 5 10 20 30 40 50M

15.0 LANDSCAPE REHABILITATION - DURING MINING SECTION 2: REALIGNED WATERWAY



KEY PLAN - DURING MINING SECTION 2 FROM PAGE 13



INDICATIVE CROSS SECTION G-GG

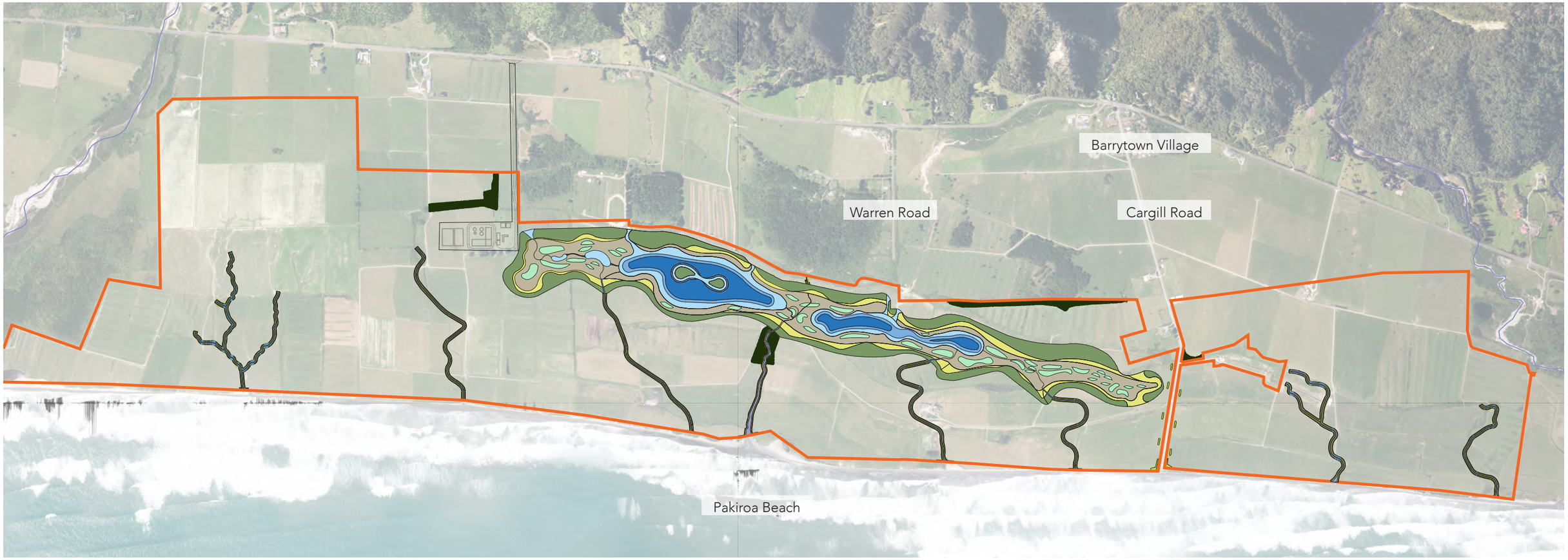
1:500

0 5 10 20 30 40 50M

Note:
Cargill Road will not be realigned.

LANDSCAPE REHABILITATION - POST MINING

16.0 LANDSCAPE REHABILITATION PLAN - POST MINING FINAL OUTCOME: SECTIONS 1, 2 & 3 COMBINED



KEY

- Shallow Marsh - Average Depth 0.4m — Total Area: 5.2ha
- Mid-depth Water - Average Depth 1m — Total Area: 2.8ha
- Deep Open water - Average Depth 2m — Total Area: 5.3ha
- Flaxland and Dry Edge Vegetation — Total Area: 15.3ha
- Carex Rushlands — Total Area: 5.3ha
- Raupo Wetland — Total Area: 15.6ha
- Raised Islands — Total Area: 4.1ha
- Riparian Planting — 3-6m in width either side of channel
- Existing Planting to be Retained
- Consent Area

TOTAL WETLAND AREA: 53.7ha Approximately

1:15,000

0 100 500 1000 1500M

N

Note:
At the completion of mining activity the consent area will have:

- The existing planting areas that were retained
- Clusters of new planting along Cargill Road
- New riparian planting along waterbodies (four primary ones which have been realigned, plus Granite Creek)
- An extensive well functioning connected new wetland of approximately 53.7 hectares.

16.0	LANDSCAPE MITIGATION	DURING MINING FINAL OUTCOME: SECTIONS 1, 2 & 3 COMBINED	PROJECT NUMBER 2410	REVISION C	SCALE 1:10,000@A3 1:5000@A1	DESIGN: GHLA DRAWN: EM APPVD: NC	DATE 3/03/2026

17.0 LANDSCAPE SPECIES AND INDICATIVE GROWTH RATES

Below are the plant species that will be used for mitigation and rehabilitation planting.

- An approximate growth rate of 0.40-0.60m per year has been determined in consultation with the project Landscape Architect [Mrs Crawford] and project Ecologist [Mr Bramley]. The combined experience of these two individuals notes that these plants will sit at a lower growth rate for the first two years following planting, and will have an increase in growth rates in following years. It is also noted that larger individual specimens have a longer 'sitting' period than smaller ones.
- Growth rates can be influenced by seasonal fluctuations, maintenance, moisture/precipitation, exposure, ground conditions, and type of plant species.
- **Note:** The plant species proposed to be used are shown in Schedule of Species below, although other similar species may be used in addition to those listed (e.g., if a particular species is unavailable to source or if for any reason a species is deemed unsuitable at a later stage).

INDICATIVE PLANT GROWTH

Year of growth	Native Plant Height
1	Seed Collection
2	0.4 - 0.6m at planting
3	0.8 - 1.2m
4	1.2 - 1.8m
5	1.6 - 2.4m
6	2.0 - 3.0m
7	2.4 - 3.6m
8	2.8 - 4.2m
9	3.2 - 4.8m

SCIENTIFIC NAME	COMMON NAME	SCREENING	BUND	RIPARIAN	WETLAND	ULTIMATE SIZE (m) wxh
Aristotelia serrata	makomako, wineberry		x	x		3 x 6
Carex geminata	rautahi			x	x	1x1
Carex secta	purei			x	x	1.5 x1.5
Carex virgata	pukio	x	x	x	x	0.5 x 1
Coprosma propinqua	mikimiki	x	x	x	x	2.5 x 5
Coprosma robusta	karamu		x	x	x	2.5 x 5
Cordyline australis	tī kōuka, cabbage tree			x	x	2 x 6
Dacrycarpus dacrydioides	kahikatea, white pine			x	x	5 x 50
Juncus edgariae	edgar's rush			x	x	1 x 1
Metrosideros robusta	northern rata		x	x	x	3 x 15
Melicytus ramiflorus	māhoe, whiteywood		x	x	x	2.5 x 8
Phormium tenax	harakeke, korari, New Zealand flax	x	x	x		2 x 3
Pittosporum eugenioides	tarata, lemonwood		x	x		3 x 6
Pittosporum tenuifolium	kohuhu		x	x	x	3 x 6
Rhopalostylis sapida	nīkau	x	x			3 x 15
Typha orientalis	raupō, bull rush				x	1.5 x 2.3

18.0 PLANTING PALETTE

TREES

Aristotelia serrata
Makomako / Wineberry

Cordyline australis
Cabbage tree

Dacrycarpus dacrydioides
Kahikatea / White Pine

Metrosideros robusta
Northern Rata

Melicytus ramiflorus
Mahoe / Whiteywood

Pittosporum eugenioides
Tarata / Lemonwood

NATIVE SHRUBS

Pittosporum tenuifolium
Kohuhu / Black Matipo

Rhoplostylis spaida
Nīkou

Carex geminata
Rautahi, Cutty grass

Carex secta
Makura Sedge

Carex virgata
Pukio / Swamp Sedge

Juncus edgariae
Wiwi

Coprosma propinqua
Mingimingi

Coprosma robusta
Karamu

Typha orientalis
Raupo /Bull rush

Phormium tenax
Harakeke / NZ Flax

Appendix D

Template section 30 letter

[Date] March 2026

Tāiko Critical Minerals
c/-100 Mackay Street
GREYMOUTH 7805
Attention: mike.meehan@tigamm.co.nz

Tāiko Critical Minerals Limited Fast-track application - Section 30(3) Fast-track Approvals Act 2024 Response

Thank you for your notification letter dated 3 March 2026 notifying the West Coast Regional Council (Council) that you intend to lodge a substantive application for resource consents under the Fast-track Approvals Act 2024 (FTAA) for the Barrytown Minerals Project (Southern Block).

After reviewing Council records, we have identified consents that apply to land intended to be utilised as part of the Barrytown Minerals Project (Southern Block), set out in the table attached. We can confirm that there are no existing resource consents that fall under section 124C(1)(c) or section 165ZI of the Resource Management Act 1991, as referenced in section 30(3) of the FTAA.

Therefore, as no existing resource consents under section 30(3) have been identified, section 30(3)(b) applies and no further action is required by West Coast Regional Council in respect of these sections.

If you have any questions or require further clarification, please do not hesitate to contact us.

Next steps where section 30(3)(b) of the FTAA applies

As set out under section 30(6)(b) of the FTAA, if you wish to lodge a substantive application you must do so within three (3) months of the date of this notice.

Jocelyne Allen
Group Manager – Regulatory & Policy
West Coast Regional Council

Legal description	West Coast Regional Council consents
Section 4-6 Block V Waihero Survey District contained in Record of Title Ws2D/1085	
Section 7-8 Block V Waiwhero Survey District contained in Record of Title WS2D/855	
Lot 1 DP 3548 and Rural Section 2927 contained in Record of Title WS8C/143	
Part Section 2928 Block V Waiwhero Survey District and Defined on DP 764 contained in Record of Title WS1A/1166	
Lot 1 DP 2719 and Lot 2 DP 339364 contained in Record of Title 161879	
Section 2929 and Part Section 2634 – 2635 Block V Waiwhero Survey District and defined on DP 764 contained in Record of Title WS2A/228	
Rural Section 2930 contained in Record of Title WS1B/293	
Rural Section 2931,2932,2933,3316 and Part Rural Section 2639 contained in Record of Title WS8B/528	
Section 4033 Block V Waiwhero Survey District contained in Record of Title WS1A/892	
Part Section 5 Block IX Waiwhero Survey District contained in Record of Title WS2B/591	
Lot 1 DP 406050 contained in Record of Title 486401.	

Department of Conservation Consultation Material

TĀIKO CRITICAL MINERALS
WEST COAST NEW ZEALAND

Mining with the environment
Working with the community
A world class, high grade critical minerals deposit

18 March 2026

Penny Nelson
Director-General
Department of Conservation

And to:

Fast-track Team
Department of Conservation
Whare Kaupapa Atawhai/Conservation House
PO Box 10420
Wellington 6140
By email: fasttrackapplicationenquiries@doc.govt.nz

Kei te rangatira, tēnā koe

Tāiko Critical Minerals Limited – Barrytown Minerals Project – Fast-track Approvals Act 2024 application

1 As you are aware, Tāiko Critical Minerals Limited (**TCM**) is the authorised person with respect to the Barrytown Minerals Project (**Project**), which is a Schedule 2 listed project in the Fast Track Approvals Act 2024 (**FTAA**).

2 We are writing to the Department of Conservation (DoC) in its capacity as a relevant administering agency in terms of Section 11 of the FTAA to confirm that TCM will be applying for all approvals necessary under the FTAA to mine the Southern Block of the Barrytown Minerals Project. DoC will also be invited to comment on the resource consent component of the application.

3 The Fast Track Approvals Amendment Act 2025 will replace consultation requirements with the requirement to notify relevant parties on 31 March 2026. As TCM commenced consultation with DoC prior to that date, it is required to finish consultation with DoC and is not required to notify DoC under the new provisions (see FTAA, Schedule 1, clause 10).

4 By way of summary, the Project is to undertake mineral sand mining to obtain ilmenite, garnet and other minerals across an area of the Barrytown Flats, in the Grey District. Resource consent has already been granted to TCM for initial stages of the Project, including to undertake mineral sands mining to the north of the Project site (on the Central Block), establish and operate a Mineral Separation Plant at Rapahoe (including transportation from Barrytown Flats to the MSP) and to establish and operate a Wet Concentrator Plant for processing on site.

5 The application will seek all approvals for mining and related activities within the Southern Block including (but not limited to):

(a) the extraction of sand using a floating dredge over approximately 280 hectares;

(b) remediation, rehabilitation and closure activities, including the establishment of a constructed wetland and reshaping of contours over 411 hectares.

6 Mining of the Southern Block is likely to take place over approximately 14 years followed by rehabilitation of the site, including construction of the wetland.

7 A project description and proposed resource consent and wildlife approval conditions are attached at **Appendices A** and **B**. These have been developed based on expert advice, consultation to date and the previous publicly notified resource consent process for the Central Block. TCM will adjust and update these draft conditions with feedback received through further consultation and further expert review and advice.

8 Approvals sought include:

(a) Land use consents, water permits, and discharge permits related to mining and processing activities normally required under the Resource Management Act 1991;

(b) Approvals normally required under the Wildlife Act 1953 for handling, salvage (including incidental killings) and relocation activities; and

(c) Approvals normally required for under the Heritage New Zealand Pouhere Taonga Act 2014 to modify or destroy recorded and unrecorded archaeological sites.

9 To assist with the design and assessment of actual and potential environmental effects associated with the project, TCM has engaged a range of technical experts. Of relevance to DoC, these include landscape, hydrology, water quality, ecology (terrestrial and freshwater), and erosion and sediment control.

10 The company has engaged with Terry Calmeyer, the DoC Fast Track team, local DoC staff and technical staff in relation to species management. This consultation was assisted by the extensive engagement TCM had undertaken on the publicly notified resource consent for the Central Block, where DoC was an active participant, including in appeals against the council decisions to grant consent. Robust resource consent conditions in relation to the Westland Petrel were agreed with DoC and other parties to the appeals via consent order. Lighting conditions for this application follow those agreed conditions and as mining activity will only occur during daylight hours, there are no anticipated effects on the Westland Petrel.

11 In addition, management plans are proposed to assist with the management of birds, lizards and native freshwater fish, including capture and relocation where appropriate. A draft ecological report and draft management plans are attached at **Appendices C** - **F**. A draft landscape mitigation package is contained at **Appendix G**.

12 We would be grateful if you could confirm that you have received this letter. If any further questions or matters arise that you would like to discuss, please do not hesitate to contact us. We would be grateful for your response by 10 April 2026. We are happy to make our experts available for any questions or further discussions you consider necessary.

13 We thank the DoC for its meaningful contribution to date.

Nāku, nā

Mike Meehan
Project Director
E: mike.meehan@tigamm.co.nz
Ph: 021-289-8636

Appendix A: Project Description – Draft for Consultation

Barrytown Critical Minerals Project
Southern Block

Project description – draft for consultation
18 March 2026

1. Overview

1.1 This section sets out a detailed description of the Project to inform the applications made for approvals under Schedules 5, 7, and 8 of the FTAA.

1.2 Tāiko Critical Minerals (formally TiGa Minerals and Metals, the **Applicant**) holds various resource consents from the Grey District Council and the West Coast Regional Council authorising the extraction, processing, and transportation of mined material in the form of Heavy Mineral Concentrate (**HMC**) from the Central Block (**CB**) at Barrytown, as part of its critical minerals project on the Barrytown Flats. Minerals sought to be obtained through the process are ilmenite, garnet, zircon and gold.

1.3 The initial resource consent for mining, HMC production, transportation and associated ancillary activities was subject to a publicly notified process. Through this extensive process, all aspects of the company's operations were assessed against the relevant District and Regional Plans, the Resource Management Act 1991, and applicable national direction. This enabled full participation by interested parties and agencies and resulted in a robust set of consent conditions, which have informed the company's Fast-track application, including the substantive environmental data set the company has produced and which is ongoing.

1.4 Following the granting of the substantive resource consent for the CB (north of Canoe Creek), an additional resource consents have been granted for a Mineral Separation Plant (MSP) at Rapahoe. Consent for the establishment, operation and maintenance of a centralised Wet Concentrator Plant (**WCP**) adjacent to the Southern Block (**SB**), associated water management infrastructure (known as the Mine Water Facility (MWF)) and access road, is currently being processed by the Grey District Council. Consent for the earthworks component of this activity was granted by the West Coast Regional Council in February 2026. The MSP and WCP will process material from the CB and the SB.

1.5 In adopting this approach, the company has undertaken extensive consultation with the local community, mana whenua, Councils, and relevant agencies throughout these community-facing processes. This engagement has contributed to the development and acceptance of comprehensive consent conditions and management provisions. It has also enabled the assessment and approval of high interest matters, such as trucking activities on State Highway 6. As a result, the Fast-track application is focused on seeking all necessary approvals for the mining activity within the SB. Plan A shows the three resource blocks of the Barrytown Critical Minerals Project.

1.6 The SB comprises approximately 408ha on the Barrytown Flats as shown in Plan B. All land subject to this application is privately owned with access to the site approved by the respective landowners. Mining activity is proposed to occur on approximately 280ha of the total area, which is known as the 'mining disturbance area' and shown in Plan B. Earthworks will be undertaken on parts of the SB outside the mining disturbance area to assist with recontouring and rehabilitation.

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1.7 Mining on the SB will be undertaken using a floating dredge of modern design. Mining will be undertaken in three sections as follows (shown on Plan C), although only one section will be mined at a time:

(a) Section 1: Granite Creek North;

(b) Section 2: Granite Creek South;

(c) Section 3: Cargill Road.

1.8 Mining of the SB is expected to commence in approximately 2034 - 2035 once the mineral resource on the CB has been exhausted. The WCP and MWF will be used to process material from both the CB and SB.

1.9 Various measures are proposed for the avoidance, minimisation and mitigation of ecological (terrestrial and freshwater), landscape, visual, noise and dust-related effects. The Project also includes significant ecological and landscape enhancements in the form of an extensive wetland, realignment of creeks into natural patterns, riparian planting and stock exclusion fencing.

1.10 Mining of the SB is expected to take approximately 14 years (excluding preparation and rehabilitation), based on the extraction rate of 2,000,000 tonnes per year (producing 400,000 tonnes of HMC per year). This will extend the overall mining component of the Barrytown Minerals Project to approximately 30-35 years. Taking into account pre-mining construction works and post-mining final rehabilitation and mine closure works, it is anticipated that the Project will be completed between 2055 and 2060. Approvals are sought for 35 years to provide sufficient time for mining activity to occur over stages, final rehabilitation and operational factors to take place.

1.11 The anticipated work programme for the Project is as follows:

(a) Bunding and initial mitigation planting – 1 year (2027);

(b) Mining of the Central Block (consented) – 6 years (2029 – 2034);

(c) Mining Section 1: Granite Creek North (Stage 1) – 7 years (2035 - 2042);

(d) Mining Section 2: Granite Creek South (Stage 2) – 4 years (2043 – 2047);

(e) Mining Section 3: Cargill Road (Stage 3) – 3 years (2047 - 2050);

(f) Final rehabilitation – 3 years (2050 – 2053); and

(g) An operational contingency period of 6 years (2050 – 2056 followed by the final rehabilitation proposed in (f)).

2. Consents sought and relevant land parcels

2.1 All resource consents necessary are being sought, including for the following activities:

Consent type	Activity	Rule breaches
Grey District Plan		
Land use consents	Clearance of indigenous vegetation	Rule 19.7.5(vii): Clearance of indigenous vegetation exceeds

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		permitted activity volumes outside of an SNA
Decisions Version Te Tai o Poutini Plan Rules under appeal are noted with an * e.g. ECO-R1*		
Land use consent	Clearance of indigenous vegetation	ECO-R9*: the clearance of indigenous vegetation in the coastal environment and riparian margins will exceed the permitted activity volumes
	Earthworks within riparian margins	NC-R4*: because the earthworks will be undertaken across the mining disturbance area including creeks and their riparian margins
	Structures within riparian margins	NC-R5*: existing farm bridges will be replaced post mining which are not permitted under this plan
	Structures in the coastal environment	CE-14*: existing farm bridges will be replaced post mining which are not permitted under this plan
	Mineral extraction	GRUZ-R25*: do not comply with permitted activity rule due to volume of material to be extracted, mining to be undertaken within the riparian margins of creeks and wetlands, will disturb two historic heritage sites; undertaken within 250m of a sensitive activity on an adjoining site; and operate outside permitted hours.
West Coast Regional Land and Water Plan		
Land use consent	Earthworks within riparian margins; Earthworks in the non-erosion prone area outside riparian margins; Vegetation disturbance in riparian margins	Rule 16 WCRLWP: do not comply with permitted activity rule as earthworks will exceed permitted volumes and vegetation clearance will take place in riparian margins with creeks to be mined across the site
Land use consent	Activities within the bed of a river outside of a wetland identified in Schedule 1 or 2	Rule 35 WCRLWP: Creek beds will be reconstructed in the same or similar locations and represent meandering

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		pathways, and water will be drained during diversions
Water permit	To take and use water for the purpose of mineral sand processing	Rule 55 WCRLWP: the take and use of water from Canoe Creek to operate the Wet Concentrator Plant is a restricted discretionary activity
Water permit	To take and use ground water for the purpose of mineral sand mining and processing	Rule 56 WCRLWP: to take and use groundwater intercepted during mining to pump run-of-mine material to the Wet Concentrator Plant.
Land use consent	Diversion of water	Rule 58 WCRLWP: five creeks across the SB will require diversion which is a discretionary activity
Discharge permit	To discharge water to the mining void	Rule 71 (discharge to water and land) WCRLWP: to discharge water to the mining void is a discretionary activity due to the augmentation of lime
Regional Air Quality Plan		
Discharge permit	To discharge dust to air from stockpiling and handling gravel, sand and soil	Rule 16: consent being sought as precautionary measure to authorise unanticipated dust emissions
Freshwater NES		
	Vegetation clearance within, or within a 10m setback from, a natural inland wetland	Section 45D(1)
	Earthworks within, or within a 10m setback from, a natural inland wetland	Section 45D(2)
	Earthworks outside a 10m, but within a 100m setback, from a natural inland wetland that will result in partial or complete drainage of the wetland	Section 45D(3)
	Diversion of water within, or within a 100m setback from, a natural inland wetland	Section 42D(4)

	Discharge of water into water within, or within 100m setback from, a natural inland wetland	Section 45D(5)
	Reclamation of bed of rivers	Section 57

^For completeness it is noted that the mining activity relies on a number of permitted activity rules in the district and regional plans.
*Rule under appeal.

2.2 The application relates to the following land parcels:

Legal description
Section 4-6 Block V Waiwhero Survey District contained in Record of Title WS2D/1085
Section 7-8 Block V Waiwhero Survey District contained in Record of Title WS2D/855
Lot 1 DP 3548 and Rural Section 2927 contained in Record of Title WS8C/143
Part Section 2928 Block V Waiwhero Survey District and Defined on DP 764 contained in Record of Title WS1A/1166
Lot 1 DP 2719 and Lot 2 DP 339364 contained in Record of Title 161879
Section 2929 and Part Section 2634 – 2635 Block V Waiwhero Survey District and defined on DP 764 contained in Record of Title WS2A/228
Rural Section 2930 contained in Record of Title WS1B/293
Rural Section 2931,2932,2933,3316 and Part Rural Section 2639 contained in Record of Title WS8B/528
Section 4033 Block V Waiwhero Survey District contained in Record of Title WS1A/892
Part Section 5 Block IX Waiwhero Survey District contained in Record of Title WS2B/591
Lot 1 DP 406050 contained in Record of Title 486401.

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3. Initial works

3.1 Initial works on the site will be undertaken prior to the commencement of any mining. These include:

(a) Bunding, planting (associated with noise bunds) and fencing; and
(b) Establishment of the mine starter pit.

3.2 A mine starter pit is required in each of the three sections to establish the initial dredge pond in which the floating dredge will operate. Separate starter pits are necessary because the sections are divided by physical features that will not be disturbed i.e. Granite Creek separates Sections 1 and 2, and Cargill Road separates Sections 2 and 3. These starter pits enable the dredge to begin operations independently within each section.

3.3 The floating dredge will be transported to each mine starter pit using conventional mining equipment transport methods in order to avoid adverse effects on the surrounding environment. This approach is consistent with the methodology proposed for transporting the dredge to the Application area and for its initial assembly.

3.4 The mine starter pit will be developed by excavating into the water table. An area of approximately 100m wide x 300m long, and up to 10m deep will be excavated using an excavator and trucks, removing approximately 270,000m^3 of material. This size allows for:

(a) A dredge pond (mine void) of approximately 100m x 100m;

(b) A 100m x 50m area behind the dredge for the deposition of tailings following processing; and

(c) A 100m x 100m area in front of the dredge pond at various stages of excavation, ready to be mined.

3.5 The first mine starter pit will be located in Section 1: Granite Creek North. Material extracted from the starter pit will be used for the construction of the noise control bunds adjacent to Lot 2 DP2178 and another near Warren Road, located along the eastern boundary. Both bunds will be approximately 3m high with a 4.8m crest. The Warren Road bund will extend approximately 280m. Constructing the bunds at this early stage enables associated planting to be carried out in advance and allows time for vegetation to establish. The location of the starter pit is shown in **Plan D**. The construction of both the starter pit and the Section 1: Granite Creek North bunds are anticipated to take approximately two months.

3.6 A similar approach will be taken for Sections 2 and 3, with a mine starter pit excavated prior to the commencement of mining in each section. For Section 2, material excavated from the starter pit will be used to construct an 'L-shaped' noise control bund on the northern side of Cargill Road. For Section 3, material excavated from the starter pit will be used to construct a noise control bund along the southern side of Cargill Road near 101 Cargill Road. Both bunds will be approximately 3m high with a 4.8m crest.

3.7 The location of the noise bunds are shown in **Plan E**. Any excess material not required for bund construction will be stockpiled for future processing and rehabilitation.

4. Indicative mining sequence and setbacks

4.1 Following construction of the mine starter pit, the dredge will extract ore in strips. The indicative mining sequence, showing the anticipated pattern and extent of mining over time, is shown in **Plan D**. Mining will generally progress in a north/ south direction, although there will be some mining in an east/west direction where the dredge turns to commence a new strip. **Plan D** also shows the location of each mine starter pit.

4.2 The indicative mine path is influenced by both ore grade distribution and the long-term rehabilitation of the site. Commencing mining in areas with higher ore grades provides an earlier return on investment for the company. Mining from the western (coastal) side and progressing eastward allows previously mined areas to be progressively rehabilitated back to existing ground levels while maintaining natural drainage gradients towards the coast. Land on the western side of the site will be rehabilitated to existing ground levels.

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4.3 As mining advances inland, ground levels will be progressively lowered contributing to the formation of a constructed wetland as part of the final landform across Sections 1 and 2 (Stages 1 and 2). To achieve the post-mining contours across all three Sections (Stages), material will be sourced from areas outside the mining disturbance area but within the wider application boundary. Approximately 110 hectares within the application area provide a readily accessible source of fill material. These areas will be selectively cut and regraded, with suitable material transferred over short haul distances, typically within approximately 100m, using bulldozer "cut and carry" methods. This material will be progressively redistributed into backfilled mining areas to recontour the landform, achieve stable final ground levels and integrate rehabilitated areas with the surrounding landscape.

4.4 Each mining strip will be approximately 100m wide and excavated to a depth of 10m below ground level noting that the depth of mining is dependent on the ore distribution. The coloured strips on Plan D represent the expected extent of mining for each year. The total disturbed land area at any one time will be 16ha. Disturbed land means the land within the application area that has been directly affected by mining or associated activities, including areas subject to vegetation disturbance, topsoil stripping, excavation and active mining in the mining void, tailings deposition, overburden placement, bund construction or areas undergoing progressive rehabilitation prior to the re-establishment of stable landform and 80% vegetative cover.

4.5 The dredge is expected to progress at an average rate of approximately 2,200 metres per year or approximately 166 metres per month or 6 metres per day (based on 26 working days in a month). This rate will yield 2,000,000 tonnes of raw material per year and is subject to variation depending on the depth of the ore body, the average grade of the ore encountered and the need to ensure that the total disturbed area for mining is no more than 16ha. Weather conditions can impact progressive rehabilitation, i.e., influencing the rate of growth of vegetative cover (see Section 7 for progressive rehabilitation and vegetation cover).

4.6 It is proposed to set mining back from key environmental features and boundaries as follows:

(a) 20m from the consent boundary;
(b) 20m from Granite Creek;
(c) 20m from Fagan Creek;
(d) 50m from Mean High Water Springs (MHWS);
(e) 20m from the proposed SNA PUN-049, which is adjacent to Section 2 (Granite Creek South);
(f) 20m from all private property boundaries not within the consent area; and
(g) 200m from dwellings other than where noise bunds are proposed.

4.7 These setbacks are shown on **Plan F**.

5. Mining methodology

5.1 Once the mine starter pit has been constructed, the following steps will be undertaken to enable the extraction of ore:

(a) Removal of pasture, small areas of farm vegetation and wildlife checks;
(b) Stripping of topsoil and overburden;
(c) Diversion of streams and drains;

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(d) Extraction of run of mine material;
(e) Initial screening of run of mine material and deposit of waste material;
(f) Pumping of run of mine material to WCP.

5.2 This process is illustrated by **Figures 1** and **2** below and discussed in detail in the following sections.

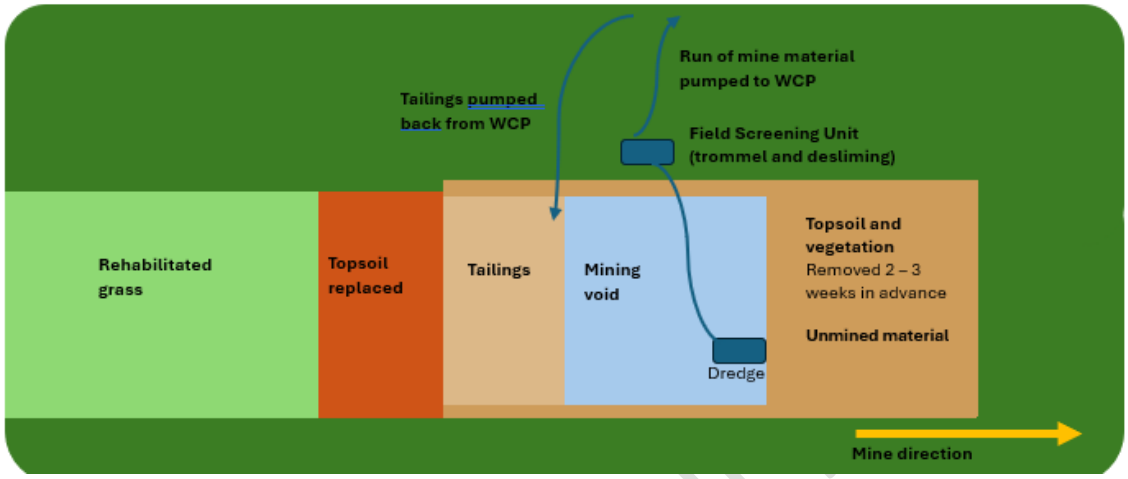

Figure 1: Schematic representation of the mining methodology in plan view

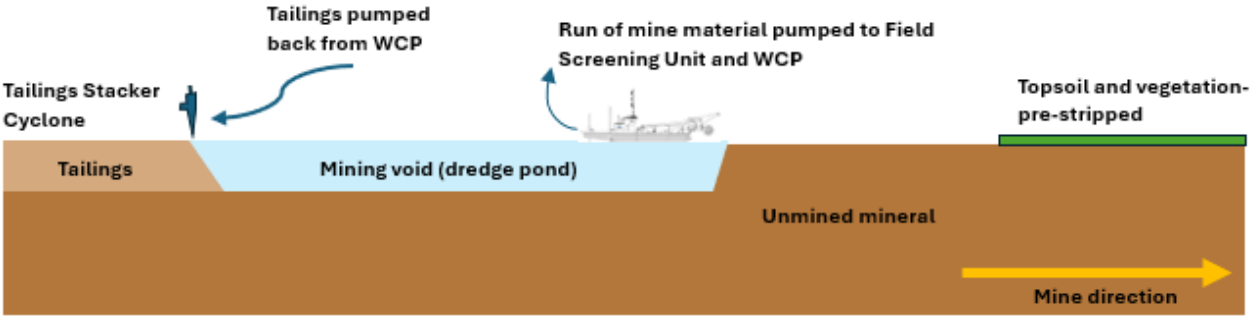

Figure 2: Schematic representation of the mining methodology in profile view

Archaeological Assessment

5.2 An archaeological assessment of the SB has been carried out. The SB was extensively dredged and modified in the 1930's and 1940's and then humped and hollowed for farming purposes. There are two recorded archaeological sites (find spots) within the mining disturbance area. The artefacts from both find spots have been removed and there is no evidence that further features or deposits relating to the site remain in situ. Earthworks on site will proceed under an archaeological authority.

Vegetation removal and wildlife checks

5.3 There are small areas of vegetation located around some creeks, drains and former dredge ponds, which will need to be removed at the same time as topsoil is removed (i.e., 2 – 3 weeks prior to mining). Some of that vegetation has been identified as potential habitat for

lizards. In addition, open pasture can potentially be used by breeding birds. **Plan G** shows the waterbodies on site.

5.4 It is proposed to undertake regular surveys of areas scheduled for mining before and during the breeding season to identify any breeding behaviour in the area. Where those surveys identify that nesting is possible, birds will be discouraged from establishing nests through methods such as walkovers, visual cues, audible bird scarers and machinery placement. These actions will be undertaken more frequently and at a greater distance from the mining front than in traditional mining operations, reflecting the operational requirements and movement patterns of the floating dredge. Where monitoring identifies the presence of Kororā (little blue penguin), relocatable fencing will be erected around the active mining area (including stripped area, mining void, tailings deposition area and contoured land awaiting resowing) to prevent penguin access and minimise risk of harm.

5.5 Lizard monitoring will be undertaken by a suitably qualified ecologist prior to mining an area of potential lizard habitat. If lizards are confirmed to be present, it is proposed to capture and relocate the lizards to suitable habitat as close as practicable to the site, but outside the mining disturbance area.

5.6 Prior to the commencement of any stream diversion or streamworks activities, native freshwater fish present within affected watercourses or wetland habitats will be salvaged and relocated. Similar to any lizards found, salvaged fish will be relocated to suitable habitat as close as practicable to the site but outside the mining disturbance area.

5.7 Once wildlife (if any) has been appropriately managed, any vegetation useful for rehabilitation will be removed. Where it can be, vegetation will be transferred and used as part of the progressive rehabilitation in the planting around creek mouths, diverted creeks or the constructed wetland.

Topsoil and overburden stripping

5.8 Once vegetation has been removed, topsoil (to approximately 0.2 - 0.6m deep) and overburden will be removed 2 – 3 weeks prior to mining, using an 85-tonne excavator and 40 tonne articulated trucks. The area of topsoil and overburden stripping is shown in **Figure 1** above.

5.9 Some of the removed material will be used to create small 1m high safety bunds (to prevent vehicles from driving into the mining void and provide stormwater control) along either side of the mining void. The mining void is the area comprising the dredge pond, the area behind the dredge pond for deposit of tailings after processing, and the area in front of the dredge pond from which run of mine material is being extracted. The remainder of the material will be used for rehabilitation. Initially, that material will be stockpiled for later use, but once mining commences fully, it will be trucked to the rear of the mining void to be used as part of the progressive rehabilitation. The safety bunds provide the separation between stormwater and mine water (mine water being water that is being discharged back into the mining void).

5.10 The total area stripped of topsoil and overburden in advance of mining will be approximately 100m x 100m.

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Stream diversions/ removal of drains

5.11 Diversions to, and reconstruction of the existing creeks will be required to enable mining Drainage channels across the site will be diverted to enable mining, and will be reconstructed where required to maintain catchment drainage patterns.

5.11 The specific creeks requiring diversion are shown in **Plan G** and are:

(a) Northern Creek;
(b) Central Creek;
(c) Clarke Creek;
(d) Wasabi Creek; and
(e) Southern Creek.

5.12 Productive farming practices have resulted in a network of drainage channels developed across the site. As mining progresses, these drains will be diverted to avoid the active mining area.

5.13 Little Granite Creek runs along the eastern boundary of the site before joining Granite Creek. These two creeks, Little Granite Creek and Granite Creek, will remain undisturbed and are not proposed to be diverted as part of the mining operation. Canoe Creek and Fagan Creek will also remain unaffected by the activity.

5.14 The diversion methodology differs for each creek or artificial drain depending on their orientation, sequence of mining activities and future purpose (in regards to artificial drains these may be retired or a new 'creek' constructed to manage drainage).

(a) North–south oriented creeks and drains will be diverted into a previously mined area before mining reaches the creek or drain (except where mining is adjacent to the coastal setback boundary). This may require adjustments (widening or narrowing) of the mine path to facilitate this. A permanent reconstructed channel will be built in advance as part of the rehabilitation of the mined land, and the flow will be redirected into it in a single 'livening' event. Refer **Figure 3** for further detail.

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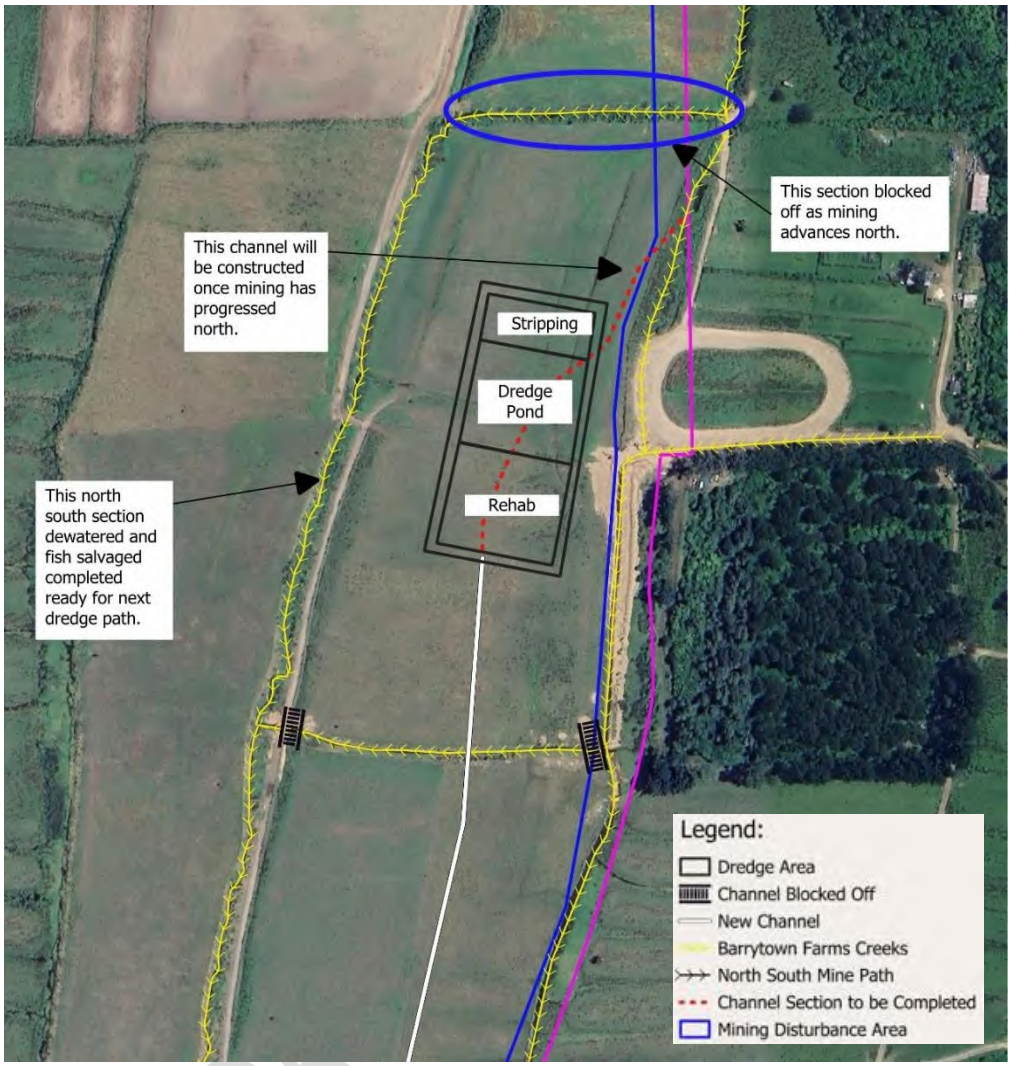

Figure 3: Diversion methodology for north south waterbodies

(b) East–west oriented creeks and drains will be diverted into previously mined areas (behind the mining void) and into the adjacent mine path (to the east as mining moves inland), prior to mining progressing through the creek or drain's existing alignment. This requires a temporary diversion of the creek or drain around the active mining area. Once mining has advanced beyond the alignment, a permanent reconstructed channel can be constructed and the creek, and where required drain, can be reinstated.

Creeks and drains will likely be disturbed several times, with temporary diversions occurring each time the active mining area intersects these waterbodies, potentially once per year for up to 3 months at a time per waterbody. Diverting the creek or drain around two sections of mine path at a time reduces the number of diversions required. Refer **Figure 4** for further detail.

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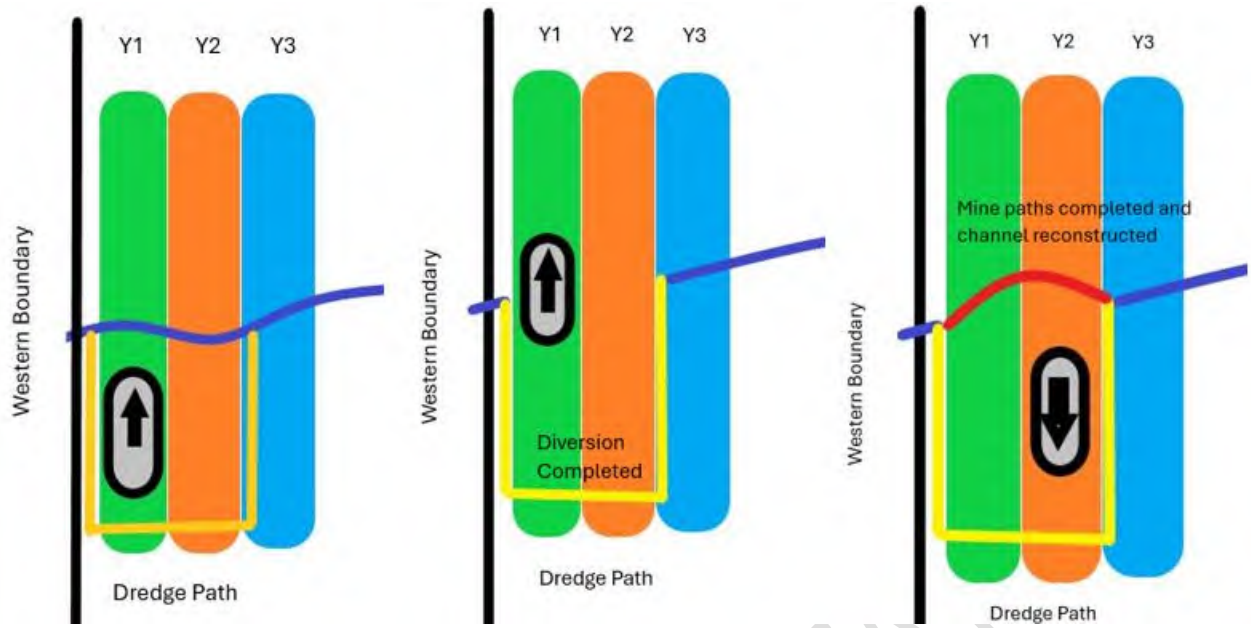

As the dredge approaches the creek or drain, a temporary diversion (shown in yellow) is constructed behind the mining void.

The creek or drain is then diverted into this temporary channel, allowing the dredge to continue along its planned path.

Once the mining void has progressed beyond the proposed reconstructed alignment, the diversion is redirected into the newly rehabilitated channel (shown in red).

Figure 4: Diversion methodology for east west waterbodies

5.15 Fish relocation will be undertaken onsite as part of the diversion process as specified in 4.7.

5.16 The five creeks that will be diverted and mined are Northern Creek, Central Creek, Clarke Creek, Wasabi Creek and Southern Creek. Each of these creeks will be reinstated during progressive rehabilitation. **Table 1** identifies the creeks that are to be diverted, and their pre-mining indicative lengths. New creeks will be constructed to ensure no loss of extent, and ensuring the minimum extent outlined in **Table 1** is achieved. The diversion methodology to be applied has also been identified.

5.17 Some of the original artificial drainage channels may be reinstated, particularly if land contouring alone does not provide sufficient drainage. Creeks and drains will be connected to the constructed wetland area or re-established natural creek systems to support site hydrology and ecological function.

Table 1: Creek extent pre and post mining

Creek	Length pre-mining (based on continually or intermittent flow extent)	Diversion methodology to be applied
Northern Creek	1,178m	East West
Central Creek	764m	East West
Clarke Creek	681m	North South
Wasabi Creek	733m	North South / East West
Southern Creek	469m	East West

Extraction of run of mine material

5.18 Following the removal of topsoil and overburden, the floating dredge can extract the run of mine material (**ROM**) from the newly stripped area from within the mine void without the use of other machinery.

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5.19 The floating dredge will sit in a 1ha dredge pond, located in the mining void. The maximum depth of the mining void is 10m, which will maintain a natural water level approximating the ambient water table height. A picture of the type of floating dredge that will be used in the Project is shown in **Figure 5** below.

Figure 5: Floating dredge proposed to be used

5.20 The dredge has a suction cutter at the end of the dredge arm. The suction cutter will excavate the pit face by cutting into the bank and breaking down consolidated material. The loosened material will be drawn in through the suction head below water level, immediately mixed with water taken from the dredge pond to form a slurry and pumped to the field screening unit within the safety bund area.

5.21 The dredge is capable of precise cutting and will cut slopes at approximately 1 vertical to 3 horizontal (1V:3H), which is consistent with industry standards for cutter suction dredging and provides for stable batters. The presence of water in the mining void provides sufficient pressure to ensure slope stability, as does the progressive tails deposition in the rear of the mining void. Safety bunds around the outside of the mining void will ensure that heavy machinery does not operate on the edge of the mining void, creating pressure on the slopes.

Initial screening of run of mine material and deposit of initial waste materials

5.22 The Field Screening Unit undertakes the initial screening of the ROM. Slurry passes through a trommel (a rotating cylindrical screen), which separates larger, coarser materials and debris (+2mm) from finer particles. Oversized material captured by the trommel is removed from the process stream to prevent damage or blockages in downstream equipment.

5.23 The slurry then enters the desliming circuit, which removes very fine silt and clay particles (referred to, when mixed with water, as "slimes"). By eliminating these particles, the desliming circuit improves the recovery of valuable heavy minerals and reduces the load on the WCP.

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5.24 The large reject material from the trommel and the slimes will be returned to the rear of the mining void to be used in the progressive rehabilitation (see Section 7 for further discussion).

5.25 After screening and desliming, ROM is pumped as a slurry to the WCP for further processing.

6. Processing of run of mine material and transportation to market

6.1 Authorisations for further processing and transport are not being sought through this Fast-track application, as they have already been granted (or applications are being processed), as outlined in Sections 1.2 – 1.5. The resource consents and other permissions that have been obtained provide for a full mine to market process that results in finished product being exported to markets around the world. The following information is provided to explain the overall processing methodology and to place the proposed activities within the full operational context.

6.2 Following extraction, ROM will be processed in two stages. The first stage of processing will be undertaken on site at the WCP to extract Heavy Mineral Concentrate (HMC). The HMC will then be transported by truck to the MSP at Rapahoe to undergo the second stage of processing.

6.3 Consent for the MSP at Rapahoe was granted by the Grey District Council in October 2025.

6.4 Consent from the Grey District Council for the establishment, operation and maintenance of the WCP and access road is currently being processed and is expected to be granted prior to lodgment of this application. Consent for the earthworks component of this activity was granted by the West Coast Regional Council in February 2026.

Stage 1 processing - WCP

6.5 Mined ore will be pumped as a slurry from the mining void to the WCP, a fixed processing facility that receives material from mining activities across the resource area. At the WCP, valuable heavy minerals are separated from sand and silt using a water-based gravity separation process. This produces three material streams: HMC, middles and tails ('middles' and 'tails' are referred to generically as 'tailings' in this application).

6.6 Tailings are returned to the mining void as slurry, while clean water is managed and reused within the process. The HMC is dewatered to 10-15%, temporarily stored and transported off site by heavy vehicle for further processing at the MSP at Rapahoe.

Stage 2 processing - MSP

6.7 Processing at the MSP enables the extraction of concentrated garnet and ilmenite products.

6.8 The MSP has been strategically located at Rapahoe to ensure proximity to rail where product will be transported in containers to Lyttleton or Timaru Port for export to global markets. Waste material from the MSP (which has come from the SB) will be transported by heavy vehicle back to the WCP at the SB. That material will be deposited within a bunker at the WCP before it is pumped back to the mining void as a slurry to be used to backfill the mine pit for rehabilitation.

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6.9 The MSP represents a critical component of the long-term viability and growth of the sand mining industry on the West Coast. The MSP provides significant value-add by enabling on-shore, and in-region, refinement of mineral products prior to export.

7 Management of processing water and stormwater

7.1 Water will be required for the processing of ROM at the WCP. Water used for processing, as well as stormwater captured on the WCP site, will be managed through a MWF located adjacent to the WCP.

7.2 The MWF will include lined treatment ponds and thickener tanks that enable sediment and fine particles to settle out of return water using biodegradable flocculants. Treated (clean) water will be recycled back into the processing system, while settled solids will be combined with tailings and returned to the mine pit as a slurry to support backfilling and rehabilitation.

7.3 The MWF is part of the ancillary infrastructure required to operate the WCP and will be authorised by the consent for the WCP.

Processing water

7.4 Processing water will be sourced from the existing water take location on the CB, unless further investigation identifies a practical alternative water source on the SB through future testing. Consent GDC-3154-23 / WCRC-2023-0046 authorises the abstraction of water for processing CB-mined material at the WCP for a 12 year duration. A new consent is being sought via this application to ensure the water take is available to the newly located WCP, and to support longer-term mining of the SB. It is proposed that the existing consent be surrendered as part of the grant of the new take. The approximate water take location on the CB is indicated on **Plan H**.

7.5 Water taken will be used to fill the ponds at the MWF, storing water for when it is required to be used for processing ROM at the WCP. The peak water take will occur when the WCP is restarted to process material from the SB or following maintenance or shutdowns. This is because the tanks and pipelines of the WCP must be filled with water prior to material being processed. During these periods, the full take of 63l/s will be required, likely over several days.

7.6 Once processing is underway, water demand will significantly decrease. Water is recycled and reused throughout the plant, reducing the need for a continuous fresh supply. Only intermittent top-ups will be required to offset the water that remains in the HMC, and therefore lost from the site. It is estimated that approximately 10-15% of water drawn from the bore will be retained in HMC. This makes up the largest water loss within the system.

7.7 To compensate, make-up water will be drawn down at an average rate of 9.5l/s for the duration of processing. In practice, make-up water will be taken in short bursts of typically 15-20 minutes at a time, two to three times per day, at the peak rate of 63l/s.

7.8 Tailings will be mixed with water to form a slurry to be pumped back to the mine void. Tailings will be deposited at the rear of the pit by cyclone and the water will re-enter the mine void and rejoin the surrounding hydrological system.

7.9 The slurry circuit (the pumping of ROM to the WCP and tailings back to the mine void, all undertaken as a slurry) is considered to have a largely neutral effect on the water level in the

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mining void. The water that returns with the tailings help maintain, or even increase, water levels in the void, offsetting any lowering of the water table caused by the removal of the slurry from the mine void.

7.10 The MWF is designed to treat and temporarily hold process water before it is recycled for use in the WCP. After processing, excess water is treated via a thickener tank, which serves as the primary treatment stage. Fines and suspended sediment are separated from the water in the thickener tank. This water then flows into the forebay and ponds for further settling and storage. A flocculant may be added to enhance the settlement of fine particles. Fines and slimes collected in the thickener tank and forebay are pumped back to the mining void and mixed with coarse tailings for use in rehabilitation. Clean water is recycled back into the WCP for reuse in mineral separation processes or for transporting tailings as a slurry back to the mining void.

7.11 There is no discharge from the MWF treatment ponds to any surrounding water bodies. The only discharge is to the mining void.

7.12 If necessary to maintain capacity in the MWF excess water may be pumped back into the mining void to dissipate naturally.

7.13 It is possible that dissolved metals could be liberated and mobilised because of the mechanical processes of mineral separation and sand and slimes deposition during backfilling of the worked excavation. Lime augmentation (i.e. lime dosing) of tailings and slimes at the time of emplacement within the void, and the inclusion of lime boulders in creek reconstruction will mitigate these effects. Both groundwater and surface water quality and quantity monitoring will be undertaken across the site as set out in the Water Management, Monitoring and Mitigation Plan.

Stormwater

7.14 Stormwater captured within the mining disturbance area will be contained on site by the safety bunds constructed on either side of the mining void. It will either be allowed to infiltrate into the sandy subsoils, or directed to discharge into the mining void where there is sufficient capacity for the water to assimilate into the ground water.

7.15 Stormwater generated in the WCP area, including runoff from roofs, hardstand areas, stockpiles, and processing surfaces, will be collected via a network of drains, bunds and sumps, and directed to the ponds at the MWF. To maintain operational capacity during high rainfall periods, treated stormwater may be pumped to the mining void to dissipate naturally.

8 Rehabilitation and mine closure

8.1 Rehabilitation of the SB will be undertaken in three stages:

(a) Mined land will be progressively rehabilitated as the mining void advances;
(b) Each section will be rehabilitated as it is completed and mining moves to the next section; and
(c) Final rehabilitation and mine closure will be undertaken once mining of the SB is fully completed.

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Progressive rehabilitation of mining void

8.2 The total area of disturbed land is proposed to be limited to 16ha within the SB at any one time, for the purposes of mitigating potential effects relating to dust, landscape, visual and sedimentation/ water quality.

8.3 The 16ha limitation for the mining area means that the site will be progressively rehabilitated by filling the mining void with waste material as mining advances, replacing topsoil and re-grassing the mined area. The 16ha limitation is proposed to only apply to those disturbed areas with less than 80% vegetative cover and mined land will be removed from the disturbed area calculation once that level of vegetative cover has been reached. The disturbed area limits include contingency for any periods of slow growth that may occur (e.g. during winter or a cold wet spring).

8.4 Rehabilitation of the mining void will take place at the same time as mining occurs and is expected to be completed within 12 months of the conclusion of mining in that location. The waste material (known as "tailings") produced by the initial screening of raw material at the Field Screening Unit will be pumped back into the rear of the mining void immediately. Any tailings from the WCP will also be pumped back and deposited at the rear of the mining void. Waste material from the MSP that has been transported back to the SB will also be pumped from the WCP to the mining void and deposited with the tailings to assist with rehabilitating the landform.

8.5 The tailings will be deposited at the rear of the mining void using dewatering cyclones which assist in separating water from solids to create a more stable land surface suitable for rehabilitation. The water separated from the tailings as they are dispersed is discharged back into the mining void.

8.6 The material to be returned to the excavated area includes un-mineralised sand, clay slimes, and gravel and rock greater than 2mm. Tailings will be allowed to naturally beach (spread) out. The cyclone will be moved as required to distribute the tailings evenly across the area.

8.7 Tailings will then be levelled and contoured, as per a surveyed final landform design, with the use of excavators and bulldozers ready to receive the pre-stripped overburden and topsoil. This topsoil and overburden, as well as material from outside the mining disturbance area within the wider application area and the bunds as they are retired, will be spread out and used as a growing medium for rehabilitation of the site. Once overburden and topsoil are replaced, the land will be re-vegetated with grass and other vegetation that was removed prior to mining, where possible and appropriate.

8.8 Initial vegetative cover will be established as soon as practicable (potentially using hydroseeding) to minimise any erosion potential. This will be followed by the establishment of longer term, permanent pasture species.

Progressive rehabilitation of each section

8.9 As the mining of each section is completed, the section will be rehabilitated to its final landform which includes a proposed wetland of approximately 51.7ha on the eastern boundary of Sections 1 and 2, which will be constructed in stages (addressed in Section 7.17 below).

8.10 Approximately 5.6 million tonnes (equivalent to 2.6 million cubic metres at a bulk density of 2.2 g/cm^3) of HMC will be removed from the mining disturbance area over the life of the

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project for further processing and export., To achieve the proposed post-mining contours, material will be sourced from areas located outside the mining disturbance area, from the higher terrace, to be used as fill to reconstruct the final landform. When balanced against the available redistribution material, the final change in landform equates to an average reduction in land height of approximately 0.63m across the entire 408ha consent area.

8.11 The western boundary will be returned to its current ground level to minimise any effects from coastal hazards. Restoring this area to its natural elevation maintains the existing buffer between the active coastal environment and the inland mined area and future farmland. This helps to ensure that the rehabilitated land is not at increased risk from coastal hazards such as erosion or ponding from storm surge events.

8.12 The site is naturally wet and exhibits poor drainage, despite the presence of a humped and hollowed landform and an established network of creeks and drains throughout the area. Following mining activities, the site will be rehabilitated to improve drainage and soil conditions, enabling its return to more productive farmland use.

8.13 The final landform will be contoured to slope towards reestablished creeks to improve drainage and ensure the future productive use of the site. The five diverted creeks (Northern Creek, Central Creek, Clarke Creek, Wasabi Creek and Southern Creek – refer section 4.16 – 4.17) will be reconstructed along more natural, meandering paths, as opposed to their straight and rectified channels, to enhance ecological and hydrological values while maintaining current catchment drainage patterns. Post mining creek extent will ensure no loss of extent or value. Some existing drains may be reinstated if contouring alone is insufficient. Some modified humping and hollowing will be incorporated, though it is intended to be less pronounced than the existing humping and hollowing, and will include the raising of the low areas (hollows) above the water table to reduce sediment and nutrient runoff from future farming activity providing long-term ecological benefits and improved drainage across the site.

8.14 Fences, internal farm roads, bridges and culverts will be reinstated as required.

8.15 The anticipated final land contour is illustrated in **Plan I**.

8.16 A Work Programme will be submitted to the Grey District Council and West Coast Regional Council annually, which will specify rehabilitation works to be undertaken in each 12-month period. This will include a summary of the rehabilitation completed during the previous 12 months. This is standard practice for mining activities on the West Coast.

Proposed wetland

8.17 The proposed wetland will be constructed in two stages as follows:

(a) The first stage of the wetland will be constructed on Section 1: Granite Creek North, north of Granite Creek and south of the WCP, following completion of Section 1;

(b) The second stage of the wetland will be constructed on Section 2: Granite Creek South, north of Cargill Road and south of Granite Creek, following completion of Section 2.

8.18 The new wetland will be established along the eastern boundary, planted in native species and fenced from stock.

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8.19 There will be an increase in the extent and integrity of wetland across the site due to the construction of the new wetland area. Indigenous biodiversity values are expected to increase at the site, including a net gain in wetland area and indigenous vegetation cover.

8.20 The proposed wetland is shown in **Plan J**.

Proposed planting

8.21 The Applicant has engaged Glasson Huxtable Landscape Architects to assess the potential landscape and visual amenity effects of the proposal. The Landscape Assessment identifies areas where current vegetation should be retained and additional planting, associated with the restoration of creeks and construction of the wetland area, is to be undertaken. These plantings have been designed both for ecological and landscape mitigation for the project and will have long term ecological benefits in terms of stream health and habitat for indigenous species.

8.22 Due to the distance of the mining activity from public viewpoints for the majority of its operation, bunding and planting works are restricted to managing the effects of noise. There are four noise bunds also proposed as set out in Section 7.23. Bunds will have an inward facing grassed slope with dense planting on the crest and outward facing slope.

8.23 Planting and bunding includes:

(a) Lot 2 DP2178 bund - 3m high with a 4.8m wide crest (24m width) approximately 500m long;

(b) Warren Road bund – 3m high with a 4.8m wide crest (24m width) approximately 900m long;

(c) Cargill Road bund - at the eastern edge of the site stretching north – 3m high with a 4.8m crest (24m width) approximately 460m long;

(d) 101 Cargill Road bund – on the western boundary - 3m high with a 4.8m wide crest (24m width) approximately 440m long.

8.24 Retention of key vegetation has been identified at:

(a) Planting clusters near the WCP;

(b) Planting clusters along the eastern application area boundary north of Cargill Road;

(c) Planting patch adjacent to 101 Cargill Road; and

(d) Riparian vegetation adjacent to Granite Creek;

Closure sequence

8.25 Final rehabilitation of Section 3 (Cargill Road) will occur following the completion of mining activities in this area.

8.26 As progressive rehabilitation will be undertaken across the SB there will be limited final contouring and blending required once mining is complete. Any final contouring/blending at the southern end of the mining disturbance area will use material from within the wider application area as required.

9 Plant and machinery

9.1 The following machinery listed in **Table 2** is likely to be required to undertake mining, pumping and rehabilitation of the site (although specific models may differ).

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Table 2: Mining machinery list

Type	Supplier	Model	Number
Bucketwheel Cutter Suction Dredge	Neumann Contractors	Series 350	1
Dozer	Komatsu	D71PX-24	2
Grader	Komatsu	GD655-7	1
Integrated Tool Carrier	Hitachi	ZW220-5	3
Artic 6wd 45 Truck	Hitachi	B45E	3
Excavator (Long stick)	Hitachi	ZX890LCH	2
Excavator (30 or 40 tonne)	Hitachi	ZX345USLC	2
Field Screening Unit (trommel)	Bespoke		1

9.2 Additional mining equipment and vehicles will be used on site, including a variety of pumps (including land-based, floating and submersible) and light 4-wheel drive vehicles for the transport of mining personnel.

10 Site operation

10.1 This section describes how the site will be operated, in terms of hours of operation, site configuration, transport, lighting, dust management and hazardous substances use.

Hours of operation

10.2 Mining activities associated with the extraction of material will be undertaken during daylight hours only, consistent with the existing consent granted for the CB.

10.3 Hours of daylight are between 30 minutes before sunrise to 30 minutes after sunset[1].

10.4 Mining shall not occur between the hours of 0600 and 0700 within 500m of the dwellings located at:

(a) Lot 2 DP2178;

(b) 37, 41, 43 and 50 Warren Road;

(c) 64, 86 and 101 Cargill Road.

10.5 There will be no mining on Sundays.

Site configuration

10.6 Access tracks will be required within the mining area. These will be formed to provide light vehicle and machinery access for the preparation, mining and rehabilitation of various areas as mining progresses. These access tracks will move as mining progresses.

10.7 It is proposed to retain the existing access points for farming activities for the duration of the mining activity, to ensure that any ongoing farming traffic is kept separate from the mine traffic.

Vehicle movements

10.8 There are 57 full time staff proposed to be employed across the WCP and wider mine site at the SB. This includes 18 staff to be employed specifically for the mining activity.

[1] *Sunrise and sunset times can be found at* https://www.sunrise-and-sunset.com/en/sun/new-zealand/westport/2023/june

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10.9 Vehicle movements associated with mining activities are largely generated by the existence of the WCP adjacent to the SB. They will therefore be authorised by the WCP consent.

Lighting

10.10 Due to activities taking place during daylight hours only, only minimal lighting will be required on the mine site and at the mining void.

10.11 There will be limited fixed lighting in the mine area, which may include lighting around the pump to allow for the pump circuit to be checked overnight. Any fixed lighting in the mine area will be shrouded and adhere to the principles outlined below.

10.12 Lighting will not exceed 2.0 lux spill (horizontal and vertical) onto any adjoining property, measured at any point more than 2m inside the boundary of the adjoining property or the closest window on the adjoining property (whichever is the closest).

10.13 All lighting on site will adhere to the Australian Government's National Light Pollution Guidelines for Wildlife January 2023 (or subsequent revision), including but not limited to:

(a) Utilising the Seabird Light Mitigation Toolbox in Appendix G – Seabirds (Schedule 4);
(b) All fixed lighting shall be pointed downward and shielded to avoid light spill, with a lighting temperature of no more than 2000K, and be filtered to reduce blue and violet wavelengths;
(c) Lights shall only illuminate the object or area intended;
(d) Fixed lights shall be mounted as close to the ground as practicable;
(e) External lighting shall use the lowest intensity lighting as possible, while ensuring compliance with workplace health and safety requirements;
(f) External lighting shall be equipped with light minimising technology, including motion sensors or timers;
(g) Mobile lighting within the mine site will adhere to the above principles, including the dipping of headlights of vehicles operating on site.

10.14 Adherence to the above standards will minimise light spill, thereby preserving the natural character and dark night sky of the coastal environment. The measures proposed will also assist in avoiding the risk of adverse effects on the Westland Petrel Colony located approximately 5.5km north of the WCP location. These standards are consistent with the conditions of consent granted for the CB.

Noise

10.15 Noise will be generated from the activities at the mining void including excavators and front end loaders to strip top soil and overburden, trucks to move material to the rear of the site, the dredge and field screening unit and the spreading of tails from the cyclone.

10.16 Noise generation has been taken into account in the design of the project. Hours of operation control the activity each day. Earthworks near dwellings will be minimised, and noise mitigation bunds will be constructed at four locations as outlined in Section 7.23.

10.17 The site will operate in accordance with a Noise Management Plan, which sets out the management techniques to be applied to ensure that the site operates in accordance with best practice and unnecessary noise generation is minimised by:

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(a) Exhaust silencers fitted to all mobile plant;
(b) Power from the grid used in preference to diesel generators where possible;
(c) Vehicles and equipment maintained to avoid unnecessary noise and vibration;
(d) Trucking contractor behaviour expectations including following speed limit; restrictions, no unnecessary sounding of horns or revving of engines, avoidance of engine braking, vehicles to be properly maintained;
(e) Metal to metal contact avoided during the loading of trucks;
(f) No tonal reversing alarms;
(g) Site vehicles to follow speed limits and drive in consistent manner, no amplified music permitted inside vehicle cabs, horns to be used in emergency only;
(h) Access road and working surface maintained free from potholes and corrugations.

10.18 The following noise limits are proposed to apply at or within the notional boundary of any dwelling existing at the date consent is granted on any other site, except in relation to the four dwellings on Warren Road, three dwellings on Cargill Road and at Lot 2 DP2178:

(a) Daytime (0700-2200): 55 dB LAeq (15 min)
(b) Night-time (2200-0700): 45 dB LAeq (15 min) and 75 dB LAFmax

when measured and assessed in accordance with the latest New Zealand noise standards: NZS 6801:2008 "Acoustics – Measurement of environmental sound" and NZS 6802:2008 "Acoustics -Environmental Noise".

10.19 At some locations, extraction of ore can proceed between 0600 and 0700hrs (classified as night-time under the District Plan) while still complying with the 45 dB L_{Aeq} noise limit.

Dust Management

10.20 Some activities proposed to be undertaken have the potential to generate dust emissions. While the application site is within a high rainfall area, there are periods of dry weather.

10.21 As the mining activity is a wet process dust generating activities will be limited to times of overburden removal and rehabilitation and vehicle movements on site. These activities are intermittent (not always continuous) and can be managed with techniques outlined in the Dust Management Plan. Dust will be managed via visual inspections, use of water carts and other dust suppression techniques as required.

10.22 The Applicant has installed dust monitors on the perimeter of the mine site. These monitoring stations will remain in place for the duration of mining activities on site.

Hazardous substances use, storage and management

10.23 The refuelling of machinery will be undertaken on site using a mobile fuel tanker with a centralised fuel store located at the WCP (40,000 litres). The proposed above ground tank will be authorised by the WCP consent.

10.24 Re-fuelling will be completed under direct supervision of the machine operator to minimise the risk of spills occurring. Refuelling will occur at least 20m away from waterbodies.

10.25 Mechanical repairs and servicing will occur at the WCP area. In the event of major mechanical break-down, machines may be taken to an off-site workshop. Spill kits and procedures will be available on site in the event of a fuel or oil spill occurring.

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10.26 All waste oil and fuel containers will be removed from the site promptly.

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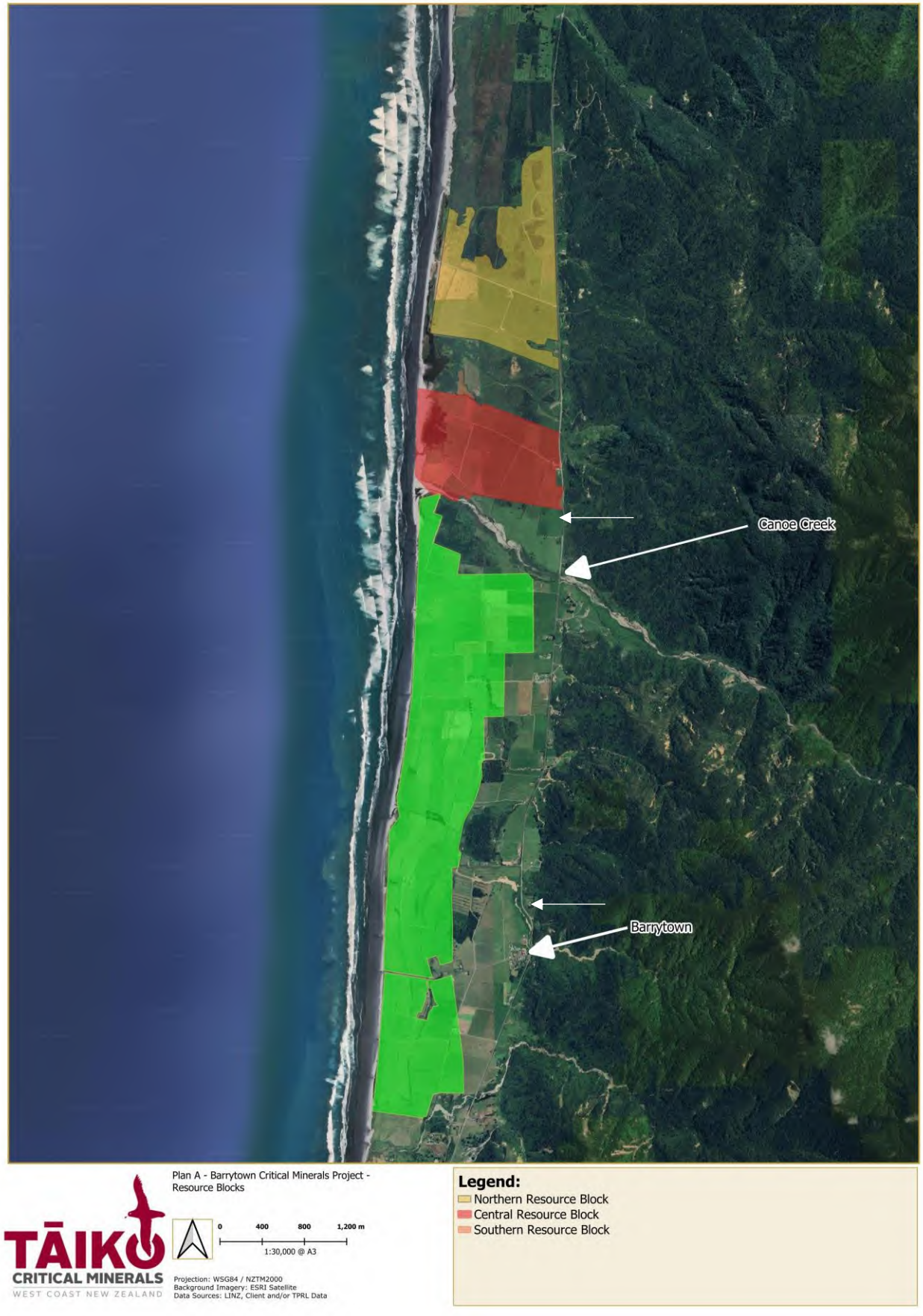
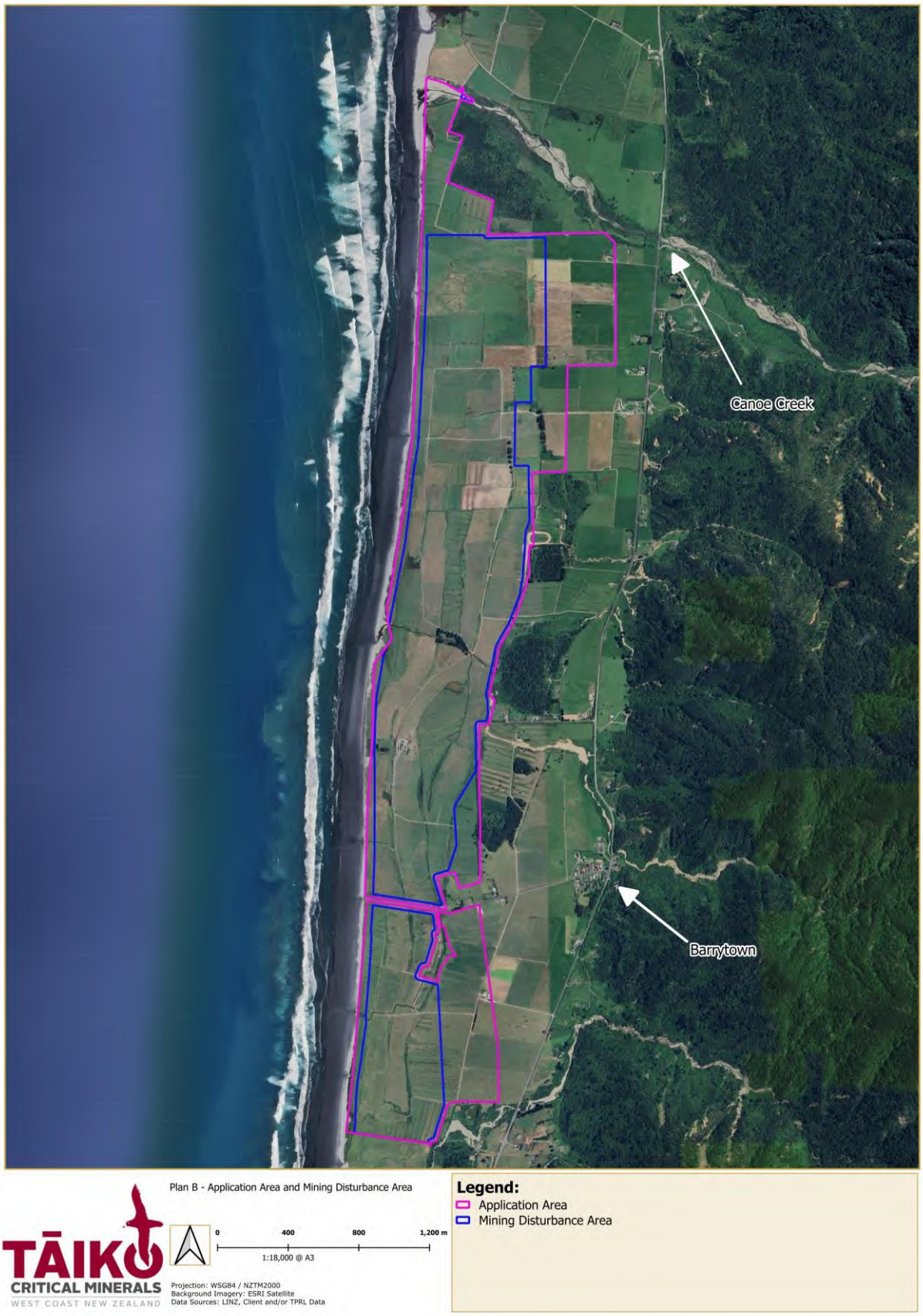
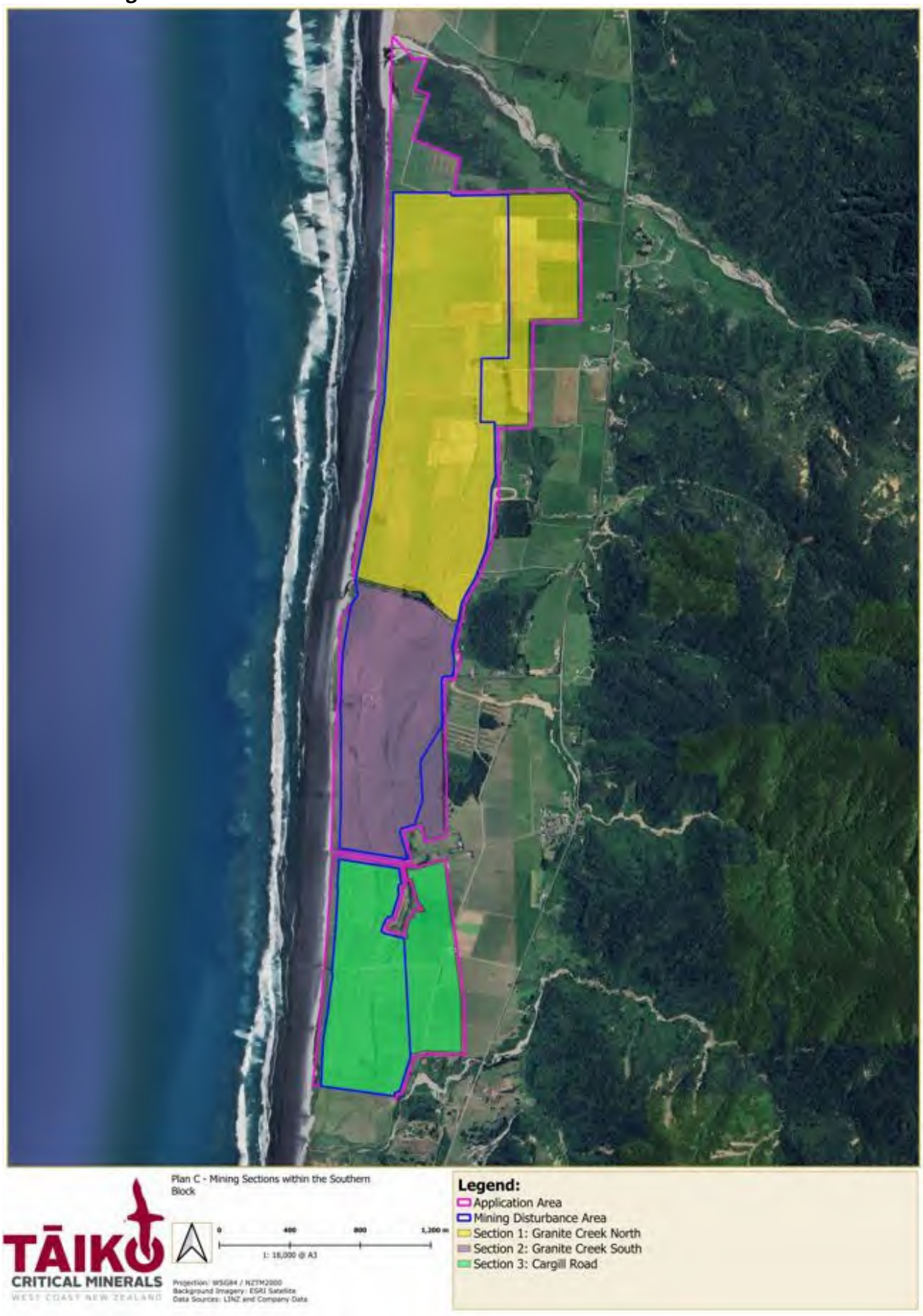
Plan A: Barrytown Critical Minerals Project – Resource Blocks



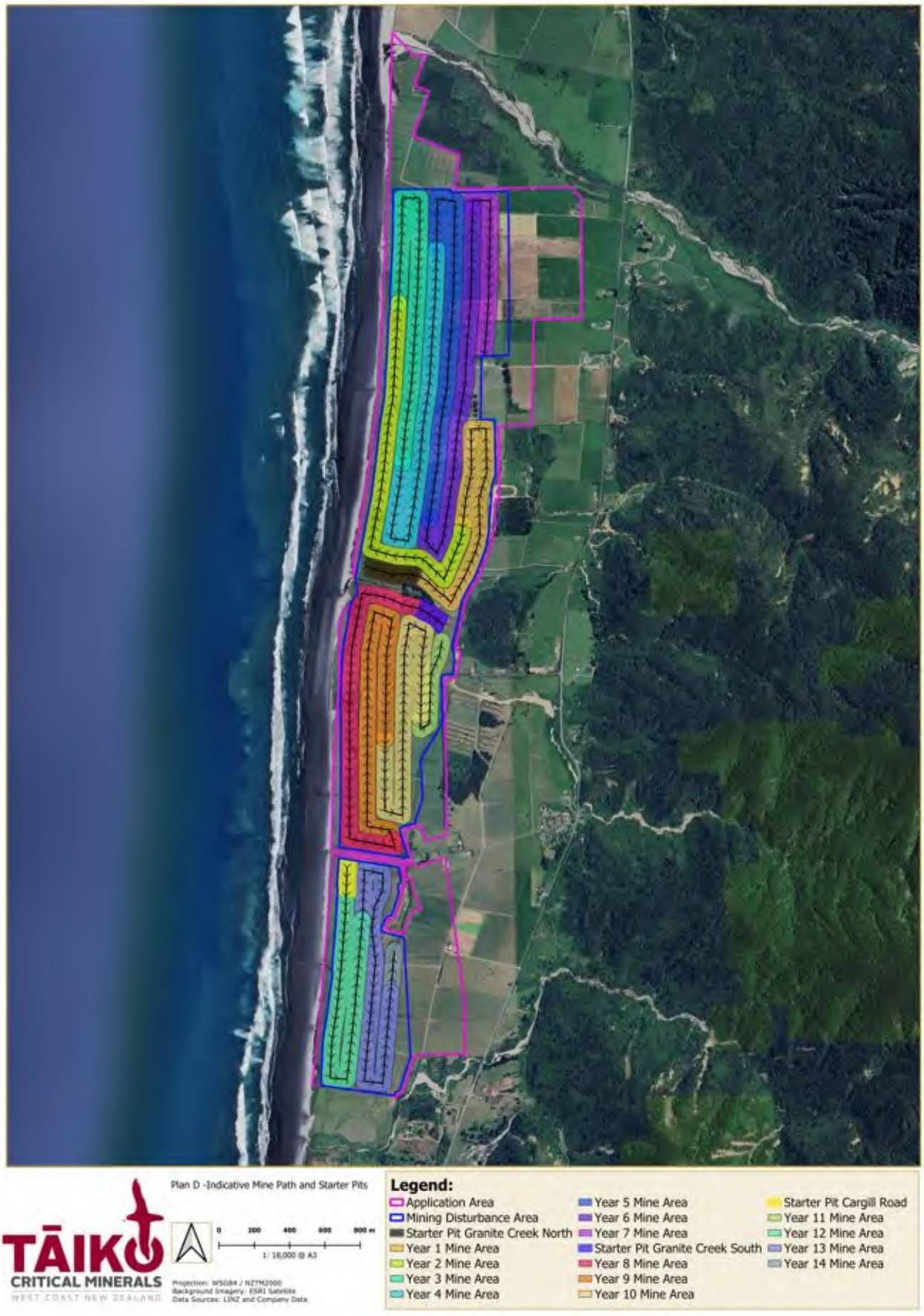
Plan B: Southern Block Application Area and Proposed Mining Disturbance Area



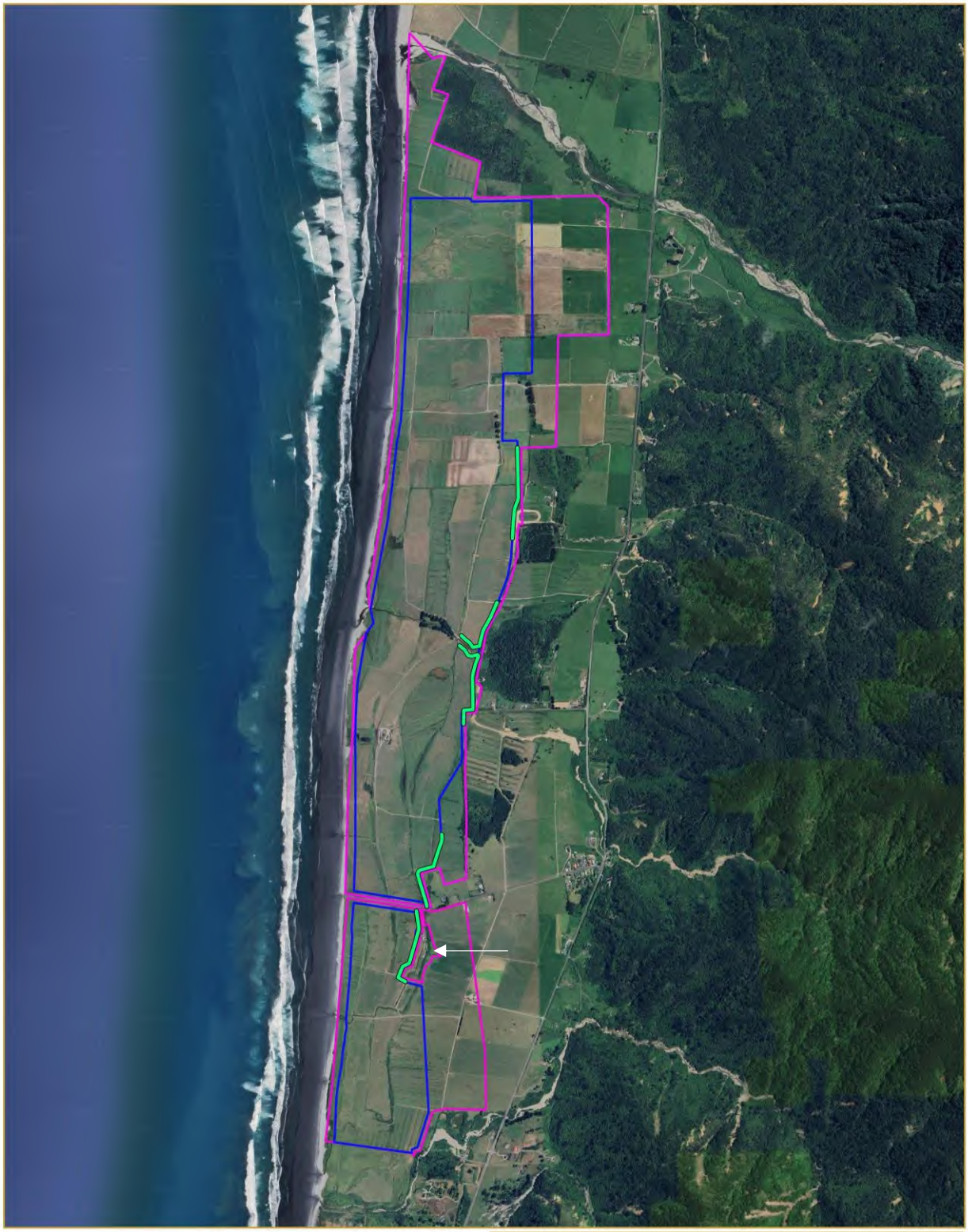
Plan C: Mining Sections within the Southern Block



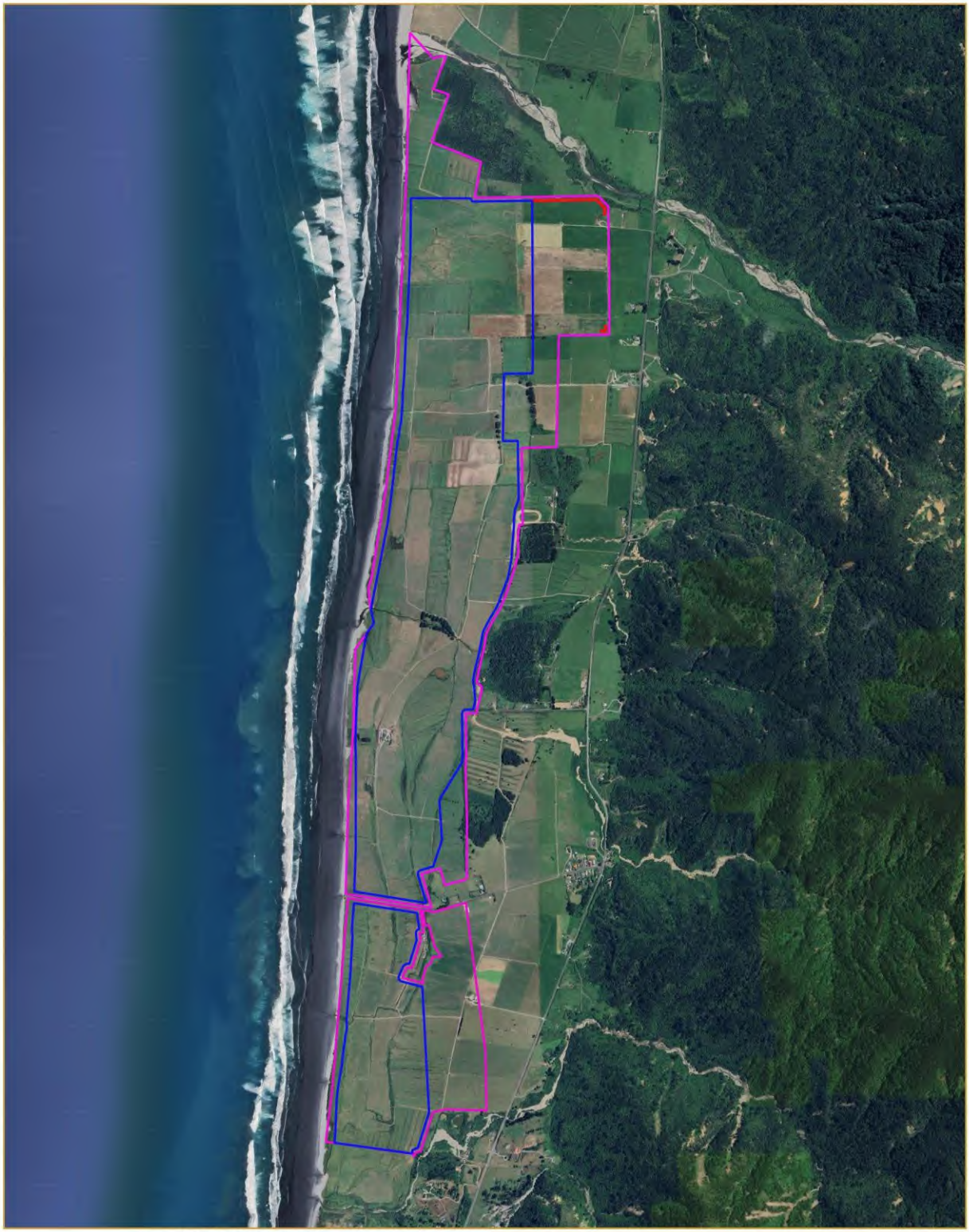
Plan D: Indicative Mine Path Including Mine Starter Pits



Plan E: Noise Bunds



Plan F: Setbacks From Key Environmental Features



Plan F -Setbacks from Key Environmental Features

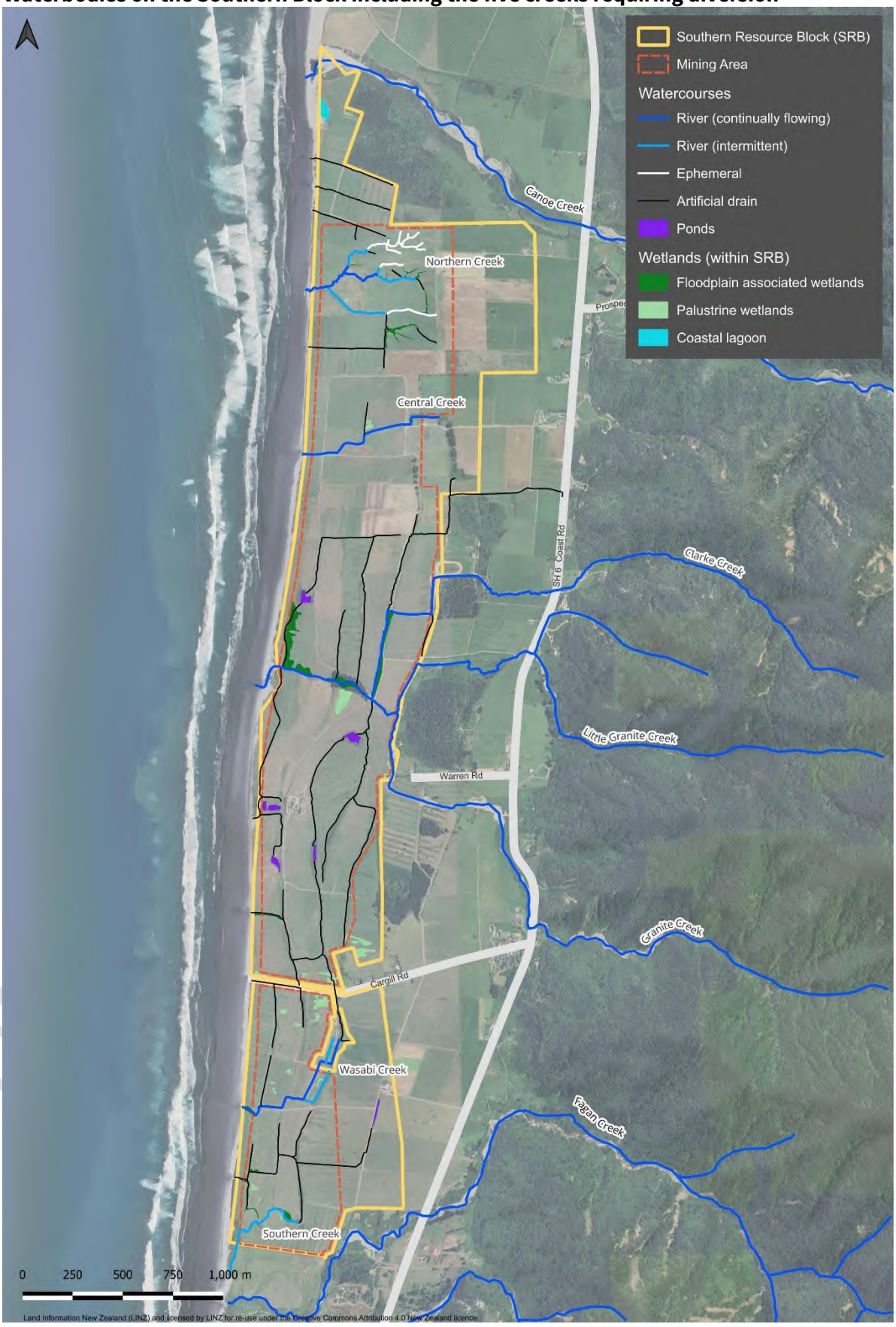
0 400 800 1,200 m

1: 18,000 @ A3

Projection: WSG84 / NZTM2000
Background Imagery: ESRI Satellite
Data Sources: LINZ and Company Data

Legend:
- Application Area
- Mining Disturbance Area
- Northern Neighbour Buffer

Plan G: Waterbodies on the Southern Block including the five creeks requiring diversion



Plan H: Location of Water Take

Plan H - Location of Water take

0 200 400 600 m

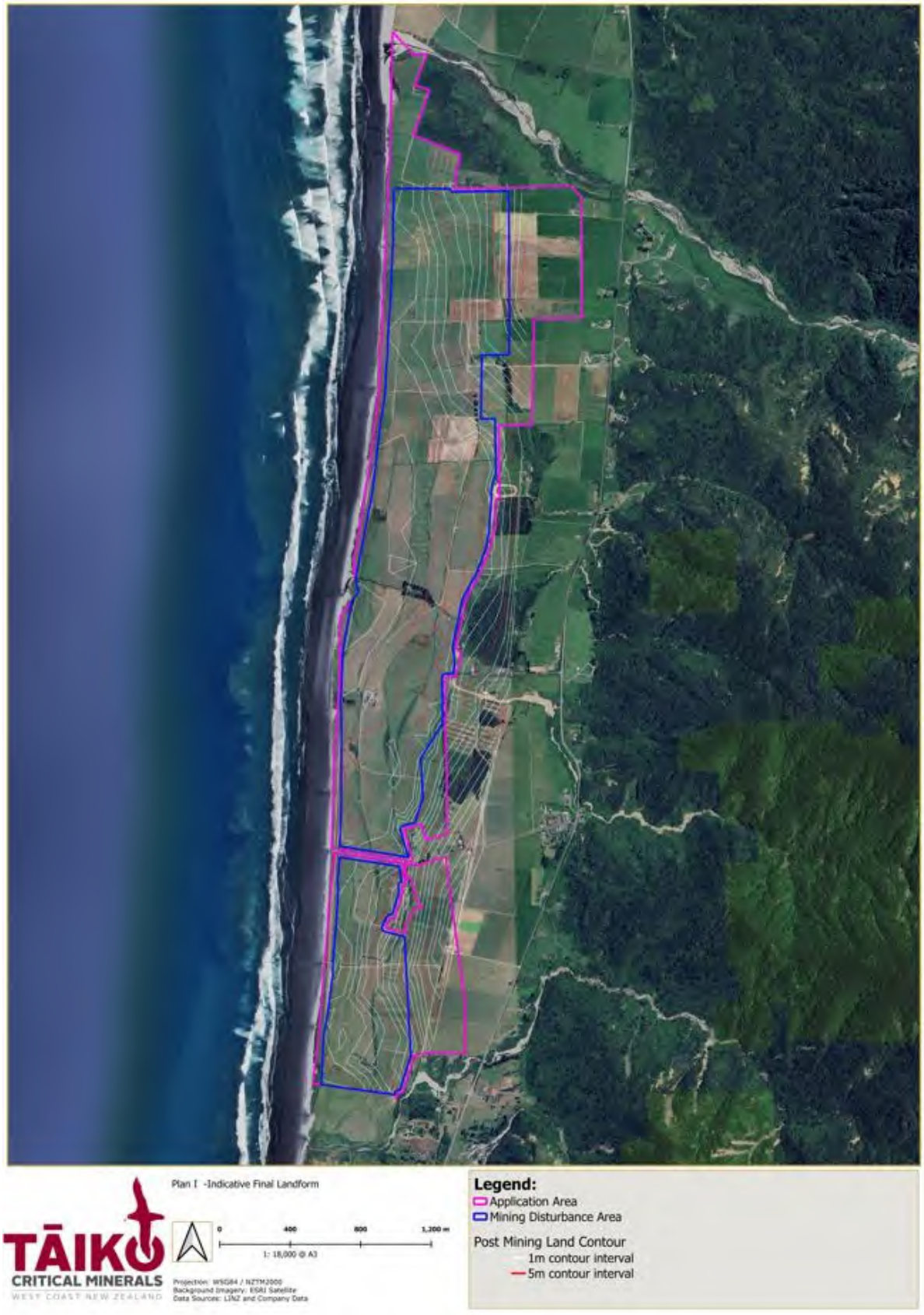
1:7,000 @ A3

Projection: WSG84 / NZTM2000
Background Imagery: ESRI Satellite
Data Sources: LINZ, Client and/or TPRL Data

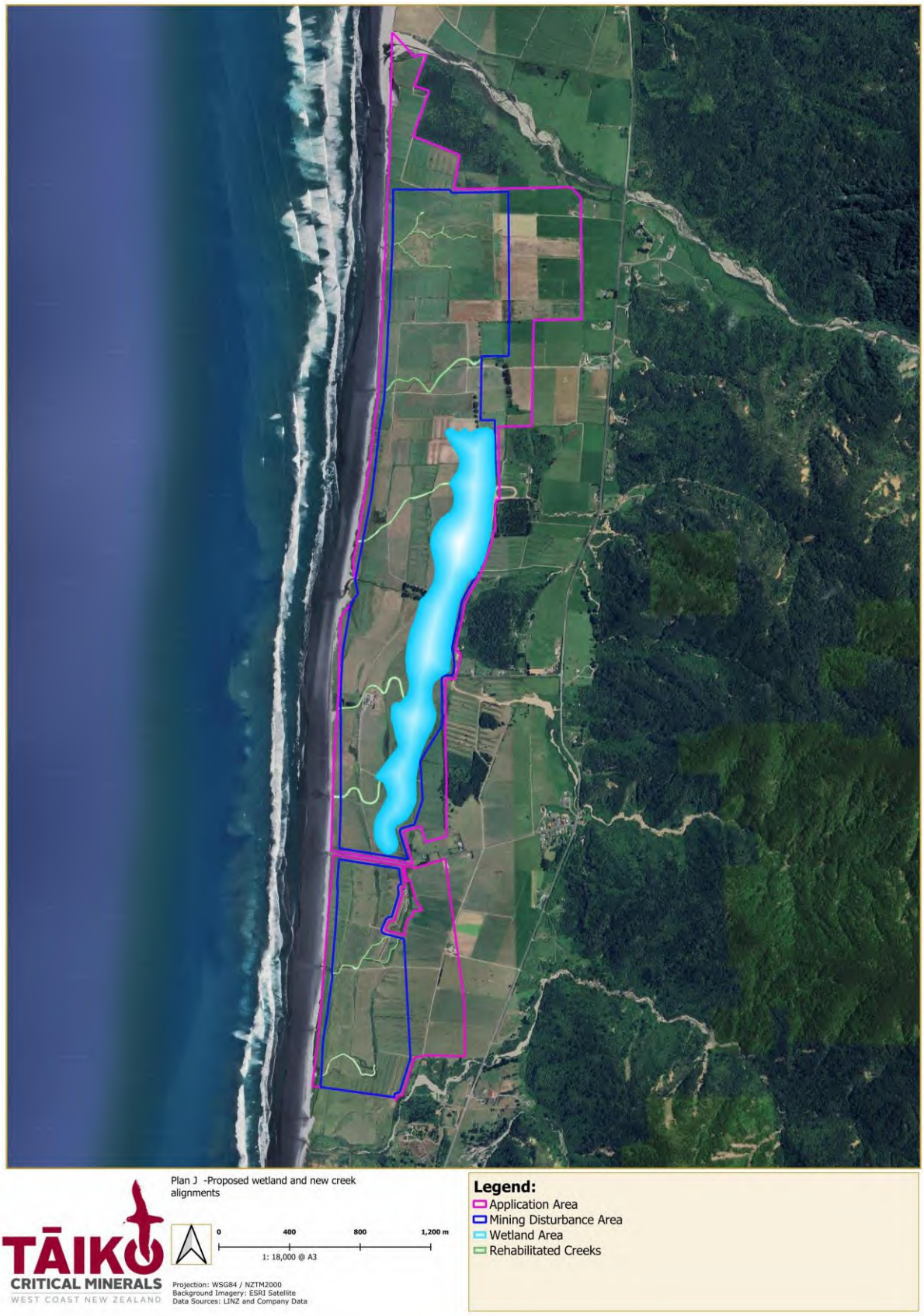
Legend:

- Application Area
- Mining Disturbance Area
- Water take Location
- Gallery Water take
- RC 2023 0046 Consent Area

Plan I: Indicative Final Land Contour



Plan J: Proposed Post-Mining Wetland and Watercourse Rehabilitation Layout



Appendix B1: Draft Conditions

Barrytown Critical Minerals Project
Southern Block

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General Conditions for Grey District Council and West Coast Regional Council	
1.0 General	
1.1	The Consent Holder must carry out the mineral sand mining and associated activities in general accordance with the application made through the Fast-track Approvals process, the Site Plan enclosed as Schedule 1 prepared by Tai Poutini Resources Ltd and the following management plans [to be inserted].
1.2	The Consent Holder must ensure all staff and contractors are made aware of, and have access to, the resource consent conditions prior to the commencement of mining. A copy of the resource consent conditions must also be readily available on-site.
1.3	All actual and reasonable costs incurred by the Consent Authorities in monitoring, enforcement and administration of this resource consent must be met by the Consent Holder.
1.4	a. Within 2 months of the commencement of these consents, the Consent Holder must appoint an Accountable Person to be responsible for ensuring compliance with all conditions of these consents. The Accountable Person must be based on-site for a minimum of 4 hours per day, for three days per week. The Accountable Person must: i. Review, submit and ensure compliance with all management plans listed in the conditions of these consents; ii. Ensure there is another person who can provide cover in the event they are sick or unavailable, and to provide for succession ('Nominated Cover Person'); iii. Be the point of contact between the Consent Holder, the Consent Authorities, and the community generally, and pro-actively engage with these parties as required; iv. Deliver on reporting requirements required by the conditions of these consents. b. The Consent Authorities must be advised of the name and contact details of the Accountable Person and the Nominated Cover Person when they are appointed. In the event that the Accountable Person or Nominated Cover Person change, the Consent Authorities must be notified. A sign must be erected at the property boundary adjacent to the site access road, which provides the name and contact details of the Accountable Person and Nominated Cover Person required to be appointed under sub-clause a
2.0 Notification	
2.1	For monitoring purposes, the Consent Holder must notify the Consent Authorities of the following: a. The intended commencement date of works on-site at least 15 working days prior to commencement of works on-site; and b. The intended completion of final mine closure rehabilitation activities at least 15 working days prior to works ceasing on-site.
3.0 Review of Conditions	
3.1	Pursuant to Section 128(1) of the Resource Management Act 1991, the Consent Authorities may review any of the conditions of these consents by serving notice on the Consent Holder within a period of 60 working days, commencing on each anniversary of the date of commencement of these consents for any of the following purposes: a. To deal with any unanticipated adverse effect on the environment which may arise from the exercise of the consents which is appropriate to deal with at a later stage. b. To assess the appropriateness of imposed monitoring parameters, monitoring regimes and monitoring frequencies and to alter these accordingly. c. To ensure that any management plan required by conditions gives effect to conditions of these consents. d. If the information made available to the Consent Authorities by the applicant for the purposes of applying for consent contained material inaccuracies and the effects of the exercise of the consent are such that it is necessary to apply more appropriate conditions.

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4.0 Bond Conditions	
4.1	The Consent Holder must provide and maintain in favour of the Consent Authorities (the West Coast Regional Council and the Grey District Council [jointly for their respective interests]) a bond or bonds related to mine closure activities required by these consents.
4.2	The payment of the bond quantum by the Consent Holder, as required by Condition 4.5 must either be: a. A bond in favour of the Consent Authorities for the guarantee sum in a form and executed by a surety acceptable to the Consent Authorities; or b. A cash bond deposited with and held in a bank account by the Consent Authorities.
4.3	Where a bond is guaranteed in accordance with Condition 4.2 a., the guarantor must bind itself to pay up to the bond quantum for the carrying out and completion of all obligations of the Consent Holder under the bond.
4.4	The bond (as set at any time under Condition 4.1) must be held or remain in full force and effect throughout the term of these consents until all conditions under these consents have been performed unless otherwise agreed by the Consent Authorities.
4.5	a. The bond quantum must be $300,000. b. The method for arriving at the bond quantum does not limit the scope of the bond, which is set by Condition 4.1.
4.6	The provisions of Section 109 of the Resource Management Act 1991 must apply to any bond, or bonds, required pursuant to the above and must not be limited by the details of the bond instrument.
4.7	The amount of the bond may be inflation adjusted annually, if requested by the Consent Authorities, by the movement of the CPI relative to the CPI at the date when the bond is first provided.
4.8	The Consent Holder must not exercise these consents: a. Until the bond required by Condition 4.1 has been fully executed by the Consent Holder and guarantor, or has been deposited with the Consent Authorities, or b. In respect of any inflation adjusted bond referred to in Condition 4.7, after 30 working days have expired from the date the Consent Holder was notified of the terms of the inflation adjusted bond by the Consent Authorities unless the inflation adjusted bond has been executed with the Consent Authorities by the Consent Holder and guarantor, or has been deposited with the Consent Authority; or c. In respect of any bond sum changed or reviewed pursuant to Sections 127 or 128 of the Act, after thirty 30 working days have expired from the date the Consent Holder was notified of the decision of the changed or reviewed bond by the Consent Authorities unless the changed or reviewed bond has been executed with the Consent Authorities by the Consent Holder and guarantor, or has been deposited with the Consent Authorities, or d. If, during the term of these consents, the whole or any part of the bond is required to be used for the carrying out and completion of all obligations of the Consent Holder under the bond, unless the full bond has been executed with the Consent Authorities by the Consent Holder and guarantor, or has been deposited with the Consent Authorities.
4.9	The Consent Holder must complete such work requested in respect of which any bond or deposit is held, within the time period nominated by the Consent Authorities' written request.
4.10	If the consents are transferred in part or whole to another party or person, the bond must continue until any outstanding work at the date of transfer is completed to ensure compliance with the conditions of these consents, unless the Consent Authorities are satisfied adequate provisions have been made to transfer the liability to the new Consent Holder.
4.11	In the event of any such transfer of the consents, the Consent Holder must ensure that the transfer provides a replacement bond to the Consent Authorities on the terms required by the Bond Conditions.

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4.12	The Consent Holder must meet the costs of providing any bond, or bonds, including the costs of the bond and any substitute bond. ***Advice Note:*** • *The Consent Authority will release the bond upon the closure of the mine if all conditions of consent have been complied with to the satisfaction of the Consent Authorities*.
5.0 Annual Work Programme	
5.1	At least 20 working days prior to mining activities commencing and thereafter on or before the anniversary date of the mining activities commencing, the Consent Holder must submit a programme of work ("Annual Work Programme") for certification by the Consent Authorities detailing: a. The proposed works to be carried out over the next 12 months including: i. Equipment to be used; ii. Areas of topsoil and overburden stripping ; iii. New areas of land disturbance that will be mined; iv. Access tracks; v. Drilling or prospecting sites and other tracks to be constructed; and vi. Any other site works within the consent area. b. The approximate open volume of the mining void at the start of the year including the depth of excavations and the area of the mining void. c. Extent of creek diversions and reclamations. d. The progressive rehabilitation works to be carried out over the next 12 months including: i. Areas of unrestored land (i.e. any land not finally topsoiled and revegetated) at the beginning of the 12-month period; ii. The area that will be fully rehabilitated during the forthcoming 12-months; iii. Maximum slope angles, bench heights and widths of recontoured ground, if applicable; iv. Rehabilitation methods and techniques including replacement of topsoil and vegetation cover with seed collection and plant procurement details; d. Description of measures to prevent adverse effects on natural waterbodies, including drainage works within the consent area, and the collection and treatment of site run-off; e. Measures to ensure soil conservation; f. A description and analysis of any unexpected adverse effects that have arisen as a result of activities within the last 12 months, the steps taken to address those adverse effects and measures implemented to avoid a repeat occurrence of them.
5.2	The following plans, reports and results of monitoring must also be submitted as part of the Annual Work Programme: a. A detailed plan or aerial photograph showing: i. The open working area at the start of the year; ii. Proposed mine path for the forthcoming year including haul and access roads; iii. Rehabilitated ground behind the mining void area; iv. Location of natural surface water bodies; v. Proposed diversions of creeks, location of fish diversions and reclamations of creeks; vi. Reconstructed creeks; vii. Location of present and intended drainage works and settling ponds; and viii. Any other site works within the consent area. b. A Site Specific Erosion and Sediment Control Plan in accordance with Condition 21.2. c. Results of surface water quality, surface water flows, and groundwater level monitoring from the previous 12 months in the form of an Annual Hydrological and Water Quality Report required by Condition 24.4. d. Any proposed updates to management plans submitted in accordance with the respective conditions of consent. e. Results of any previous dust monitoring required by Condition 26.2.

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5.3	The Consent Holder must provide the Consent Authorities with any further information, which the Consent Authorities may reasonably request after considering any Annual Work Programme. This information must be provided within 5 working days of any request from the Consent Authorities.
6.0 Management Plans	
6.1	At least 20 working days prior to undertaking any activities authorised by these consents, the Consent Holder must submit the following management plans to the Consent Authorities for certification: a. Noise Management Plan b. Avian Management Plan c. Lizard Management Plan d. Native Freshwater Fish Capture and Relocation Plan e. Dust Management Plan f. Rehabilitation Management Plan g. Water Management Plan h. Erosion and Sediment Control Plan ***Advice Notes:*** • *These are collectively referred to as 'Management Plans'.* • *Where a plan requires the input of an appropriately qualified professional, the Consent Authorities may engage an appropriately qualified person to peer review the plan as part of the certification process.*
6.2	a. The purpose of the Management Plans is to implement the relevant conditions of these consents. All Management Plans must include (where relevant): i. The purpose/objective of the plan; ii. Reference to the conditions of these consents that the management plan implements; iii. How each of the relevant conditions have been given effect to; iv. Procedures for implementing the relevant plan; v. Plan auditing check lists; vi. Monitoring programmes and/or monitoring protocols; vii. Feedback mechanisms for adaptive management, including circumstances in which a material change to the management plan would be required; viii. An organisational chart showing staff and contractor positions and responsibilities for plan implementation; ix. Relevant training and induction procedures and training schedules; and x. Reporting procedures and format for providing the results of any monitoring or surveys required by the plan. b. Where plans require the input of an appropriately qualified professional, the Consent Holder must engage an appropriately qualified person to prepare the Plan.
6.3	Site activities must not commence until the Management Plans listed in Condition 6.1 have been certified by the Consent Authorities.
6.4	If the response from the Consent Authorities is that they are not able to certify the management plans, the Consent Holder must consider any reasons and recommendations provided by the Consent Authorities, amend the management plan accordingly, and resubmit the management plan to the Consent Authorities.
6.5	The Consent Holder may amend a management plan at any time to take into account: a. Any positive measure/s to ensure the stated objectives of the management plan are achieved; b. Any changes required to further reduce the potential for adverse effects as a result of actions identified in the Annual Work Programme; and c. Any required actions identified as a result of monitoring to address a. or b.

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	Where the preparation of a management plan required the input of an appropriately qualified person, any amendment to that management plan must also be undertaken by an appropriately qualified person. ***Advice Note:*** • *Some management plans have ongoing annual review requirements which are required in order to manage effects. These specific review requirements are stipulated in the relevant conditions of this consent.*
6.6	Any amended management plan must be provided to the Consent Authorities within 20 working days of its review, for recertification in accordance with Condition 6.1. ***Advice Note:*** • *The Consent Authorities may engage an appropriately qualified person to peer review the amendments.*
6.7	A management plan may only be amended in a way that is consistent with, and does not contravene, the conditions of these resource consents.
6.8	A copy of the latest version of the certified Management Plans must be kept on site at all times and all personnel must be made aware of each Plan and their responsibilities under each Plan.
6.9	Subject to any other conditions of these consents, all activities must be undertaken in accordance with the latest version of the certified Management Plans.
7.0 Method of Operations	
7.1	a. The mine boundaries must be clearly marked on the ground as per Schedule 1 before any earthworks take place, with the following setbacks applied: i. 20m from the consent boundary; ii. 20m from Granite Creek iii. 20m from Fagan Creek; iv. 50m from the mean high water spring v. 20m from the proposed SNA PUN-049; vi. 20m from all private property boundaries not within the consent area as shown on Schedule 1; vii. 200m from dwellings other than where noise bunds are proposed.
7.1A	For Condition 7.1(a)(iv), the mine boundaries from the mean high water spring must be clearly marked at the start of each mining section: • Section 1: Canoe Creek to Granite Creek • Section 2: South of Granite Creek to Cargill Road • Section 3: South of Cargill Road to Southern Boundary
7.2	The maximum area of site disturbance must not exceed 16.0 hectares at any one time. ***Advice Note:*** • *The disturbed area includes the stripped area ahead of mining, mining void and active rehabilitation areas (including borrow areas).*
7.3	a. The Consent Holder must strip soil material ahead of mining operations and stockpile it for progressive and final mine closure rehabilitation purposes. b. Stockpiled soil must be protected from erosion caused by water and wind as far as practicable.
7.4	The Consent Holder must not bury any topsoil or soil material suitable as a growing medium or remove it from the site.
8.0 Hazardous Substances	
8.1	a. Refuelling, lubrication and mechanical repairs of equipment and storage of hazardous substances and dangerous goods must be undertaken in such a manner that ensures spillages of hazardous substances or dangerous goods onto the land surface or into a waterbody do not occur, including that refuelling must not occur outside the mining area or within 20 metres of a water body.

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	b. Any accidental discharge of greater than 20 litres of fuel, oil or hazardous substances must be reported immediately to the Consent Authorities along with details of the steps taken to remedy and/or mitigate the adverse effects of the discharge.
8.2	All contractors and/or operators transporting or storing more than 20 litres of fuel, oil or hazardous substances must carry spill kits to contain any fuel, oil or hazardous substances discharges on-site.
8.3	A list of all hazardous substances and dangerous goods stored or used on site must be maintained on site at all times showing the location of the storage and use.
8.4	The Consent Holder must undertake quarterly systematic testing of the heavy minerals concentrate from within the active mining area to confirm that the concentrate remains below the acceptable level of radioactivity concentration limits as specified in Schedule 2 of the Radiation Safety Act 2016. Copies of the independent test results must be submitted to the Consent Authority within 10 working days of receipt of the results. ***Advice Note:*** • *If material meets the criteria in Schedule 2 of the Radiation Safety Act 2016, the extraction, processing and transport of heavy minerals concentrate will require a Source Licence under this Act, and may possibly require a radiation safety plan as per section 18 of the Act.*
8.5	In the absence of any extant and current New Zealand Code of Practice for handling naturally occurring radioactive materials, the Consent Holder must carry out all activities on site in accordance with the Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing Code of Practice and Safety Guide published by the Australian Radiation Protection and Nuclear Safety Agency. ***Advice Note:*** • *The Code of Practice within this consent condition requires that if radiation levels exceed 1Bq/g, the relevant authority must be notified, which differs from state to state. In the New Zealand context, the relevant body to notify is the Office of Radiation Safety.*
8.6	a. The Consent Holder must maintain radiation monitoring devices in the locations specified in the Dust Management Plan. Data from the radiation monitoring devices must be collected and analysed once every three months. Copies of the test results must be submitted to the Consent Authorities with 10 working days of receipt of the results. b. If the radiation monitoring devices record radiation levels exceeding the equivalent of 1 mSv (millisievert) above background levels over 12 months (i.e., the sum of results from the past four device readings at each location minus background levels established prior to the activity commencing), then the Radiation Safety Act 2016 applies, and the Consent Holder must: i. inform and consult the Office of Radiation Safety, New Zealand Ministry of Health; and ii. carry out all activities on site in accordance with the Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing Code of Practice and Safety Guide published by the Australian Radiation Protection and Nuclear Safety Agency (or any subsequent revision).
9.0 Rehabilitation	
9.1	The Consent Holder must carry out progressive rehabilitation, to achieve the following requirements: a. Reinstatement of productive pasture; b. Reinstatement of existing creek and drainage patterns to reflect pre-mining catchment areas ensuring no loss of extent and values, with appropriate riparian planting, in accordance with Condition 24.5 c. Construction of wetland and riparian areas in accordance with Conditions 15.5.
9.2	At the completion of mining (final mine closure), the mine area must be fully rehabilitated, in general accordance with a Rehabilitation Management Plan. The objectives of the Rehabilitation Management Plan are:

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	a. To create a final landform with a similar contour and profile at final mine closure as that which existed prior to mining but with improved drainage across the site; b. To establish vegetation cover on all areas disturbed by mining activity; c. To protect freshwater values associated with natural waterways; d. To reinstate existing creek and drainage patterns to reflect pre-mining catchment areas ensuring no loss of extent and values; and e. To construct and establish a permanent wetland area that contributes to ecological enhancement, hydrological function and landscape integration at final mine closure. ***Advice Notes:*** • *Final mine closure is the completion of all mining and progressive rehabilitation works.* • *All Management Plans are required to adhere to the requirements of Condition 6.0.*
9.3	The Rehabilitation Management Plan must include the following: a. A programme of progressive rehabilitation of the pre-mining landform, adhering to maximum disturbed area limits. b. The original and final mine closure land contours. c. Contouring of all post-mining landforms. d. Establishment of pasture cover over all disturbed land. e. Construction methodology and planting details for the constructed wetland areas to achieve the requirements in Condition 16.8. f. Construction methodologies and riparian planting details for the diversion of, and reestablishment of creeks, including to achieve the requirements in Condition 21.2 (the Site Specific Erosion and Sediment Control Plan) and Condition 28.2 (Design requirements). g. Removal of equipment. h. Monitoring and maintenance requirements.
9.4	If for any reason active mining ceases for more than 6 months, all disturbed areas must be rehabilitated as required by the conditions of these consents within 12 months from the date of the last mining activity.
10.0 Complaints and Non-Compliance	
10.1	The Consent Holder must maintain a complaints register for all aspects of operations in relation to these consents. The register must be available to the Consent Authorities at all times and must detail: a. The date, time and type of any complaint; b. The cause of the complaint; and c. Any action taken in response to the complaint.
10.2	Upon receipt of any complaint, the Consent Holder must promptly investigate the complaint, take action to remedy or mitigate the cause of the complaint and within 24 hours inform the Consent Authorities of the details of the complaint and any action taken.
10.3	Complaints which may infer non-compliance with the conditions of these consents, must be referred to the Consent Authorities within 48 hours of their receipt.
10.4	a. The Consent Holder must immediately notify the Consent Authorities upon becoming aware of any non-compliance with the conditions of these consents b. Within 5 working days thereafter the Consent Holder must provide written notification to the Consent Authorities which explains the cause of the non-compliance, and if the cause was within the control of the Consent Holder, steps which were taken to remedy the non-compliance and steps which will be taken to prevent any further occurrence of non-compliance with the conditions of these consents. ***Advice Note:*** • *This consent condition does not replace the compliance and enforcement responsibilities of the Consent Authorities.*

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Grey District Council Conditions	
11.0 Hours of Operation	
11.1	a. Mining, overburden and topsoil stripping, bund development and any related activities must not operate during the hours of darkness. For the purpose of this condition, hours of darkness are between 30 minutes after sunset to 30 minutes before sunrise. b. Mining shall not occur between the hours of 0600 and 0700 within 500m of the dwellings located at Lot 2 DP2178, 23, 37, 41, 43 and 50 Warren Road, and 64, 67, 86 and 101 Cargill Road. c. Mining shall not be undertaken on Sunday. ***Advice Notes:*** • *Sunrise and sunset times can be found at https://www.sunrise-and-sunset.com/en/sun/new-zealand/greymouth* • *In addition to Condition 12.1, further restrictions on noise are contained in Conditions 13.1 – 13.4 Noise.*
11.2	Mining shifts must operate only during the hours of daylight.
12.0 Noise	
12.1	The consent holder shall ensure that all operational mining activities on site do not exceed the following noise limits at or within the notional boundary of any dwelling: a. Daytime 0700 to 2200 55 dB L_{Aeq}(15 min) b. Night-time 2200 to 0700 45 dB L_{Aeq}(15 min) and 75 dB L_{AFmax} when measured and assessed in accordance with the latest New Zealand noise standards: NZS 6801:2008 "Acoustics – Measurement of environmental sound" and NZS 6802:2008 "Acoustics -Environmental Noise". ***Advice Note:*** • *'Notional boundary' is defined as a line 20 metres from any side of a dwelling or the legal boundary where this is closer to the dwelling*.
12.2	Construction activities must be conducted in accordance with NZS 6803: 1999 "Acoustics - Construction Noise" and must comply with the "typical duration" noise limits contained within Table 2 of that Standard. ***Advice Note:*** • *Construction activities include the formation of access roads, bunds, land contouring and planting. For the avoidance of doubt, overburden stripping and topsoil removal associated with mining operations must not be considered construction activities.*
12.3	The Consent Holder must prepare a Noise Management Plan (NMP) to control day-to-day noise emissions from the site. This NMP must be submitted to the Consent Authority for certification 10 working days prior to commencement of the commencement of on-site works. As a minimum, the NMP must include: a. The person responsible for implementing the NMP b. Applicable noise conditions relating to noise c. Training of staff relating to how to minimise noise and vibration d. Mining risk analysis for noise generation e. Method for handling noise complaints f. Noise monitoring methodology, including frequency, duration, and location. ***Advice Note:*** • *All Management Plans are required to adhere to the requirements of Condition 6.0.*
12.4	a. The Consent Holder must engage a suitability qualified and experienced acoustic consultant to undertake compliance noise monitoring within 30 days of mining or processing operations occurring and thereafter at 3 monthly intervals for the first 12 months of the mining operation. Thereafter, compliance noise monitoring must be undertaken on an annual basis.

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	b. All noise monitoring must be submitted to the Consent Authority within two weeks of completion of each monitoring event. c. If compliance with Condition 12.1 is not achieved, the Consent Holder must: i. investigate the reasons for non-compliance and within 20 working days implement additional mitigation measures to achieve compliance with those noise limits. ii. submit a report to the Consent Authority within 30 working days of the relevant monitoring event detailing the additional mitigation measures that were implemented. d. If additional mitigation measures are implemented, the Consent Holder must engage a suitability qualified and experienced acoustic consultant to undertake further compliance noise monitoring within 10 working days of any mitigation measure being implemented to determine the effectiveness of that mitigation. e. If compliance with Condition 12.1 is still not achieved the Consent Holder must repeat the requirements of c. and d. until compliance is achieved.
12.5	Mining operations must utilise the best practicable option to minimise noise at all times. This includes: a. Replacement of worn machinery parts, maintenance of mufflers, lubrication of moving machinery to avoid squeaks and squeals, and appropriate operation of all equipment. b. Vehicles or equipment must not be fitted with tonal reversing alarms. c. Where reversing alarms are required, broadband reversing alarms must be used.
13.0 Avian Management	
13.1	a. Prior to and during each breeding season, the Consent Holder shall undertake regular surveys of all areas scheduled for mining to identify any bird breeding or nesting activity. Where surveys indicate that nesting is likely to occur, the Consent Holder shall implement appropriate deterrence measures, including walkovers, visual cues, audio bird scarers, and strategic placement of machinery, to discourage birds from establishing nests. ***Advice Note:*** • *Conditions relating to the Avian Management Plan are Conditions 13.7 – 13.9.*
13.2	Staff, contractors and visitors associated with the mining activity must not be permitted to bring dogs to the site at any time, except for conservation purposes.
13.3	a. The Consent Holder must deploy wildlife cameras at suitable locations to detect target wildlife (particularly Kororā and Tāiko) including low spots and creek mouths along the coastal edge of the mine disturbance area and other locations likely to detect activity as determined by a suitably qualified ecologist and set to record for at least 10 nights every month. b. The cameras must be equipped with passive infrared receptors (or other mechanisms to enable night vision capability and motion detection) and be installed by a suitably qualified ecologist. c. Imagery must be reviewed for wildlife interactions at least weekly by a suitably qualified ecologist, retained for a minimum of 6 months, and be made available to the Consent Authority or the Department of Conservation on request.
13.4	a. Any interactions with wildlife recorded as a result of the monitoring requirements in the Avian Management Plan including the wildlife cameras required by Condition 13.3, must be reported to the Consent Authority and the Department of Conservation on a weekly basis from 1 November to 31 January each year, and on a monthly basis from 1 February to 31 October. b. Footage must be made available to the Department of Conservation and the consenting authority as set out in Condition 13.3.
13.5	a. The Consent Holder must engage a suitably qualified expert to carry out annual penguin surveys of Pakiroa beach and the mine area within 500m of the mining disturbance area to detect the presence of Kororā. If available, the Consent Holder must use a certified conservation dog. If a certified conservation dog is unavailable or unable to complete

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	the survey, human surveys and increased camera monitoring will be undertaken in accordance with the advice of a suitably qualified ecologist. b. The first survey must be conducted within the first 12 months of the commencement date of the resource consent, and at least two annual surveys must be completed before mining commences. c. If penguins or burrows are detected the GPS location must be recorded and the Consent Holder must undertake the following management actions: i. If penguins are detected using the mining area to access other habitats, any existing access ways must be maintained and/or works affecting that accessway must be completed in the period April – June (outside the breeding and moult period). ii. Any potential penguin burrows identified must be investigated, including use of a burrowscope, to determine whether Kororā are using them. iii. Where any penguin burrows are compromised by mining (i.e. there are direct effects), replacement artificial burrows or nest boxes must be installed at a rate of 2:1. Any additional nest boxes provided must be located within the vegetated coastal foreshore habitat associated with any identified accessways. iv. If penguins are found within the application site, a specific Penguin Management Plan must be developed by a suitably qualified and experienced ecologist on behalf of the applicant in consultation with the West Coast Penguin Trust. The West Coast Penguin Trust must be reimbursed for reasonable time and expenses associated with consultation on the Penguin Management Plan. v. Any deceased penguins found on or near the mine site must be provided to the Department of Conservation for necropsy.
13.6	a. The Consent Holder must erect and maintain a penguin fence foreach section of mining identified in the Avian Management Plan to deter Kororā from entering hazardous areas. b. The penguin fence must be comprised of geosynthetic mesh to a height of at least 900mm above ground and buried at least 300mm below the ground and with posts no greater than 4m apart. c. The fence installation must be certified by a suitably qualified ecologist as preventing the ingress of Kororā to the active mine disturbance area. d. The certification must be supplied to the Consent Authority prior to mining commencing. e. Upon completion of all mining activities and associated site rehabilitation, all penguin fencing must be removed. ***Advice Note:*** • *The requirement to erect a penguin fence only applies if Kororā are detected within 500m proximity of the active mining disturbance area during pre-mining surveys. If no Kororā are detected within 500m of the active mine disturbance area a penguin fence is deemed unnecessary.*
13.7	The Consent Holder must conduct activities on site in general accordance with an Avian Management Plan (AMP) prepared by a suitably qualified ecologist or ornithologist. The objectives of the AMP are: a. To ensure adverse effects on the threatened and at risk birds present in the vicinity of the site and any other threatened and at risk species detected by subsequent monitoring are avoided. b. To ensure safe ongoing use of the site and its environs by the birds which currently occur in the area. ***Advice Note:*** • *All Management Plans are required to adhere to the requirements of Condition 6.0.* • *Threatened or at-risk bird species refers to the Conservation Status according to the Department of Conservation's Threatened Classification System.*
13.8	The AMP must detail:

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	a. A description of the site b. A description of the threatened and at risk indigenous birds likely to be present in these habitats and which species require specific mitigation measures c. A description of the measures that are required to be implemented to avoid effects on threatened and at risk indigenous birds . d. A procedure for managing and responding to Westland Petrel or other wildlife being found on the mine site; e. Details of the penguin fence for each Section of mining described in condition 13.6. f. Lighting management at the site to comply with the guidelines in Condition 17.2. g. A description of the monitoring requirements to assess the effectiveness of the AMP.
13.9	The AMP must be reviewed annually by the Consent Holder. Any proposed amendments to the AMP must be submitted to Council for certification and must: a. Achieve the AMP's objectives including avoiding effects on any threatened or at-risk indigenous bird species; b. Comply with the conditions of this resource consent; c. Have been reviewed by an appropriately qualified and experienced ecologist or ornithologist; d. Have been provided in advance to Te Rūnanga o Ngāti Waewae and the Buller/Kawatiri (for Tāiko) and the Greymouth (for other wildlife) office of the Department of Conservation for comment (and feedback received collated and submitted with the amendments to be provided to Council); and e. Follow the certification process set out in Condition 6.1. ***Advice Note:*** • *Any disturbance or relocation of avifauna may require a permit from the Department of Conservation under the Wildlife Act (1953).*
13.10	a. The Consent Holder must engage a suitably qualified expert(s) to undertake all monitoring of avian species from the commencement of consent until at least one year following the cessation of mining activities on this site. b. The monitoring must be carried out in accordance with the monitoring requirements in the AMP.
13.11	An annual bird management report must be provided to the Consent Authority, Te Rūnanga o Ngāti Waewae, the Buller/Kawatiri and Greymouth offices of the Department of Conservation in Westport, the West Coast Penguin Trust, Paparoa Wildlife Trust, the Community Liaison Group and Waka Kotahi NZ Transport Agency Environment and Sustainability Team (via: environment@nzta.govt.nz), no later than 30 June each year. The report must include the following matters: a. The timing and duration of any mining within 100m of the proposed SNA Site PUN-049; b. Results of seasonal bird surveys at the site; c. Timing of nest detection surveys and observations relating to nesting or other behaviours observed within the area to be mined; d. Efforts to deter any attempts at nesting within the area to be mined and the outcome of those efforts; e. Species attempting to nest within the area to be mined (including threatened and at risk species); f. Date of first nesting attempts (if any) for threatened and at risk species within the area to be mined; g. Number and location of nesting attempts by threatened and at risk species within the area to be mined; h. Outcome of individual nesting attempts by threatened and at risk species within the area to be mined; i. Results of annual Kororā surveys on Pakiroa Beach, the implications for mine operations and any management actions undertaken;

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	j. Number, dates and location of any mining operation vehicle strikes or near misses involving the Westland Petrel or Kororā; k. Autopsy outcomes for any dead Westland Petrel or Kororā collected; l. The findings of any lighting audits undertaken during the year and steps taken to resolve any issues identified; m. A summary of any revisions made to the AMP and the reasons for the changes; and n. The date and duration of any operational shut-downs.
14.0 Lizard Management	
14.1	The Consent Holder must conduct activities on site in general accordance with a Lizard Management Plan (LMP) prepared by a suitably qualified ecologist. The objective of the LMP is to minimise adverse effects on indigenous lizards present within the project area during construction and operation.
14.2	The LMP must include (but is not limited to): a. Survey of lizard species and habitats within the site; b. Methods for lizard capture, salvage, and relocation; c. Methods for construction of artificial refuges in advance of lizard salvage at the lizard release site; d. Identification of release sites and habitat enhancement measures; e. Timing of works to minimise impacts on lizards; f. Monitoring and reporting requirements; g. Contingency procedures if lizards are discovered during works.
14.3	Site works must not commence until the Consent Authority has certified the LMP in accordance with Condition 6.0.
15.0 Native Freshwater Fish Management	
15.1	The Consent Holder must conduct activities on site in general accordance with a Native Freshwater Fish Capture and Relocation Plan (NFFCRP) prepared by a suitably qualified freshwater ecologist. The objective of the NFFCRP is to avoid, or otherwise minimise adverse effects on native fish present within the project area.
15.2	This NFFCRP must detail how native fish will be salvaged and relocated prior to streamworks commencing and must include but not be limited to: a. Methodologies to capture fish within the impacted streams and wetland habitats, or justification there is no habitat for native fish present at the time of earthworks; b. Fishing effort; c. Details of the relocation site(s) including a description and assessment of the quantum and availability of suitable aquatic habitat at the relocation site; d. Storage and transport measures including prevention of predation and death during capture; e. Euthanasia methods for diseased individuals or pest species f. Reporting.
15.3	Streamworks must not commence until the Consent Authority has certified the NFFCRP.
16.0 Landscape Mitigation and Rehabilitation	
16.1	a. As soon as practicable following the commencement date of this consent, and prior to the commencement of mining, the Consent Holder must construct bunds and complete planting and fencing in accordance with the “Landscape Mitigation Package” prepared by Glasson Huxtable Landscape Architects dated February 2026, REV C (Schedule 2).
16.2	New bunds are to be constructed 3.0 metres high and 24 metres wide with an inward facing grassed slope and dense planting on the crest and outward facing slopes. While primarily required for noise mitigation, the bunds will also provide visual screening. Bunds are to be located: a. On the western boundary of Lot 2 DP2178. b. Near the bottom of Warren Road (with a separation at Granite Creek). c. On the northern side of Cargill Road at the eastern boundary. d. On the southern side of Cargill Road, alongside the western boundary of 114 Cargill Road.

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	The above areas are illustrated within the "Landscape Mitigation Package" prepared by Glasson Huxtable Landscape Architects dated February 2026, REV C (Schedule 2).
16.4	Vegetation to be retained includes: a. The stand of Old Man Pines and the large cluster of vegetation near the consented WCP. b. Clusters of vegetation along the eastern application area boundary north of Cargill Road. c. The patch of vegetation adjacent to 101 Cargill Road. d. The stand of Old Man Pine and other riparian vegetation adjacent to Granite Creek. The above areas are illustrated within the "Landscape Mitigation Package" prepared by Glasson Huxtable Landscape Architects dated February 2026, REV C (Schedule 5).
16.5	Plant species selection, grades, spacing, densities and quantities must achieve the following: a. Be a species listed within the "Landscape Mitigation Package" prepared by Glasson Huxtable Landscape Architects dated February 2026, REV C (Schedule 5) and be suited to the local conditions (particularly in relation to water depth in the wetland) b. At least one plant per square metre at planting; and c. 80% vegetation cover for final rehabilitation.
16.6	The Consent Holder must source plants required for mitigation and rehabilitation planting from within the Punakaiki Ecological District or North Westland Ecological Region in order of preference. Where this is unable to be achieved, the Consent Holder must notify the Consent Authority and work with the Consent Authority and a suitably qualified Landscape Architect and Ecologist to determine an appropriate alternative plant source.
16.7	The wetland construction, Granite Creek riparian planting, and creek and drainage riparian planting must be undertaken and managed in accordance with the Landscape Mitigation Package" prepared by Glasson Huxtable Landscape Architects dated February 2026, REV C (Schedule 2).
16.8	The Rehabilitation Management Plan must include details of a final wetland design: a. A final wetland design that, when the planting required in Condition 16.7 achieves an area of at least 53 ha with the following habitats: i. At least 5.2ha of shallow marsh with an average depth of 0.4m ii. At least 2.8ha of mid-depth water with an average depth of 1m iii. At least 5.3ha of deep open water with an average depth of 2m iv. At least 15.3ha of flaxland and dry edge vegetation v. At least 5.3ha of Carex Rushlands vi. At least 15.6ha of Raupo vii. At least 4.1ha of raised islands b. Site preparation requirements for the wetland and riparian planting; c. Planting methodology for planting and establishment of the wetland and riparian areas; d. Monitoring and maintenance requirements to ensure the survival and ecological functioning of the constructed wetland, including pest and weed control.
16.10	Each plant shall be of nursey stock and be of good form that is true to species. Plants shall be healthy, vigorous and free of disease, injury, parasites or insects and not root bound.
16.11	All new planting areas required by this consent including wetlands and riparian areas shall be fenced off with stock proof post and wire fencing immediately following planting.
16.12	All planting must be maintained for the duration of the consent. Maintenance includes weeding, spraying, staking, watering, fertilising, trimming, pest removal and plant replacement. The aim is to have plants which are vigorous and thriving, thereby providing effective screening and rehabilitation.
16.13	Any plants that are dead, diseased, fail to thrive or are damaged must be replaced with the same or similar plant species within the following planting season.
16.14	The existing mature flax and raupo located within the site will be utilised where possible for direct vegetation transfer associated with the constructed wetland.
17.0 Lighting	
17.1	Fixed lighting must not exceed 2.0 lux spill (horizontal and vertical) of light onto any adjoining property, measured at any point more than 2m inside the boundary of the adjoining property or the closest window on the adjoining property whichever is the closest.

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17.2	Lighting must be designed in a manner which adheres to the Australian Government's National Light Pollution Guidelines for Wildlife May 2023 (or subsequent revision), including but not limited to: a. All fixed lighting must be directed downward, shielded to avoid light spill outside of permitted limits, operate primarily in the yellow orange spectrum, and be filtered to reduce blue and violet wavelengths; b. Lights must only illuminate the object or area intended; c. Fixed lights must be mounted as close to the ground as practicable while still achieving site lighting requirements; and d. External lighting must use the lowest intensity lighting possible, while ensuring compliance with workplace health and safety requirements.
18.0 Accidental Discovery Protocol	
18.1	Immediately following the discovery of material suspected to be a taonga, kōiwi or archaeological site the following steps shall be taken: a. All works on the site will cease immediately at that place and within 20m around the site. b. Immediate steps will be taken to secure the site to ensure the archaeological material is not further disturbed. c. The contractor/works supervisor/owner will notify the Rūnanga, Council and the Area Archaeologist of Heritage New Zealand. In the case of kōiwi (human remains), the New Zealand Police must be notified. d. The Rūnanga and Heritage New Zealand will jointly appoint/advise a qualified archaeologist who will confirm the nature of the accidentally discovered material. e. The contractor/works supervisor/owner will also consult the Rūnanga on any matters of tikanga (protocol) that are required in relation to the discovery and prior to the commencement of any investigation. f. If kōiwi (human remains) are uncovered, in addition to the steps above, the area must be treated with utmost discretion and respect, and the kōiwi dealt with according to both law and tikanga, as guided by the Rūnanga. Remains are not to be moved until such time as Rūnanga, NZ Police and Heritage New Zealand have responded. g. Works in the site shall not recommence until authorised by the Rūnanga, Heritage New Zealand (and the NZ Police in the case of kōiwi). h. All parties will work towards work recommencing in the shortest possible timeframe while ensuring that any archaeological sites discovered are protected until as much information as practicable is gained and a decision regarding their appropriate management is made, including obtaining an archaeological authority under the Heritage New Zealand Pouhere Taonga Act 2014 if necessary. Appropriate management may include recording or removal of archaeological material. i. Although bound to uphold the requirements of the Protected Objects Act 1975, the contractor/works supervisor/owner recognises the relationship between Ngāi Tahu whānui, including its Rūnanga, and any taonga (Māori artefacts) that may be discovered. Where Rūnanga so request, any information recorded as a result of the find such as a description of location and content, is to be provided for their records.
General Conditions to Apply to all West Coast Regional Council Consents	
20.0 Method of Mining	
20.1	The consent holder must only carry out mining activities within the mining area shown on the attached map titled "Tāiko Fast-track Application" prepared by Tai Poutini Professional Services Ltd dated [*insert date here*] attached as Schedule 1.
20.2	The maximum combined surface area of un-rehabilitated disturbed land in the application area must not exceed 16.0 hectares at any one time, which includes a maximum exposed surface area of 2.0ha from the borrow cut location.
20.3	The mining and associated activities under this consent must not cause or induce erosion or slope instability outside the mining area (during operations), or the application area as part of final rehabilitation.

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21.0 Erosion and Sediment Control Plan	
21.1	The Consent Holder must operate in general accordance with the Erosion and Sediment Control Plan labelled 'Barrytown Mineral Sand Operation Erosion and Sediment Control Plan and Water Management' (ESCP) prepared by Ridley Dunphy Environmental Ltd, dated [*insert date here*]. The objective of the ESCP is to establish procedures and design criteria in relation to earthwork and streamwork activities to be implemented during the Project construction to minimise sedimentation of waterbodies adjacent to the mining area, and assist with compliance with the water quality parameters in Condition 23. The ESCP has the following outcomes: a. Minimise to the extent practicable the area and volume of earthworks required for construction of the Project; b. Maximise the effectiveness of erosion and sediment control measures and processes associated with earthworks and streamworks by minimising sediment generation and consequential sediment-laden runoff and discharges; c. Through the implementation of the ESCP and ensuring that discharges from earthworks and streamworks are minimised, protect receiving environments to the greatest extent practicable; d. Monitor all erosion and sediment control measure implementation and any associated discharges to allow for ongoing continuous improvement of erosion and sediment control implementation and effectiveness; and e. Undertake progressive rehabilitation and stabilisation as works proceed to ensure open exposed areas are minimised, to a maximum of 16ha at any one time and consequently achieve a reduction in the risk of sediment generation and discharges.
21.2	A Site Specific Erosion and Sediment Control Plan (SSESCP) must be prepared and reviewed annually (or updated as required) and submitted to the Consent Authority with the Annual Work Programme, reflecting the water management measures proposed for construction and mining for the following 12 months, and adhering to the objective and outcomes of the Erosion and Sediment Control Plan in Condition 21.1 above. The SSESCP must include: a. Location of the work including mining and rehabilitation borrow areas; b. Contour information; c. Erosion and Sediment Controls (ESCs); d. Details of all non structural erosion and sediment control measures and methodologies (including sequencing of works) to be implemented to ensure the ESCP outcomes are achieved; e. Internal catchment boundaries; f. Details of earthworks and ESC construction methods; g. Contingency measures; h. ESC design details; i. Design details and criteria for all permanent creek diversions; j. A programme for managing non-stabilised areas; k. The identification staff who will manage ESCs; l. The identification of staff who monitor compliance with consent conditions; m. A chain of responsibility for managing erosion and sediment control issues; n. A programme of water monitoring and sampling for turbidity which includes weekly and rainfall-event turbidity monitoring (≥25 mm in 24 hours) using field meters or grab samples upstream and downstream of mining activities in the creeks, and daily and rainfall-event turbidity monitoring downstream of creek diversions and any borrow cut locations; and o. Methods and procedures for decommissioning ESCs (if applicable).
21.3	The sediment and erosion controls at the site of the works must be inspected on a regular basis and within 24 hours of each rainstorm event that is likely to impair the function or performance of the erosion and sediment controls. A record must be maintained of the date, time and any maintenance undertaken in association with this condition which must be forwarded to the Consent Authority on request.

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22.0 Water Management Plan	
22.1	The Consent Holder must operate the mine in general accordance with a Water Management Plan (WMP) which includes a Monitoring and Effects Management Plan (MEMP) prepared by a suitably qualified hydrologist. The objectives of the Water Management Plan are to avoid adverse hydrological effects by: a. The flows in Granite Creek or Canoe Creek not being reduced by more than 10% of the MALF in long-term operation (i.e., over more than 7 days). b. The quality of water discharged to receiving waters will not cause adverse impacts on stream ecology or visual clarity. c. Potential adverse water quality (including ecological) impacts associated with discharge of naturally present toxic metals and phosphorus in downgradient surface waters are avoided where practicable, or minimised. d. The pre-mining surface drainage patterns are restored such that the catchment areas for Clark Creek, Granite Creek and other smaller creeks are not changed to any significant extent, albeit the 51.73 ha of wetland is established across these catchments. The objectives of the MEMP are: a. The rate of take of water from Canoe Creek gallery is not greater than 10% of Canoe Creek's MALF, and mining will be set back from Canoe Creek and Granite Creek b. The groundwater level in the mining void will not be manipulated to materially lower or raise pond water levels beyond 20% of baseline dredge pond water depth. c. Pumping of groundwater will be minimised by avoiding dewatering and associated water table lowering while excavating saturated material within the void down to the economic mineral grade limit or maximum reach depth of the dredge, not exceeding 10m. d. Water pumped from the void will be conveyed to the WCP. Water will be ordinarily pumped back to the dredge pond tailings zone to achieve the hydrological effect management goals above. e. The quality of any groundwater that could enter surface water or coastal water or Wasabi Springs will be monitored to confirm that it meets standards which are consistent with Hydrological effects goal III in 6.1 of the Water Management Plan. f. Detailed design information for the water management system shall be issued to WCRC for review and comment at least 16 weeks prior to the start of mining operations. • The rate of take of water will be monitored in accordance with the Resource Management (Measurement and Reporting of Water Takes) Regulations and the pumping rate will be restricted to 63 L/s instantaneous rate, and 5,400 m^3/d or 62.5 L/s on a daily basis. The maximum rate of take is anticipated to be required for infrequent periods of up to 7 days. It is also anticipated that the long-term abstraction rate would be less at 9.5 L/s. • The rehabilitated mine area will provide for the establishment of a large wetland complex in the east of the former mining area, connecting to the sea with five creeks restored with realignment and riparian plantings. ***Advice Note:*** • *All Management Plans are required to adhere to the requirements of Condition 6.0.*
22.2	The WMP must include a description of the water management methods for the site, including: a. A description of the baseline monitoring and the receiving environment; b. The proposed mine disturbance area; c. A description of all site activities with the potential to cause hydrological impacts; d. The water management actions that will be implemented to avoid hydrological effects, including: i. The water treatment train, including settling infrastructure; ii. The return of limed water to the mining void;

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	e. Operational water level and water quality monitoring requirements for the duration of the activity; f. Groundwater level thresholds and actions to be taken should these thresholds be exceeded; g. Surface water body flow threshold for Canoe Creek and actions to be taken should that threshold be exceeded; h. Actions to be taken if water quality thresholds are exceeded; i. Final Rehabilitation requirements to avoid adverse hydrological impacts on waterbodies post-mining; j. Audit checklists; k. An organisational chart showing staff and contractor positions and responsibilities for plan implementation; and l. Relevant training and induction procedures and schedules.
22.3	The WMP must be updated on an annual basis and must be submitted to the Consent Authority for certification in accordance with condition 6.0. The annual update is required to: a. reflect the proposed mining operations for the following 12 months; and b. provide any additional or amended monitoring and mitigation requirements in order to reduce the potential for adverse hydrological and/or water quality effects.
Conditions to Apply to WCRC Discharge Permits	
23.0 Method of Discharge during mining activity	
23.1	During mining, treated mine water is only permitted to be discharged directly to the mining void, and from the Mine Water Facility, if: a. metal and metalloid water quality parameters in Table A below are complied with at the sites shown in Schedule 3; and b. the non-metal water quality parameters in Table B below are complied with at the sites shown in Schedule 3 (as required by Condition 23.2) and the locations defined in Table B.

Table A - metals and metalloids thresholds, and dependencies

Parameter	Threshold mg/L	Dependency
Aluminium	0.62[B]	Hardness, pH, Dissolved Organic Carbon
Arsenic	0.013	As arsenic (V)
Boron	0.94	NA
Cadmium	0.0002[D]	Hardness
Chromium	0.0033[D]	Hardness, as chromium (III)
Copper	0.0039[E]	Hardness, pH, Dissolved Organic Carbon
Iron	1.0	As total fraction
Lead	0.0034[D]	Hardness
Manganese	1.9	NA
Nickel	0.011[D]	Hardness
Zinc	0.008[D]	Hardness

[A] dissolved fraction, unless stated
[B] at hardness = 25 g/m^3, pH = 7.0, Dissolved Organic Carbon = 1.0 g/m^3
[C] 95%-ile trigger value
[D] at hardness = 30 g/m^3
[E] at hardness = 25 g/m^3, pH = 7.0, Dissolved Organic Carbon = 2.0 g/m^3

Table B – Non-metals

Parameter	Threshold	Notes/Monitoring Location
Turbidity (NTU)	30% increase between upstream and downstream locations	Applies to discharges to Northern Creek, Central Creek, Granite Creek downstream, Unnamed Creek north of Cargill Road, Wasabi Creek and Southern Creek, shown in Schedule 3.

	Visual clarity	Conspicuous visual change	In the receiving water bodies of Northern Creek, Central Creek, Granite Creek downstream, Unnamed Creek north of Cargill Road, Wasabi Creek and Southern Creek as shown in in Schedule 3.
		Relevant NPS-FM (2020) attribute state for visual clarity	No change in the attribute states of the receiving surface water bodies, as an annual median and a 95%-ile, versus the baseline states. See advice note b below. Monitoring locations are Northern Creek, Central Creek, Granite Creek downstream, Unnamed Creek north of Cargill Road, Wasabi Creek and Southern Creek shown in Schedule 3.
	Dissolved Reactive Phosphorus (DRP)	Relevant NPS-FM (2020) attribute state	No change in the attribute states of the receiving surface water bodies, as an annual median and a 95%-ile, versus the baseline states. See advice note b below. Monitoring locations are Northern Creek, Central Creek, Granite Creek downstream, Unnamed Creek north of Cargill Road, Wasabi Creek and Southern Creek shown in Schedule 3.
	Advice Notes: • *Water quality monitoring conditions to establish the ability to discharge under this condition are contained in Condition 24.0 below.* • *The attribute state for visual clarity and DRP must be either* *a) defined via at least 12 months of baseline monitoring in Northern Creek, Central Creek, Granite Creek downstream, Unnamed Creek north of Cargill Road, Wasabi Creek and Southern Creek; or* *b) assumed to be of pristine water quality (A Band).* • *In the case of a), the monitoring data and attribute state assessment must be submitted to WCRC for approval at least 4 weeks prior to the start of mining operations.*		
23.2	The Consent Holder must ensure that discharges to surface and groundwater do not contain any contaminants other than suspended sediments, naturally occurring elements and metals, and water treatment chemicals in accordance with Conditions below: a. The use of any water treatment chemical(s) is/are permitted provided they are used in accordance with its Material Safety Data Sheet(s) (MSDS). b. The Consent Holder must notify the Consent Authority in writing and provide the respective MSDS of any water treatment chemical(s) used in accordance with the above condition before it is used.		
23.3	The Consent Holder must take all practicable measures to prevent uncontaminated stormwater entering the mine workings and disturbed areas to reduce the volume of water passing through the mining pond/settling pond system, and to improve the efficiency of the water reticulating system.		
24.0 Water Monitoring			
24.1	The Consent Holder must carry out water monitoring at the locations shown in the ESCP and Water Management Plan, and as listed in the table below:		

Location	**Parameter(s)**	**Frequency**
Canoe Creek @ State Highway 6	Flow	Hourly
Canoe Creek Gallery	Flow Level	Hourly 6 Hourly
Discharges to mining void @ Mine Water Facility near Wet Concentrator Plant	Flow	Continuous, Automated

	Northern Creek	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others)
	Central Creek (WCP)	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others)
	Clarke Creek upstream	Monitoring Suite A* Visual clarity Flow	Quarterly (metals) Monthly (Others) Hourly
	Little Granite Creek upstream	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others)
	Granite Creek upstream	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others)
	Granite Creek downstream of mining	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others) Hourly
	Unnamed creek north of Cargill Road	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others)
	Wasabi Creek	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others)
	Wasabi Springs	Monitoring Suite A* Visual clarity Flow	Quarterly (metals) Monthly (Others) Hourly
	Southern Creek	Monitoring Suite A* Visual clarity	Quarterly (metals) Monthly (Others)
	PZ 1	Water level and Monitoring Suite A*	6 hourly Quarterly (metals)
	PZ 2	Water level and Monitoring Suite A*	6 hourly Quarterly (metals)
	PZ 3	Water level and Monitoring Suite A*	6 Hourly Quarterly (metals)
	PZ 4	Water level and Monitoring Suite A*	6 Hourly Quarterly Metals

*Monitoring Suite A includes the following water quality indicators and dependencies:

Dissolved metals	***Others***
Aluminium (Q)	EC (M)
Arsenic (Q)	pH (M)
Boron (Q)	Turbidity (M)
Cadmium (Q)	TSS (M)
Chromium (Q)	Hardness (Q)
Copper (Q)	Sulfate (Q)
Iron (Q)	Amm-N (M)
Nickel (Q)	NO_3-N (M)
Lead (Q)	Dissolved Reactive Phosphorus (M)
Manganese (Q)	Dissolved Organic Carbon (Q)
Zinc (Q)	

The Clarke Creek, Little Granite Creek and Granite Creek upstream observation locations must be upstream of the mining disturbance area.
Downstream monitoring sites will be located within the 50m buffer between MHWS and the mining disturbance area.

24.2	Notwithstanding Condition 24.1, all discharges associated with the mining operations authorised under these consents must not cause any of the following effects within any

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	receiving waterbody measured at the downstream water quality monitoring sites in Condition 24.1: a. Any conspicuous oil or grease films, scums or foams, or floatable or suspended materials, b. Any conspicuous change in the colour or visual clarity, c. Any emission of an objectionable odour, d. Any significant adverse effects on aquatic life, or e. The rendering of fresh water unsuitable for consumption by farm animals.
24.3	Sampling required under the conditions of this consent must be undertaken and analysed by suitably qualified personnel and the results supplied to the Consent Authority annually as part of the annual works programme.
24.4	An Annual Hydrological and Water Quality Report must be submitted to the Consent Authority with the Annual Work Programme in accordance with Condition 5.2 for review and evaluation of compliance. The report must be prepared by a suitably qualified and experienced person and include the following information: a. A summary of the monitoring undertaken over the preceding 12 months. The summary must: i. Reference the specific consent conditions under which the monitoring has been undertaken to show how the conditions have been complied with; ii. Provide tables of the water quality data collected in accordance with Condition 24.1. b. Discussion and evaluation of the monitoring data in relation to the relevant conditions including a summary of compliance with conditions; c. A summary of the actions that have been undertaken in response to any exceedance(s) of water quality limits; d. Records of the visual inspections that have been undertaken in accordance with Condition 24.1, 24.2 and condition 24.3.
24.5	a. The Consent Holder must engage a suitably qualified aquatic ecologist to carry out annual instream and riparian habitat, macroinvertebrate and fish surveys in Northern Creek, Central Creek, Clarke Creek, Granite Creek, Wasabi Creek and Southern Creek. b. The proposed survey methodology, including the locations where instream and riparian habitat, macroinvertebrate and fish sampling will be undertaken, the timing of the sampling, the methods that will be used to undertake the sampling, the name of the authorised person who will undertake the monitoring and reporting methods must be submitted to the Consent Authority 20 working days prior to the survey being undertaken, for the Consent Authority to certify the survey methodology. ***Advice Note:*** • *If the Consent Authority refuses to certify the survey methodology, it is expected to give reasons in writing.* • *If the Consent Authority refuses certification the Consent Holder must resubmit the survey methodology for certification addressing any concerns of the Consent Authority.* • *Surveys must not be undertaken until certification is achieved.* • *The results of the survey must be submitted to the Consent Authority within 10 working days of the results being received.* • *The surveys required by this condition are to collect baseline information about aquatic biota present within the waterbodies around the consent area and monitor long term trends in aquatic ecological health.*
24.6	a. Macroinvertebrate monitoring required by Condition 24.5 must be conducted using Protocol P2 and C1 from the Ministry for the Environment Macroinvertebrate Guidelines and the samples must be analysed by an aquatic ecologist experienced in macroinvertebrate sampling and identification. b. Monitoring must be undertaken on a day on which there has been no major flood event in the preceding 3 weeks. Whenever practicable, sites that have been sampled in the past must be used.

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Conditions to Apply to West Coast Regional Council Air Discharge Permit	
25.0 Dust Management Plan	
25.1	The Consent Holder must operate the site in general accordance with a Dust Management Plan. The objective of the Dust Management Plan is to detail the best practicable option to avoid dust nuisance being caused by mining works and to mitigate any such effects should they occur.
25.2	The Dust Management Plan must include: a. Potential sources of dust that may be created during the mining project. b. Sensitive receptors in the vicinity of identified potential sources of dust for targeted dust management. c. Dust management and mitigation methods. d. Dust monitoring methods. e. Training of staff in relation to dust management; and f. Methods for managing complaints regarding discharges of dust g. Keeping of compliance records.
25.3	Vehicles travelling within the site on unsealed roads must not exceed 15 km/hr on site at all times.
25.4	If wind (measured at the meteorological station on the Central Block site) exceeds 20km/hr, the Consent Holder must: a. Limit activities that generate dust downwind of sensitive receptors identified in the Dust Management Plan; b. Conduct frequent visual inspections of exposed earthwork areas; and c. Assess the need for additional controls such as increased water application rates.
26.0 Air Quality Management and Monitoring	
26.1	There must be no offensive or objectionable discharge of dust into air from the minerals extraction, processing and loading operations that result in an adverse effect beyond the legal boundary of the site. ***Advice Note:*** • *For the purpose of Condition 28.1 the Consent Authority will consider an effect that is offensive or objectionable to have occurred if an Enforcement Officer of the Consent Authority deems it so having regard to:* *a. The frequency, intensity, duration, amount, effect and location of the suspended or particulate matter; and/or* *b. Receipt of complaints from neighbours or the public: or* c. *Relevant written advice or a report from an Environmental Health Officer of a territorial authority or health authority.*
26.2	a. The Consent Holder must install, operate and maintain Dust Deposition Gauges in the locations shown in the Dust Management Plan. b. Dust recorded in the gauges must not exceed a value of 4g/m^2/30 days above background levels. c. Dust deposition gauges will operate as follows: i. Commissioned and run to collect 1 year of baseline data prior to mining commencing in respective block ii. Decommissioned 1 year after rehabilitation has been completed. iii. Gauges in the vicinity of Warren Road will be operational throughout the activity. ***Advice Note:*** • *Background levels are to be determined by data collected prior to the commencement date of this consent.*
26.3	a. If a breach of Condition 26.3.b is detected, the Consent Holder must notify the Consent Authority within two working days of the breach being detected. b. The Consent Holder must investigate possible reasons for the breach and take all necessary steps to achieve compliance in the following 30-day period.

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Conditions to Apply to WCRC Water Take Permit	
27.0 Groundwater abstraction outcomes	
27.1	Mine void and water table exposure and associated mitigation measures must achieve the following outcomes: a. The hydrological responses to mining activity ensure that quality of water discharged to receiving waters will not cause adverse impacts on stream ecology or visual clarity; b. The pre-mining surface drainage patterns are restored such that the catchment areas for Clarke Creek, Granite Creek and other smaller creeks are not changed significantly; c. The contouring and surface drainage installed during mine rehabilitation does not increase the rate of groundwater drainage at the site.
28.0 Diversions	
28.1	The consent holder must not commence any streamworks activity until it has obtained certification from the West Coast Regional Council for the Rehabilitation Management Plan. ***Advice Note:*** • *The Rehabilitation Management Plan is to include information on the finalised streamworks for the site. The Native Freshwater Fish Capture & Relocation Plan is to provide information on native fish relocation.*
28.2	Creek construction and riparian planting must be undertaken in accordance with the approved Rehabilitation Management Plan and ensure: a. New creeks will be constructed to: i. Ensure no loss of extent, including a minimum extent of; (a) Northern Creek – 1,178m (b) Central Creek – 764m (c) Clarke Creek – 681m (d) Wasabi Creek – 733m (e) Southern Creek - 469m ii. Have a meandering pattern; iii. Convey clean water; iv. Be formed, where possible, to include run and pool habitat, and instream features including riffles and woody debris; v. Use a variety of substrate size classes, where possible; b. Riparian planting will be undertaken to: i. 5m for Granite Creek ii. Minimum of 3m for all other reconstructed creeks ; iii. Stock proof fencing erected on the outside of all riparian planting areas; iv. The Consent Holder shall ensure the on-going maintenance of any riparian planting for a period of no less than two years. This shall include on-going monitoring and eradication of woody weed species which may establish including blackberry and gorse.
28.3	a. Upon two years following permanent diversion of creek to the new channel and completion of riparian planting, fish and macroinvertebrate surveys will be undertaken to confirm recolonisation. b. Where monitoring concludes that a pre-works equivalent state of ecological health has not been achieved (refer to Condition 24.5), a specific stream diversion and development plan shall be prepared and submitted to the Consent Authority within 2 months following the monitoring undertaken. c. The Consent Holder must implement any additional works required by the specific stream diversion and development plan within 6 months following the approval by the Consent Authority or during the next planting season (whichever is appropriate to the measure adopted).
28.4	All creek diversion activities shall be undertaken in accordance with the approved methodologies as specified in the ESCP and SSESCPs.

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28.5	All temporary creek diversions shall be designed with the same design criteria and hydrological function and profile as the existing creek channel. All permanent creek diversions shall be established to a design criteria and profile that is confirmed and certified through the SSESCP process as per Condition 21.2 above.
29.0 Canoe Creek water take	
29.1	The instantaneous surface water take from Canoe Creek must not exceed 63 litres per second.
29.2	The Consent Holder must undertake monitoring of the surface water take from Canoe Creek at 15-minute intervals and supply this information electronically to the Consent Authority every day, or at the interval instructed in writing by the Consent Authority. ***Advice Note:*** *The resource Management (Measurement and Reporting of Water Takes) Amendment Regulations 2020 applies to this water take.*
29.3	The Consent Holder must maintain auditable records and provide data in the format of date, time and rate that is suitable for electronic storage.
29.4	a. The Consent Holder must maintain the measurement device(s) in good working order so as to maintain a measurement accuracy of within ± 5% for a fully pressurised pipe or ± 10% for a partially pressurised pipe. b. The Consent Holder must provide the Consent Authority within initial written verification of accuracy from a suitably qualified person that the measurement device measures the volume of water to within ± 5% for a fully pressurised pipe or ± 10% for a partially pressurised pipe, and thereafter every five years for the term of the consent.
29.5	The Consent Holder must provide the following information to the Consent Authority no later than the ten working days prior to the water being taken under this consent: a. The type of measurement device(s) used to undertake the continuous monitoring together with the manufacturer's statement for that device; and b. The location of the measurement device(s) in relation to the water take point(s).
29.6	Upon notice to the Consent Holder the Consent Authority may require the Consent Holder to cease water abstraction for a period not exceeding 48 hours, in order to undertake monitoring of natural water flows.
29.7	A fish screen on any direct surface water take must be maintained to ensure, as far as practicable, that eels, fish and fry are prevented from passing through the intake or being trapped against the screen.
29.8	This take is not to be operated concurrently with the 12-year water take consent under WCRC-2023-0046.

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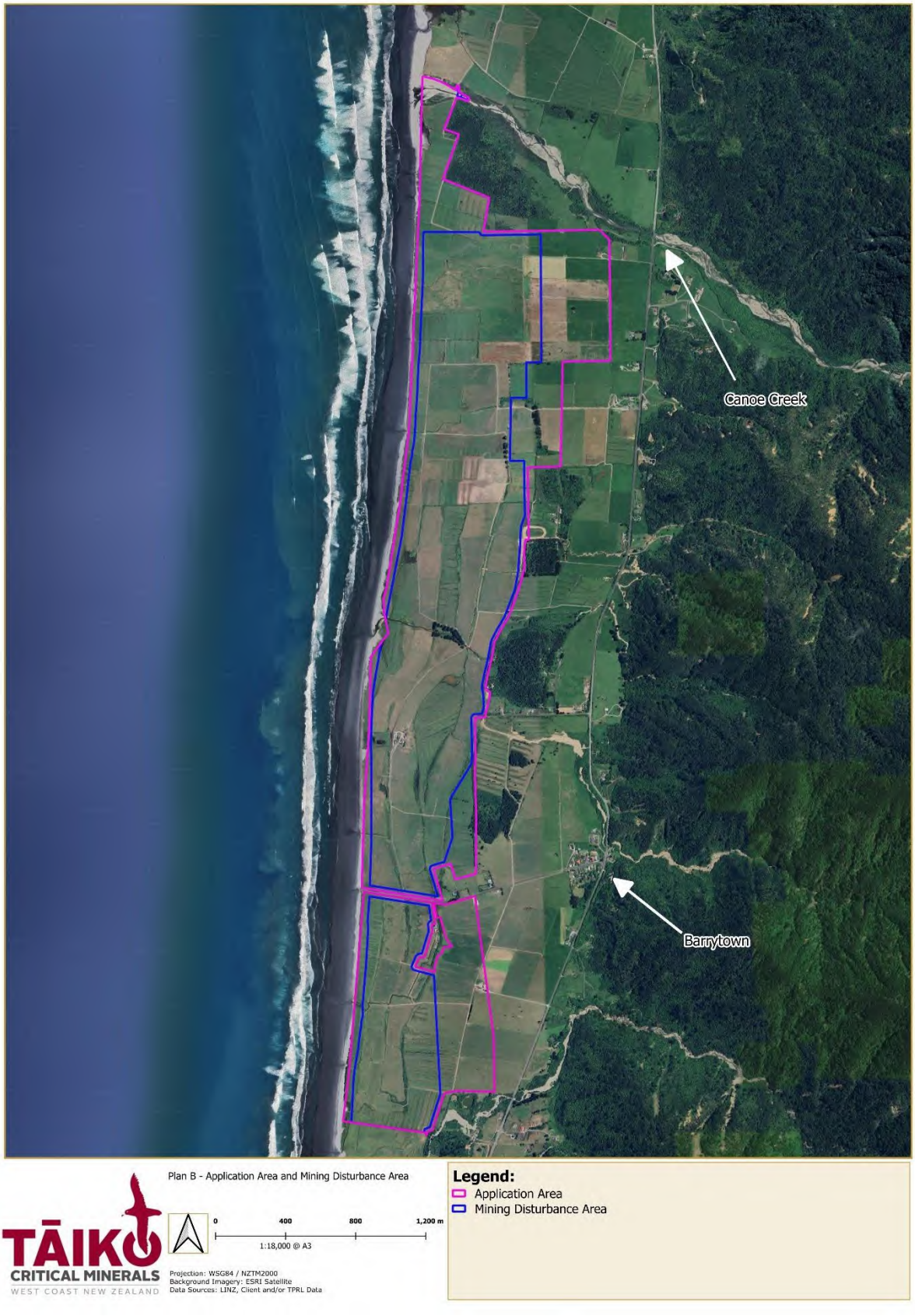
Schedule 1 – Site Plan



Schedule 2 – Landscape Mitigation Package

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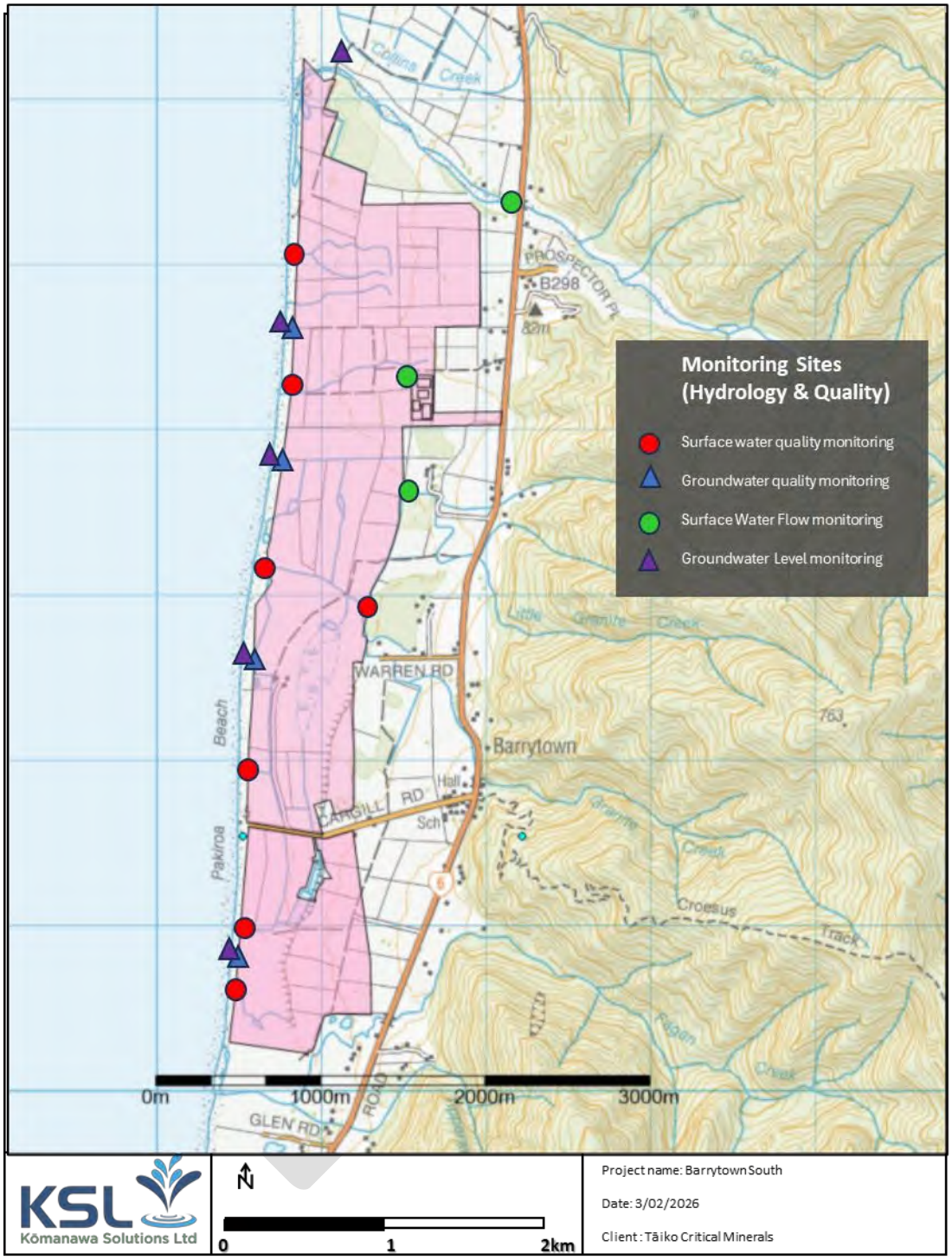
Schedule 3 – Monitoring Sites



Appendix B2: Draft Wildlife Act Authorisation

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ecoLogical Solutions
Environmental Consultants

March 2026

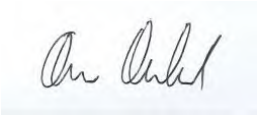
Tāiko Critical Minerals – Barrytown Southern Block Wildlife Act Authorisation Technical Report

Prepared for Tāiko Critical Minerals Limited

water fauna flora land

Quality Assurance

This report has been prepared and reviewed by the following:

Prepared by:	Owen Woodward Ecologist	
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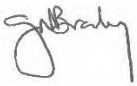
Reviewed by:	Dr Gary Bramley Ecologist	

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1.0 Introduction

Tāiko Critical Minerals Ltd (Tāiko) holds resource consents from the Grey District and West Coast Regional Councils for mineral sand mining at the 'Central Block' (CB) within Mining Permit MP 60785 as shown in Figure 1. Tāiko is seeking consents under the Fast Track Approvals Act (2024) to extend mining to the 'Southern Block' (SB) which is approximately 408 ha in extent and located south of the Central Block, between Canoe Creek and Fagan Creek. Mining activity would occur in three sections across 280 ha within the SB, referred to here as the 'mining disturbance area' and shown in Figure 1. In addition, earthworks may be undertaken within up to 72 ha of the SB outside the mining disturbance area to assist with recontouring and rehabilitation within the mining disturbance area. The affected land is owned by Moir Farms Maimai Limited, Barrytown Farms Ltd, Nikau Deer Farm and Cargill Road Barrytown Limited. Grey District Council also owns a small piece of road reserve which would be affected.

Resource consents are being sought under Schedule 5 of the Fast Track Approvals Act 2024 to undertake mineral sand mining using a floating dredge to obtain ilmenite, garnet and other minerals. This report is to support a Wildlife approval being sought under Schedule 7 for management of lizards and avifauna. Tāiko's application to seek resource consents to mine within the SB was accepted into the Fast Track process on 6 October 2024.

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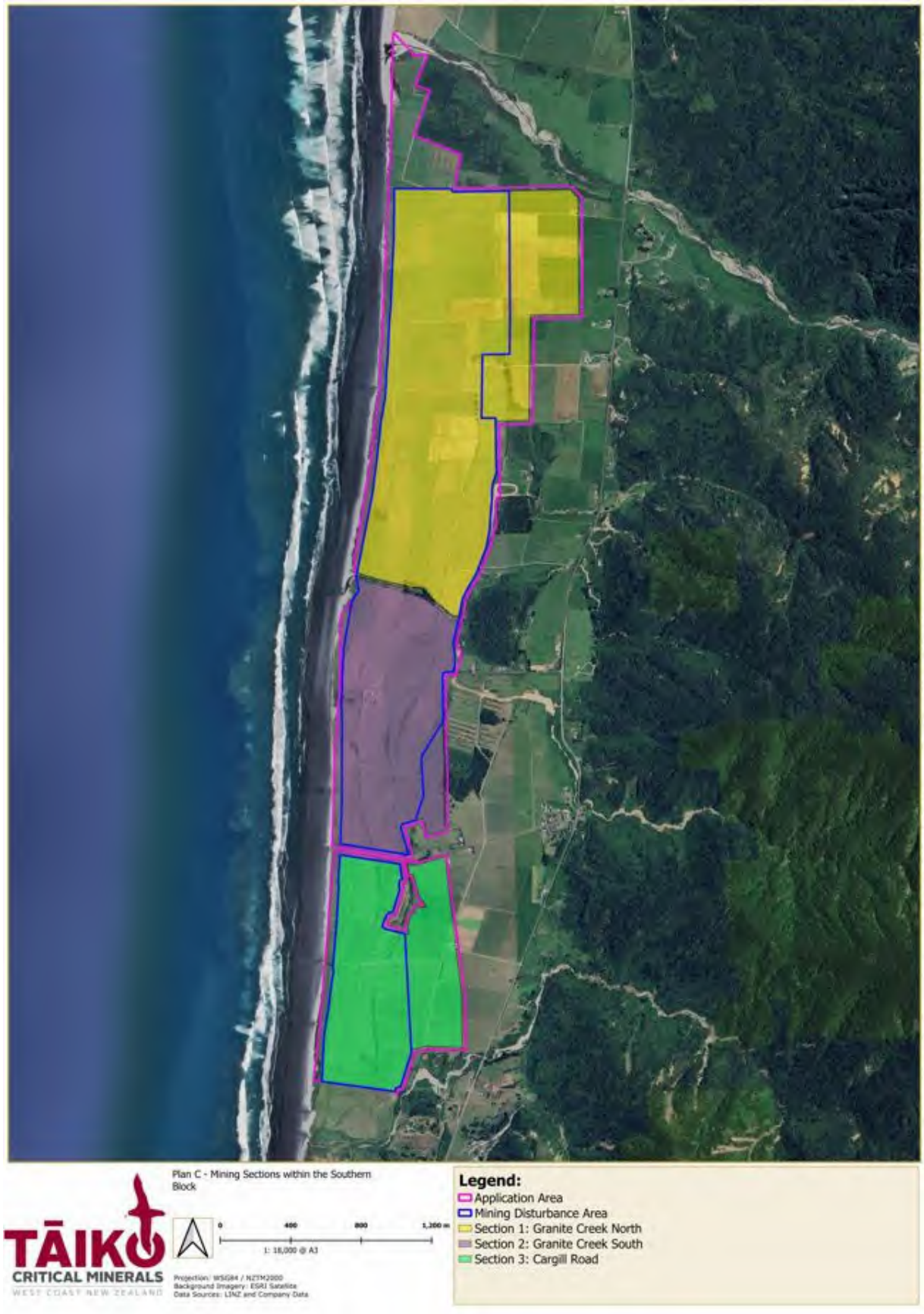

Figure 1: Mining sections within the Southern Block, Barrytown.

2.0 Information Requirements

The following information is required for the application to obtain a 'wildlife approval' (where 'wildlife approval' means a lawful authority for an at or omission that would otherwise be an offence under the Wildlife Act 1953) as set out in Clause 2(1) of Schedule 7 of the FTAA:

(1) For the purposes of section 43(3)(h), application for a wildlife approval must—

(a) specify the purpose of the proposed activity:

(b) identify the actions the applicant wishes to carry out involving protected wildlife and where they will be carried out (whether on or off public conservation land):

(c) include an assessment of the activity and its impacts against the purpose of the Wildlife Act 1953:

(d) list protected wildlife species known or predicted to be in the area and, where possible, the numbers of wildlife present and numbers likely to be impacted:

(e) outline impacts on threatened, data deficient, and at-risk wildlife species (as defined in the New Zealand Threat Classification System):

(f) state how the methods proposed to be used to conduct the actions specified under paragraph (b) will ensure that best practice standards are met:

(g) describe the methods to be used to safely, efficiently, and humanely catch, hold, or kill the animals and identify relevant animal ethics processes:

(h) state the location or locations in which the activity will be carried out, including a map (and GPS co-ordinates if available):

(i) state whether authorisation is sought to temporarily hold or relocate wildlife:

(j) list all actual and potential wildlife effects (adverse or positive) of the proposed activity, including effects on the target species, other indigenous species, and the ecosystems at the site:

(k) where adverse effects are identified, state what methods will be used to avoid and minimise those effects, and any offsetting or compensation proposed to address unmitigated adverse effects (including steps taken before the project begins, such as surveying, salvaging, and relocating protected wildlife):

(l) state whether the applicant or any company director, trustee, partner, or anyone else involved with the application has been convicted of any offence under the Wildlife Act 1953:

(m) state whether the applicant or any of the company director, trustee, partner, or anyone else involved with the application has any current criminal charges under the Wildlife Act 1953 pending before a court:

(n) provide proof and details of all consultation, including with hapū or iwi, on the application specific to wildlife impacts:

(o) provide any additional written expert views, advice, or opinions the applicant has obtained concerning their proposal.

3.0 Purpose of the Proposed Activity

(a) Specify the purpose of the proposed activity:

The purpose of species management is to avoid or minimise adverse effects on birds and

lizards during mine construction and operation. This will be achieved through the following activities as detailed within an Avian Management Plan and Lizard Management Plan prepared for the Project:

- Avian and lizard surveys to confirm individuals at risk due to the mining activity.
- Deterring birds prospecting for nests from the mining area in advance of mining and discouragement of breeding there.
- Where nests can proceed without impeding progress of the dredge, nest protection and monitoring.
- Fencing to exclude kororā from active mining areas.
- Handling of grounded or injured birds.
- Capture and relocation of lizards to remove them from clearance areas.
- Enhancement/augmentation of lizard habitat.

4.0 Actions to be Carried Out

(b) Identify the actions the applicant wishes to carry out involving protected wildlife and where they will be carried out (whether on or off public conservation land):

Key aspects of the proposed activity are summarised below:

- The total area of the SB on the Barrytown Flats is approximately 408 ha. The proposed mining disturbance area is approximately 280 ha (c. 69% of the SB) and is on private farm land (and not on conservation land). In addition, earthworks may be undertaken within up to 72 ha of the SB outside the mining disturbance area to assist with recontouring and rehabilitation within the mining disturbance area.
- Resource estimates indicate that mining 2,000,000 tonnes annually will produce 400,000 tonnes of heavy mineral concentrate (HMC) per year.
- Mine life is expected to be 14 years excluding preparation and rehabilitation. Proposed mining is anticipated to commence in approximately 2034–2035 once the mineral resource on the CB has been exhausted.
- Mining activities will be undertaken during daylight hours and not on Sundays.
- A Wet Concentrator Plant (WCP) has been consented and a water supply from lower Canoe Creek is applied for. Consent has been granted by Grey District Council for a Mineral Separation Plant (MSP) at Rapahoe where HMC will be processed further with surplus material from the SB returned to the void.
- Mining will be undertaken in three sections including: Section 1 (Granite Creek North), Section 2 (Granite Creek South) and Section 3 (Cargill Road) (refer to Figure 1). Only one of the three sections will be mined at a time.
- Mining setbacks will be established including: 20 m from the consent boundary, Significant Natural Areas, Granite Creek, Fagan Creek and any property boundaries, 50 m from Mean High Water Springs (MHWS) and 200 m from dwellings other than where noise bunds are proposed.
- Mining will be undertaken using a floating dredge within a dredge pond (100 m wide x 100 m long). The dredge pond will be within a larger area referred to as a mining void. The mining void comprises the dredge pond, the area behind the dredge pond for deposit of tailings after processing (100 m wide x 50 m long), and the area in front of the

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dredge pond in preparation for mining (100 m wide x 100 m long).

- A mine starter pit will be constructed in each of the three sections (i.e., Granite Creek North, Granite Creek South, Cargill Road) to establish an initial dredge pond in which the floating dredge can operate. Separate starter pits are necessary because the three sections are divided by physical features that will not be disturbed (i.e., Granite Creek and Cargill Road). The first mine starter pit will be located in the southwestern corner of Section 1 (Granite Creek North).
- Mining will commence in the southwest corner of Section 1 (Granite Creek North) and progress east then north. Mining will generally progress in a north/south direction within a dredge pond (dimensions = 100 m wide x 100 m length). An exception will be when the floating dredge needs to turn along a strip as it reaches the northern or southern extents of the mining disturbance area and travel in an east/west direction to commence a new strip in a north/south direction.
- Each strip will be approximately 100 m wide and excavated to a depth of 10 m below ground level noting that the depth of mining is dependent on the ore distribution. The total disturbed land area at any one time will be no more than 16 ha.
- Once the mine starter pit has been constructed, the following steps will be undertaken to enable the extraction of ore:
    (a) Removal of pasture, and small areas of other vegetation.
    (b) Stripping of topsoil and overburden.
    (c) Diversion of streams and drains.
    (d) Extraction of run of mine (ROM) material.
    (e) Initial screening of ROM material and deposit of waste material.
    (f) Pumping of run of mine material to WCP.
- Fauna management (i.e., lizards, birds) will be implemented prior to the removal of vegetation/habitat. Once completed, vegetation will be removed as mining proceeds.
- Watercourse diversions will be constructed to convey surface water in creeks and artificial drains during mining. Exceptions will be Granite Creek and Little Granite Creek, which will not be diverted. The diversion methodology will differ for each creek or artificial drain depending on the orientation of the channel (i.e., north/south or east/west), sequence of mining activities and future purpose of the land. Fish management will be implemented prior to and during the diversion of watercourses.
- Following the implementation of fauna management, removal of vegetation, topsoil and overburden and diversion of watercourses, the floating dredge will extract ROM material from the newly stripped area in the dredge pond and pump it as a slurry to the WCP.
- ROM material will be pumped from the floating dredge as a slurry to a Field Screening Unit to screen coarse material before entering the desliming circuit to remove very fine silt and clay particles (i.e., slimes) to improve recovery of valuable heavy minerals and reduce load on the WCP. After screening and desliming, ROM will be pumped as a slurry to the WCP to extract HMC and then transported to the MSP at Rapahoe for further processing.
- Tailings produced by the initial screening of ROM material at the Field Screening Unit, tailings from the WCP after extracting HMC from ROM material, and tailings from the MSP at Rapahoe will be pumped back to the rear of the mining void. Tailings deposited back into the mining void will be levelled and contoured. Overburden and topsoil stripped during pre-mining preparation will be placed over the tailings to complete the

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mining sequence and allow rehabilitation to commence.

- After an area has been mined and the land contoured and rehabilitated, creeks will be reconstructed in accordance with conditions and a Rehabilitation Management Plan (RMP) (Tai Poutini Resources Limited 2026). Some artificial drains may be reinstated if contouring alone does not provide sufficient drainage.
- Progressive rehabilitation of the mining void will take place at the same time as mining occurs and is expected to be completed within 12 months after mining at a given location has been completed and after mining voids are filled with tailings, overburden and topsoil (that was stripped pre-mining) and contoured.
- As mining in each of the three sections (i.e., Granite Creek North, Granite Creek South, Cargill Road) is completed, each section will be rehabilitated to its final landform and will include the construction of a proposed wetland of at least 50 ha, and approximately 53.7 ha, that will be planted with indigenous species and fenced to exclude livestock.
- The five diverted creeks (i.e., Northern Creek, Clarke Creek, Wasabi Creek, Southern Creek and Central Creek as shown in Figure 2) will be reinstated with more natural meandering flow paths than currently. These creeks will discharge to the coast at the same location as currently, since the outlets to the sea are within the 50 m mining setback from MHWS and therefore will not be modified.

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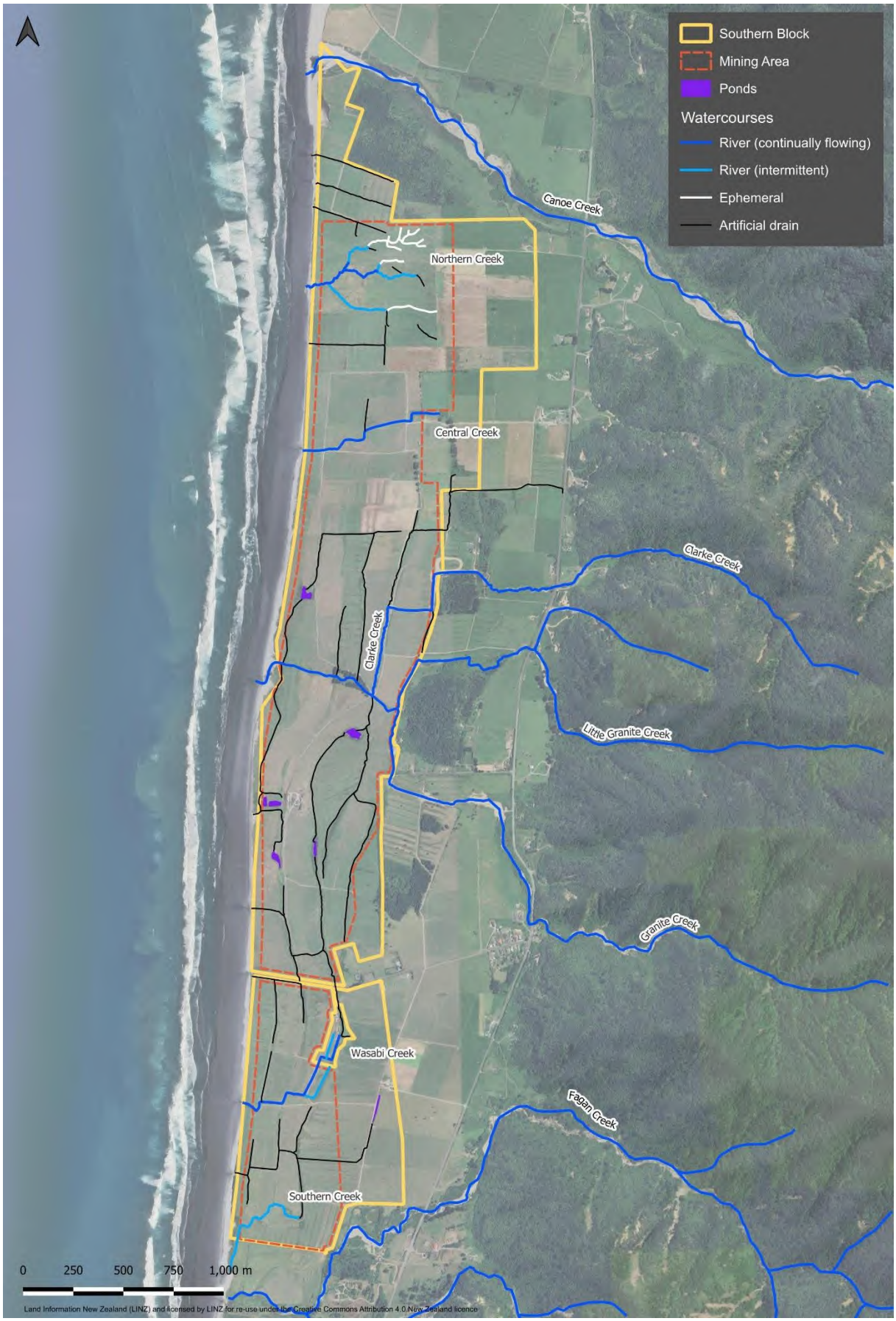

Figure 2: Watercourses within Tāiko's Southern Block.

5.0 Impact Assessment

(c) Include an assessment of the activity and its impacts against the purpose of the Wildlife Act 1953:

The Wildlife Act 1953 does not have a dedicated purpose statement. However, the Supreme Court has concluded that 'The purpose of the Act is to protect Wildlife' [1]

The proposed actions in Section 4.0 of this report are intended to protect wildlife from mortality or physical injury associated with vegetation clearance and other mining activities.

Proposed methods to handle birds and lizards are set out in Section 9.0 of this report. The actual and potential effects of the activity are detailed in Section 12.0 and measures to manage the identified effects are detailed in Section 13.0.

Proposed conditions to apply to the Wildlife Act Authority are provided in Section 17.0.

With Tāiko's implementation of approved management measures as detailed below, adverse effects on protected wildlife will be avoided or minimised. Any temporary effects of capture and relocation of individuals or disturbance to deter settling will be minimal, but relocation in particular could cause social disruption and increased competition for individuals that are relocated and individuals already present in relocation areas.

6.0 Protected Wildlife

(d) list protected wildlife species known or predicted to be in the area and, where possible, the numbers of wildlife present and numbers likely to be impacted:

There are 10 protected wildlife species that are known or predicted to be within the Barrytown Site Southern Block including six species of birds as shown in Table 1 and four species of lizard as shown in Table 2.

6.1 Protected bird species known or predicted in the area

Thirty-four species of bird have been recorded within the SB to date, including 20 native species and 14 exotic species. The birds identified as using the site or surrounds via desktop analysis and avian surveys are generally common exotic and native species typical of urban and rural environments, reflecting the highly modified state of the habitats within the SB. Fifteen of the 20 native birds recorded at the site are more commonly associated with forest, although they may also use adjoining areas and rural and suburban habitats (e.g., tūī (*Prosthemadera novaeseelandiae*) and fantail (*Rhipidura fuliginosa*)). Given the lack of suitable habitat, particularly nesting habitat, for these species within the SB they are unlikely to materially affected and management of these birds will involve avoiding clearance of shrubland and flaxland vegetation south of Cargill Road prior to planting of new shrubland vegetation and establishment of new wetland habitat within the SB.

Fifteen bird species of conservation interest have been detected within or near the site as shown in Table 1.

[1] Shark Experience Limited v Pauamac5 Incorporated [2019] NZSC 111 [11 October 2019] at paragraph 66

Table 1: Threatened and At Risk birds recorded in eBird or during surveys and considered likely to use the SB.

Common name	Scientific name	Conservation status (Robertson et al. 2021)
Banded dotterel	*Charadrius b. bicinctus*	Threatened – Nationally Vulnerable
Black billed gull	*Chroicocephalus bulleri*	At Risk – Declining
Black shag	*Phalacrocorax carbo novaehollandiae*	At Risk – Relict
Caspian tern	*Hydroprogne caspia*	Threatened – Nationally Vulnerable
Little shag	*Microcarbo melanoleucos brevirostris*	At Risk – Relict
Little blue penguin	*Eudyptula minor*	At Risk - Declining
Long-tailed cuckoo	*Eudynamys taitensis*	Threatened – Nationally Vulnerable
Red-billed gull	*Chroicocephalus novaehollandiae*	At Risk – Declining
Royal spoonbill	*Platalea regia*	At Risk – Naturally Uncommon
South Island fernbird	*Poodytes p. punctatus*	At Risk – Declining
South Island pied oystercatcher	*Haematopus finschi*	At Risk – Declining
New Zealand Falcon ('south')	*Falco novaeseelandiae*	Threatened (Nationally Endangered)
Variable oystercatcher	*Haematopus unicolor*	At Risk – Recovering
Pacific Black Duck	*Anas superciliosa*	Threatened - Nationally Vulnerable
White-fronted tern	*Sterna s. striata*	At Risk – Declining

The majority of these species are also primarily associated with coastal, wetland or forest habitats located off-site, and there is minimal quality habitat for birds within the site. However, based on existing survey data, six of the species listed in Table 1 are considered likely to temporarily use habitats within the site for foraging (especially in disturbed soil), loafing, breeding, or in the case of kororā (little blue penguin *Eudyptula minor*), may cross the site to access habitats inland. While tāiko (Westland petrel *Procellaria westlandica*) have not been detected on site, any potential effects are addressed here since the only known breeding colony is located approximately 4.5 km to the north. Table 2 sets out the species considered likely to use the site and be at risk of negative effects from mining operations. These include tūturiwhatu, tarāpunga, tōrea and tōrea tai that may use the site for foraging, roosting and potentially breeding; kororā, that are potentially impacted by impacts to access pathways to breeding areas off-site; and tāiko that may be impacted by lighting effects on navigation.

Table 2: Threatened and at-risk birds to be managed at the Barrytown Site.

Common name	Scientific name	Threat classification
Tūturiwhatu / banded dotterel	*Charadrius b. bicinctus*	Threatened – Nationally Vulnerable
Tarāpunga / red-billed gull	*Chroicocephalus novaehollandiae*	Threatened – Nationally Vulnerable
Kororā / little blue penguin	*Eudyptula minor*	At Risk – Declining
Tōrea / South Island pied oystercatcher	*Haematopus finschi*	At Risk – Declining
Tōrea tai / variable Oystercatcher	*Haematopus unicolor*	At Risk - Recovering
Tāiko / Westland petrel	*Procellaria westlandica*	At Risk – Naturally Uncommon

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6.2 Lizard species known or predicted in the area

Desktop assessment and site surveys conducted as part of an Ecological Impact Assessment (EcIA) by Ecological Solutions Limited concluded that habitat for lizards on site was scarce and low quality, though higher value habitat was present adjacent to, but outside, the mining area in the form of permanent rank pasture, rock piles, cobble and fragments of shrubland.

Lizard species present near the Site include two species of native gecko (forest gecko - *Mokopirirakau granulatus* and West Coast green gecko - *Naultinus tuberculatus*) and one skink (Newman's speckled skink – *Oligosoma* aff. *newmani* "Westland"). The site is also within the known distribution of Canterbury grass skink (*Oligosoma aff. polychroma Clade 4*).

The gecko species potentially present nearby are both primarily arboreal and so are unlikely to be using habitat within the mining area due to the lack of mature vegetation, the small, isolated and highly fragmented nature of the immature indigenous vegetation, the prevalence of highly modified pastoral habitat and the lack of pest control. Newman's speckled skink and Canterbury grass skink are unlikely to occur in the poor-quality habitats within the mining area, but their presence cannot be ruled out. Potential habitat for lizards include:

- rough exotic pasture (particularly south of Cargill Road);
- patches of indigenous coastal shrubland; and
- patches of flaxland.

Despite the highly modified and disrupted nature of the pasture habitat which comprises the majority of the Site, the lack of regular grazing of parts of the Site south of Cargill Road means that native skink species may be occupying that habitat, which would be mined during Years 12 and 13 of the Project. Habitat for lizards is of slightly better quality outside the mining disturbance area and includes rank pasture, woody debris and cobblestone habitat which may provide refuge for Newman's speckled skink and Canterbury grass skink.

Table 3: Lizard species within 10km of the Site.

Common Name	Scientific Name	Conservation Status Hitchmough et al (2021)
West Coast green gecko	*Naultinus tuberculatus*	Threatened – Nationally Vulnerable
Forest gecko	*Mokopirirakau granulatus*	At Risk – Declining
Newman's speckled skink	*Oligosoma* aff. *newmani* "Westland"	At Risk – Declining
Canterbury grass skink	*Oligosoma* aff. *polychroma* Clade 4	At Risk - Declining

7.0 Impacts on Threatened, Data Deficient and At-Risk Species

(a) outline impacts on threatened, data deficient, and at-risk wildlife species (as defined in the New Zealand Threat Classification System):

7.1 Impacts on 'Threatened' and 'At Risk' Birds

Given the lack of quality avian habitat, only a small number of species of conservation concern are likely to be using the mining site regularly or are likely to attempt to breed within the active mining area (shown in Table 2). Oystercatchers (tōrea and tōrea tai), tūturiwhatu/banded

dotterels and tarāpunga/red-billed gulls may utilise the site for foraging, roosting or possibly breeding. Impacts on species within the mining area and surrounds include the following:

- Disturbance due to deterrents implemented to deter birds from the mining area including fencing and visual/acoustic deterrents.
- Habitat clearance.
- Injury or incidental mortality due to vegetation clearance
- Disturbance, injury or incidental mortality due to mining operations (including lighting and vehicle movements).

There is the potential for kororā to be crossing the area to reach burrows inland and therefore may be at risk of injury or mortality due to mining operations. Mining operations could also impede the movements of any birds moving between the coast and inland burrows.

Since the mining area is within 6 km of the only known breeding colony of tāiko, any lighting arising from mining activities could impact navigation and cause grounding of both young and adult birds. Mining activities would only take place during daylight hours to reduce the risk to tāiko. Furthermore, lighting management to comply with the Australian Lighting Pollution Guidelines for Wildlife (May 2023) and subsequent amendments is incorporated into the Avian Management Plan to avoid effects on tāiko.

7.2 Impacts on 'Threatened' and 'At Risk' Lizards

Both 'At Risk' and 'Threatened' lizard species are found within 10 km of the site, however the habitat within the site is unlikely to support the presence of gecko species. Vegetation clearance has the potential to result in direct injury or mortality of lizards without effects management. Any lizards found will be subject to disturbance and subsequently competition post relocation.

8.0 Meeting Best Practice Standards

(f) state how the methods proposed to be used to conduct the actions specified under paragraph (b) will ensure that best practice standards are met:

The management plans which accompany the application have been prepared in accordance with available best practice guidance and will be certified by West Coast Regional Council. The AMP is based on an earlier version for TCM's Central Block, which was prepared in consultation with the Department of Conservation, the West Coast Penguin Trust and Te Rūnanga o Ngāti Waewae. Those parties will have the opportunity to provide input to the current plans. The plans will be updated as required, for example when monitoring indicates additional management is required, if new best practice standards are developed or new information on the managed species becomes available. The Department of Conservation will have the final sign-off on management plans via this Wildlife Act Authority application process and any conditions they may impose.

The specific species management in accordance with site- and species-specific management plans intended to reduce the effects of mining on wildlife will be implemented. Best practice standards listed below will be adhered to and are incorporated within the relevant species management plans:

- Key principles for lizard salvage and transfer in New Zealand (Department of Conservation 2019).
- Australian Lighting Pollution Guidelines for Wildlife (2023).

9.0 Methods to Catch, Hold or Kill

(g) describe the methods to be used to safely, efficiently, and humanely catch, hold, or kill the animals and identify relevant animal ethics processes:

9.1 Birds

Birds will not be handled unless by a suitably qualified ornithologist or ecologist. The only exception to this will be where a grounded tāiko is discovered, or where an injured or dead bird is discovered within the site. In cases where an injured bird is discovered within the site, the Department of Conservation emergency hotline will be called to determine the best course of action for the injured bird and identify where it must be taken to be treated. Injured birds will be handled carefully and placed in a dark, ventilated box until a qualified handler can be accessed.

The Avian Management Plan sets out accidental discovery protocols for live, injured and dead kororā and tāiko. It is the responsibility of the Consent Holder to provide training so as to ensure staff are appropriately informed and able to implement the accidental discovery protocol set out in the Avian Management Plan.

In the event of any dead birds (including kororā) being located at the site the Māwhera / Greymouth Department of Conservation office in Greymouth and Te Rūnanga o Ngāti Waewae will be informed and collection by or delivery to the Department of Conservation will be arranged.

In the event that a live grounded tāiko is discovered within the site, a person with the appropriate qualifications and permits will catch the bird, place it in a suitable enclosure in a warm dark place, and call the Department of Conservation hotline (0800 DOC HOT) as soon as possible for advice on care and relocation. A sturdy net suitable for catching grounded birds, leather gloves for handling birds and a suitable enclosure (lined box, crate or cage) will be held on site and all staff will be informed of their location. Best practice guidelines indicate a white flute-board or cardboard pet (cat) box with a dark interior lining is suitable for a single bird to be contained until a qualified handler can be accessed (Gummer *et al.* 2014). Boxes must have ventilation and a secured entry/exit point to ensure accidental release does not occur and to avoid injury.

If the bird is to be transferred to a care facility, it should be moved as quickly as practicable to the local (Māwhera / Greymouth Department of Conservation office (or as advised by the DOC hot line). The Department of Conservation will determine if it is fit for release and will undertake the release and inform the Mine Manager of the outcome. If injured the local Department of Conservation office will take responsibility for the bird and keep the Mine Manager up to date with progress.

In the event that a live tāiko is recovered from within 50 m of the dredge pond or the processing plant and loadout area, the event will be investigated and any reasons for grounding will be eliminated immediately where possible. The incident will be logged, reported and will result in amendment of the lighting section of the Avian Management Plan where appropriate.

9.2 Lizards

Prior to undertaking any lizard salvage activities, a lizard survey will be conducted confirm species presence and abundance within the site to confirm any species specific management actions required to best mitigate effects on lizards (e.g. provision of habitat). Prior to salvage, the extent of the vegetation clearance and earthworks will be clearly marked (e.g., flagging tape, tree dazzle or pegs) to ensure that the project herpetologist and the machine operators clearly understand the full extent of the area of impact. Lizard salvage will be required where

vegetation clearance is to be undertaken within identified lizard habitat. A Department of Conservation authorised herpetologist and suitably qualified assistant ecologist(s) will undertake targeted search and salvage campaigns prior to and during vegetation clearance. The search and salvage campaigns will be undertaken in two phases.

- *Phase 1:* Pre-vegetation clearance systematic manual habitat searches, use of artificial retreats and a live capture and relocation programme.
- *Phase 2:* Within areas where native lizards are detected, machine assisted destructive search (vegetation clearance supervision at focused areas).

Vegetation clearance supervision and machine assisted searching is a contingency measure, recognising that not every lizard may be captured during Phase 1.

- Destructive searches will involve searching through potential habitat during vegetation removal, and with the assistance of an excavator fitted with a toothed bucket or rake.
- Searches will cover all habitat where native lizards have been detected from the Phase 1 works, within the vegetation clearance area and continue until the supervising ecologist is satisfied that the potential habitats are sufficiently removed or degraded that lizards are unlikely to be present.

All lizards will be placed in a temporary containment box, which will be filled with local vegetation matter and leaf litter and misted with water. Lizards will only be held temporarily for the period of the active searches or retreat inspections, or in all cases less than two hours, after which the lizards will be transported to and released at the approved relocation site.

It is not anticipated that any lizard taxa with threat classifications higher than ‘At Risk’ will be encountered within the SB site. However, if this were to occur, the individual(s) will be captured and held temporarily in a containment box while Department of Corrections (Māwhera / Greymouth Office) is notified, and further advice and instruction is given to the herpetologist.

10.0 Proposed Activity Locations

(h) state the location or locations in which the activity will be carried out, including a map (and GPS co-ordinates if available):

For birds, the activities set out in this application apply to the entire site, since the species identified may use pasture, riparian vegetation, flaxland, indigenous coastal vegetation and exotic vegetation for foraging, roosting and breeding.

For lizards, the activities set out in this application also apply to those areas within the entire site where lizards are found to occur. While much of the SB is lacking in suitable potential habitat for lizards, the proposed activities will apply wherever lizards are found, but particularly in the isolated pockets of lizard habitat shown in Figure 3.

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Location	Vegetation type	Area (ha)
1	Grazed pasture	273.46
2	Shelterbelts	0.32
3	Pine	0.22
4	Pine	0.75
5	Indigenous coastal shrubland	0.75
6	Flaxland	0.25
7	Rough pasture	1.15
8	Rough pasture	2.33

Figure 3: Potential lizard habitats within Tāiko Southern Block, Barrytown.

11.0 Holding or Relocating Wildlife

(i) state whether authorisation is sought to temporarily hold or relocate wildlife:

A Wildlife Act Authorisation will be required to enable the handling, capture and relocation of lizards, as well as the disturbance of any 'Threatened' or 'At risk' bird species that may attempt to nest within areas proposed to be mined and are therefore at risk from mining activities. This includes species attracted by bare earth for nesting (e.g., dotterels). There is ample suitable habitat for nesting at adjacent Pakiroa Beach and birds will be encouraged to relocate outside the mining area using a variety of methods including disturbance as set out in the Avian Management Plan. Any kōrora which are found within the mining area may need to be shepherded out of harm's way. Direct physical handling of protected birds is only required in the case of accidental discovery of an injured or dead bird, or in the case of accidental discovery of a grounded tāiko. Other actions will include shepherding, disturbance using fencing, disturbance using visual and acoustic deterrents, which do not require handling.

12.0 Actual and Potential Effects

(j) list all actual and potential wildlife effects (adverse or positive) of the proposed activity, including effects on the target species, other indigenous species, and the ecosystems at the site:

Potential adverse effects of mining activities may include:

- Direct mortality or injury to individuals that may be harmed during vegetation clearance or earthworks activities.
- Disruption of movement pathways between the coast and breeding areas for kororā.
- Disturbance associated with deterrents including fencing exclusions, visual and acoustic deterrents (e.g. flagging, predator calls etc.), and shepherding (in the case of kororā being discovered under machinery or within the active mine site area).
- Temporary effects of capture and relocation of individuals may include stress, social disruption and increased competition in relocation areas.
- Disturbance associated with noise, dust and lighting from mining activities.
- Temporary reduction in breeding success due to effects of relocation.

No work is being undertaken within 50 m of the MHWS and no indirect effects (e.g., noise) are anticipated for avifauna likely to be utilising the coastal environment adjacent to the SB.

There is a low risk that artificial light will adversely affect tāiko either leaving or returning to the colony to the north. Mining would only occur during daylight hours, but lighting may be necessary at night for health and safety reasons (e.g., to assess and remedy break downs). The AMP also outlines how adverse effects of artificial light will be managed, monitored and reported. Implementing appropriate mitigation measures, including those developed as part of consenting the mining activities at the CB and which comply with the Australian National Light Pollution Guidelines for Wildlife (2023), and will minimise any effects.

13.0 Methods to Avoid/Minimise Adverse Effects

(k) where adverse effects are identified, state what methods will be used to avoid and minimise those effects, and any offsetting or compensation proposed to address

unmitigated adverse effects (including steps taken before the project begins, such as surveying, salvaging, and relocating protected wildlife):

Potential adverse effects have been identified in Section 5.0, Section 7.0 and Section 12.0 of this application. Mitigation measures proposed to address those effects are outlined in the following relevant management plans:

- Avian Management Plan (Ecological Solutions 2026a).
- Lizard Management Plan (Ecological Solutions 2026b).

Methods to avoid/minimise effects on birds include:

- Seasonal surveys and pre-clearance monitoring of birds including use of trail cameras to inform mining operations so that risks to 'Threatened' and 'At Risk' birds can be identified in advance and mitigated by methods such as deterring birds from nesting, fencing to exclude them from active areas and establishing buffers around nests (where achievable), as mining proceeds.
- Avoiding mining near important avian habitats (identified as indigenous coastal shrubland and flaxland) prior to construction and establishment of new habitats within the SB including riparian and wetland vegetation.
- Maintenance of a 50 m buffer from Mean High Water Springs and a 20 m buffer from Granite Creek and Fagan Creek to the mining disturbance area. This boundary is to be permanently marked so as to avoid crossing it inadvertently and will provide 'corridors' for kororā crossing the site.
- Weekly breeding season surveys and bi-weekly monitoring of any identified nest attempts.
- Trail camera monitoring of kororā and tāiko.
- Physical exclusion using fences and visual and acoustic deterrents, to reduce or exclude crossing or nesting in disturbance areas.
- Annual wildlife surveys for kororā using a certified conservation dog.
- Identification of active kororā burrows and breeding pairs to inform the development of site-specific management plans for each confirmed nesting pair.
- Investigation of all potential burrows, including use of a burrow scope, to confirm whether kororā are actively using them.
- Accidental discovery protocols to identify and confirm the extent and magnitude of any unexpected effects on kororā and tāiko
- Progressive rehabilitation to replace and create additional wetland habitat, riparian planting and establishment of forest/shrubland habitat prior to habitat removal.
- Restriction of mining activities to daylight hours and management of any lighting required (e.g., for Health and Safety purposes whilst remedying equipment failure) in accordance with Commonwealth of Australia guidelines.

Methods to avoid/minimise effects on lizards include:

- Prior to vegetation clearance, systematic surveys will be undertaken in order to detect any lizards present within all areas of potential habitat. If lizards are found to be present, destructive habitat searches will also be undertaken.
- All native lizards found will be released at the designated release site immediately upon capture or in all cases within two hours.

- Rehabilitation of the site will involve planting of indigenous vegetation, providing much larger amounts of habitat than what is currently present on site.
- Habitat enhancement such as creation of refugia/eco-stacks within release sites.

Table 4. Management methods to avoid or minimise effects on 'Threatened' and 'At Risk' protected wildlife.

Group	Methods	Management plan
Lizards	Survey, capture and relocation to suitable habitat within predator exclosures outside area of effect.	Ecological Solutions Limited 2026b
Birds (general)	Survey, monitor, discourage nesting and buffer around nests.	Ecological Solutions Limited 2026a
Kororā	Conservation dog surveys, trail camera monitoring, fencing deterrents, habitat rehabilitation, protection of movement corridors, accidental discovery protocols, nestbox provision.	Ecological Solutions Limited 2026a
Tāiko	Trail camera monitoring, accidental discovery protocols, lighting management	Ecological Solutions Limited 2026a

14.0 Offences and Current Charges

(l) state whether the applicant or any company director, trustee, partner, or anyone else involved with the application has been convicted of any offence under the Wildlife Act 1953:

No such convictions have been recorded.

(m) state whether the applicant or any of the company director, trustee, partner, or anyone else involved with the application has any current criminal charges under the Wildlife Act 1953 pending before a court:

No such charges are pending.

15.0 Proof of Consultation

(n) provide proof and details of all consultation, including with hapū or iwi, on the application specific to wildlife impacts:

TCM has engaged with Terry Calmeyer, the Department of Conservation Fast Track team, local DoC staff and technical staff in relation to species management. This consultation was assisted by the extensive engagement TCM had undertaken on the publicly notified resource consent for the Central Block, where the Department of Conservation was an active participant, including in appeals against the council decisions to grant consent. Robust resource consent conditions in relation to the Westland Petrel were agreed with the Department and other parties to the appeals via consent order. Lighting conditions for this application follow those agreed conditions and given mining activity will only occur during daylight hours, there are no anticipated effects on the Westland Petrel.

The Fast Track Application includes a summary of general consultation undertaken (which included discussions on wildlife and regular engagement with mana whenua) as part of the project in Appendix F.

16.0 Holder of Wildlife Approvals

Tāiko Critical Minerals will be the holder of the Wildlife Act Approval. The named ecologists for lizards will be:

- Dr Graham Ussher.
- Matt Charteris.

The named ecologists for birds will be:

- Dr Gary Bramley.
- Dr Sarah Withers.
- Patrick Stewart.
- Matt Charteris.

17.0 Additional Supporting Documentation

(o) provide any additional written expert views, advice, or opinions the applicant has obtained concerning their proposal.

None applicable.

18.0 References

Ecological Solutions, 2026a. Avian Management Plan. Unpublished report prepared for Tāiko Critical Minerals by Ecological Solutions Limited, Kāeo. March 2026.

Ecological Solutions, 2026b. Lizard Management Plan. Unpublished report prepared for Tāiko Critical Minerals by Ecological Solutions Limited, Kāeo. March 2026.

Key principles for lizard salvage and transfer in New Zealand (Department of Conservation 2019).

Robertson, H.A., Baird, K.A., Elliott, G.P., Hitchmough, R.A., McArthur, N.J., Makan, T.D., Miskelly, C.M., O'Donnell, C.F.J., Sagar, P.M., Scofield, R.P., Taylor, G.A., Michel, P. 2021. Conservation status of birds in Aotearoa New Zealand, 2021. New Zealand Threat Classification Series 36. Department of Conservation, Wellington. 43 pp.

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Appendix C: Draft Ecological Assessment

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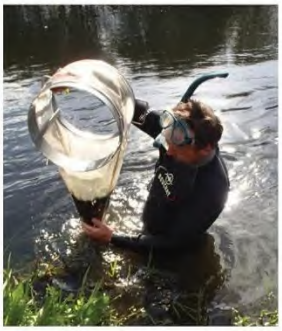
Environmental Consultants



March 2026

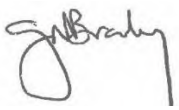
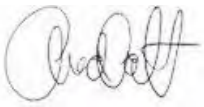
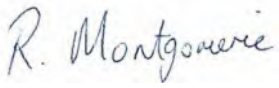
Barrytown South Mineral Sand Project
Ecological Effects Assessment

Submitted to:
Taiko Critical Minerals Limited

water fauna flora land

Quality Assurance

This report has been prepared and reviewed by the following:

Prepared by:	Dr Gary Bramley Terrestrial Ecologist	
	Chad Croft Ecologist	
	Nick Carter Freshwater Ecologist	
	Dr Mike Fitzpatrick Environmental Chemist	
Reviewed by:	Richard Montgomerie Freshwater Ecologist	

Status: Draft v19 **Issued:** 19 March 2026

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Executive Summary

Include in here Under the Fast Track - where there are any adverse impacts we need to assess the significance of that adverse impact. The decision maker then assesses against the benefits of the project. An upfront comment regarding the significance is required where you have assessed any adverse effects - as a total comment is fine. I'm assuming it will be low given all your conclusions and the proposed remediation

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1.0 Introduction

1.1 Background

Taiko Critical Minerals Ltd (TCM) holds resource consents from the Grey District and West Coast Regional Councils for mineral sand mining at the 'Central Block' (CB) within Mining Permit MP 60785 as shown in Figure 1. TCM proposes to extent mining to the 'Southern Block' (SB), which is approximately 408 ha in extent and located south of the already consented area, between Canoe Creek and Fagan Creek. Mining activity would occur on 280 ha within the SB, referred to as the 'mining disturbance area' as shown in Figure 2. In addition, earthworks may be undertaken within up to 110 ha of the SB outside the mining disturbance area to assist with recontouring and rehabilitation within the mining disturbance area. The affected land is owned by Moir Farms Maimai Limited, Barrytown Farms Ltd, Nikau Deer Farm and Cargill Road Barrytown Limited. Grey District Council also owns a small piece of road reserve which would be affected.

Resource consents are being sought under Schedule 5 of the Fast Track Approvals Act 2024 to undertake mineral sand mining using a floating dredge to obtain ilmenite, garnet and other minerals. Wildlife approvals are also being sought under Schedule 7 for management of lizards and avifauna. TCM's application to seek resource consents to mine within the SB was accepted into the Fast Track process as a Schedule 2 Project on 6 October 2024. A permit from the Ministry of Primary Industries and approval to transfer aquatic life under either section 26ZM(2) or 26ZM(3) of the Conservation Act 1987 from the Ministry of Primary Industries and Department of Conservation respectively are not required because Ecological Solutions Limited already holds the relevant permits and no species would be translocated to locations where that species is absent.

1.2 Scope of Report

Ecological Solutions Limited was engaged to undertake baseline terrestrial and freshwater surveys necessary to prepare an ecological impact assessment (EcIA). The EcIA is to inform the application for Fast Track approvals and wildlife authorisations (resource consents, approvals and authorities) and contribute to mine planning so that adverse ecological effects attributable to mine establishment and operation can be managed appropriately. The SB and proposed mining disturbance area are located near the coast and adjoin streams and wetlands. Consequently, Ecological Solutions Limited was asked to consider the proposed activities in light of the New Zealand Coastal Policy Statement (2010), the New Zealand National Policy Statement for Freshwater Management (2020) and the National Policy Statement for Indigenous Biodiversity (2024) (where they apply).

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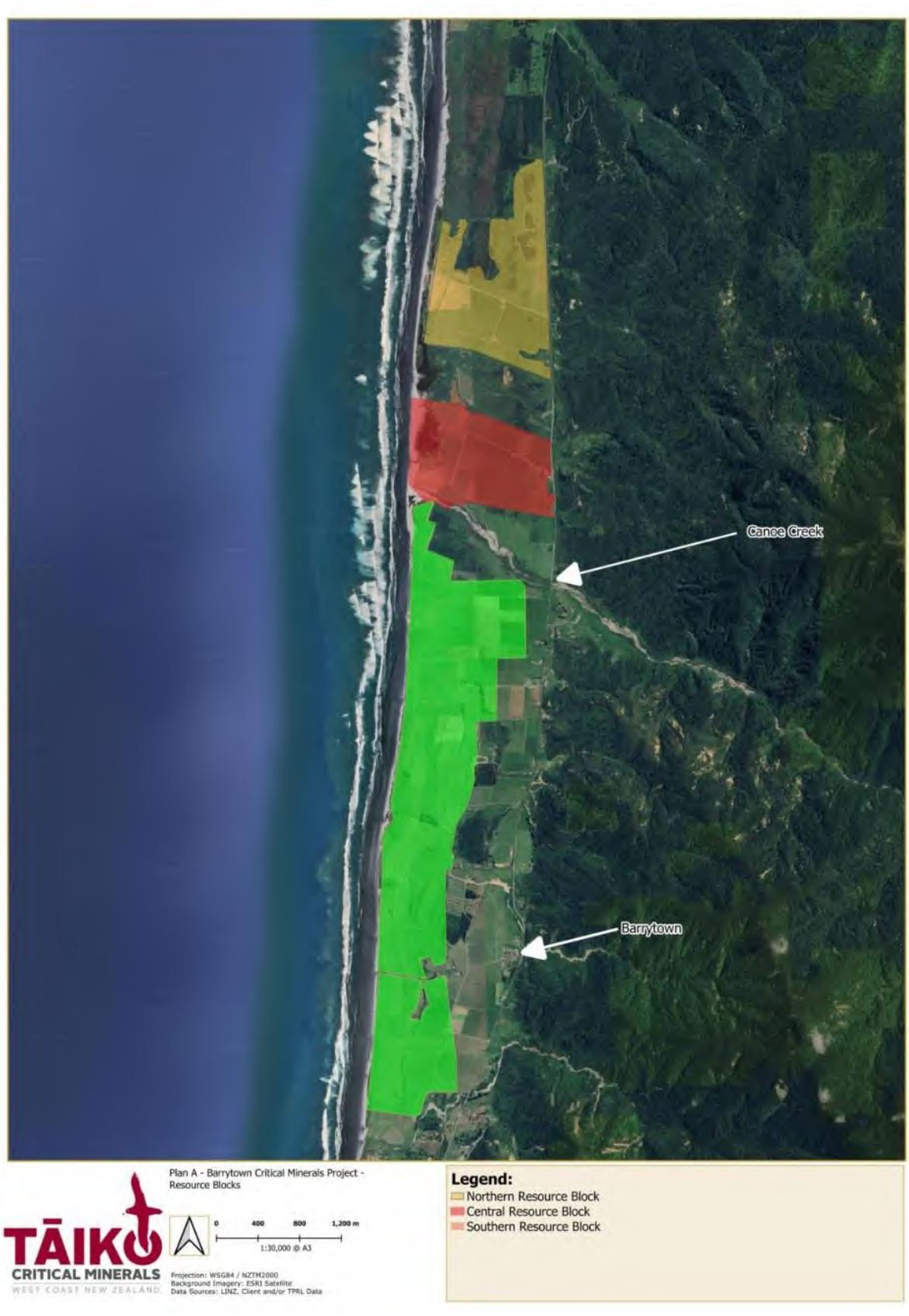

Figure 1: Location of Barrytown Critical Minerals Project Resource Blocks.

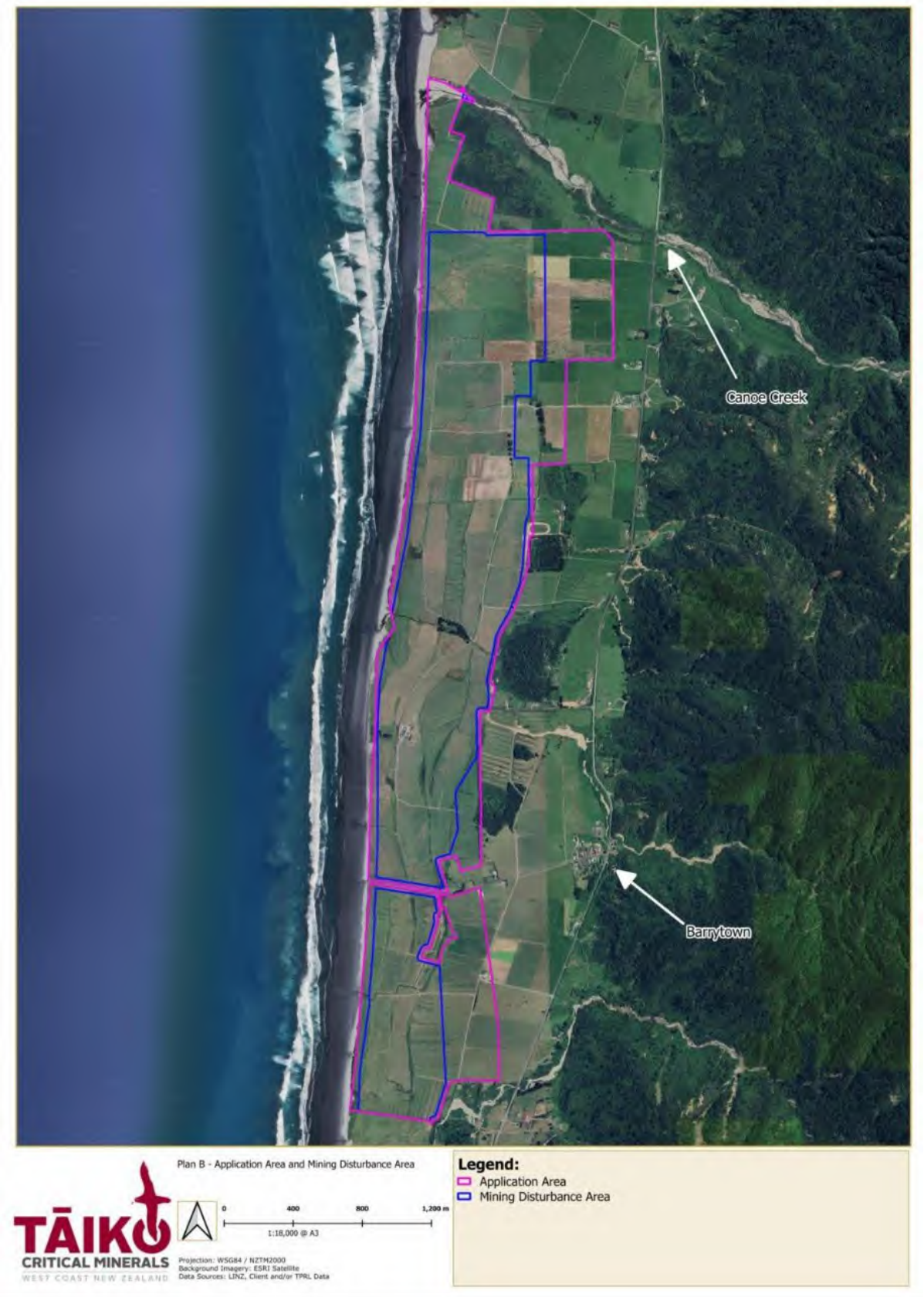

Figure 2: Location of the TCM Southern Block and Proposed Mining Area, Barrytown (Tai Poutini Resources Limited 2026).

This report includes 11 sections as follows:

- This introduction (Section 1.0).
- Description of the ecological setting of the site (Section 2.0).
- Description of survey methods used to determine ecological values (Section 3.0).
- Description of terrestrial flora and fauna recorded during field surveys (Section 4.0).
- The findings with respect to wetlands at the site (Section 5.0).
- Description of results with respect to freshwater habitats at the site (Section 6.0).
- Summary of groundwater quality at the site (Section 7.0).
- An assessment of ecological values for each of the attributes present (Section 8.0).
- An assessment of ecological effects of the proposed activity (Section 9.0).
- Description of the application of the effects management hierarchy proposed to reduce these effects (Section 9.0).
- Assessment of proposed application against the National Policy Statement for Indigenous Biodiversity (Section 10.0).
- List of references used in preparing this report (Section 11.0).

1.3 Project Description

TCM is seeking approvals to undertake mineral sand mining within the SB. The Comprehensive Project Description (Tai Poutini Resources Limited 2026) describes the proposed mining activity within the SB in the following sections relevant to this EcIA:

- Initial works.
- Indicative mining sequence and setbacks.
- Mining methodology.
- Processing of 'run of mine' material.
- Management of processing water and stormwater.
- Rehabilitation and mine closure.

Key aspects of the proposed activity are summarised below:

- The total area of the SB on the Barrytown Flats is approximately 408 ha. The proposed mining disturbance area is approximately 280 ha (c. 69% of the SB).
- Resource estimates indicate that mining 2,000,000 tonnes annually will produce 400,000 tonnes of heavy mineral concentrate (HMC) per year.
- Mine life is expected to be 14 years excluding preparation and rehabilitation. Proposed mining is anticipated to commence in approximately 2034–2035 once the mineral resource on the CB has been exhausted.
- Mining activities will be undertaken during daylight hours and not on Sundays.
- A Wet Concentrator Plant (WCP) and water supply from lower Canoe Creek were consented for mining the Central Block (CB). These consents will be retained, and extended to include the length of this project, but the WCP is proposed to be located within the SB. Consent has been granted by Grey District Council for a Mineral Separation Plant (MSP) at Rapahoe where HMC will be processed further.
- Mining will be undertaken in three sections including: Section 1 (Granite Creek

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North), Section 2 (Granite Creek South) and Section 3 (Cargill Road) (refer to Figure 3). Only one of the three sections will be mined at a time.

- Mining setbacks will be established including: 20 m from the consent boundary, private property boundaries, Significant Natural Areas, Granite Creek, Fagan Creek and any property boundaries, 50 m from Mean High Water Springs (MHWS) and 200 m from dwellings other than where noise bunds are proposed.
- Mining will be undertaken using a floating dredge within a dredge pond (100 m wide x 100 m long). The dredge pond will be within a larger area referred to as a mining void. The mining void comprises the dredge pond, the area behind the dredge pond for deposit of tailings after processing (100 m wide x 50 m long), and the area in front of the dredge pond in preparation for mining (100 m wide x 100 m long).
- A mine starter pit will be constructed in each of the three sections (i.e., Granite Creek North, Granite Creek South, Cargill Road) to establish an initial dredge pond in which the floating dredge can operate. Separate starter pits are necessary because the three sections are divided by physical features that will not be disturbed (i.e., Granite Creek and Cargill Road). The first mine starter pit will be located in the southwestern corner of Section 1 (Granite Creek North).

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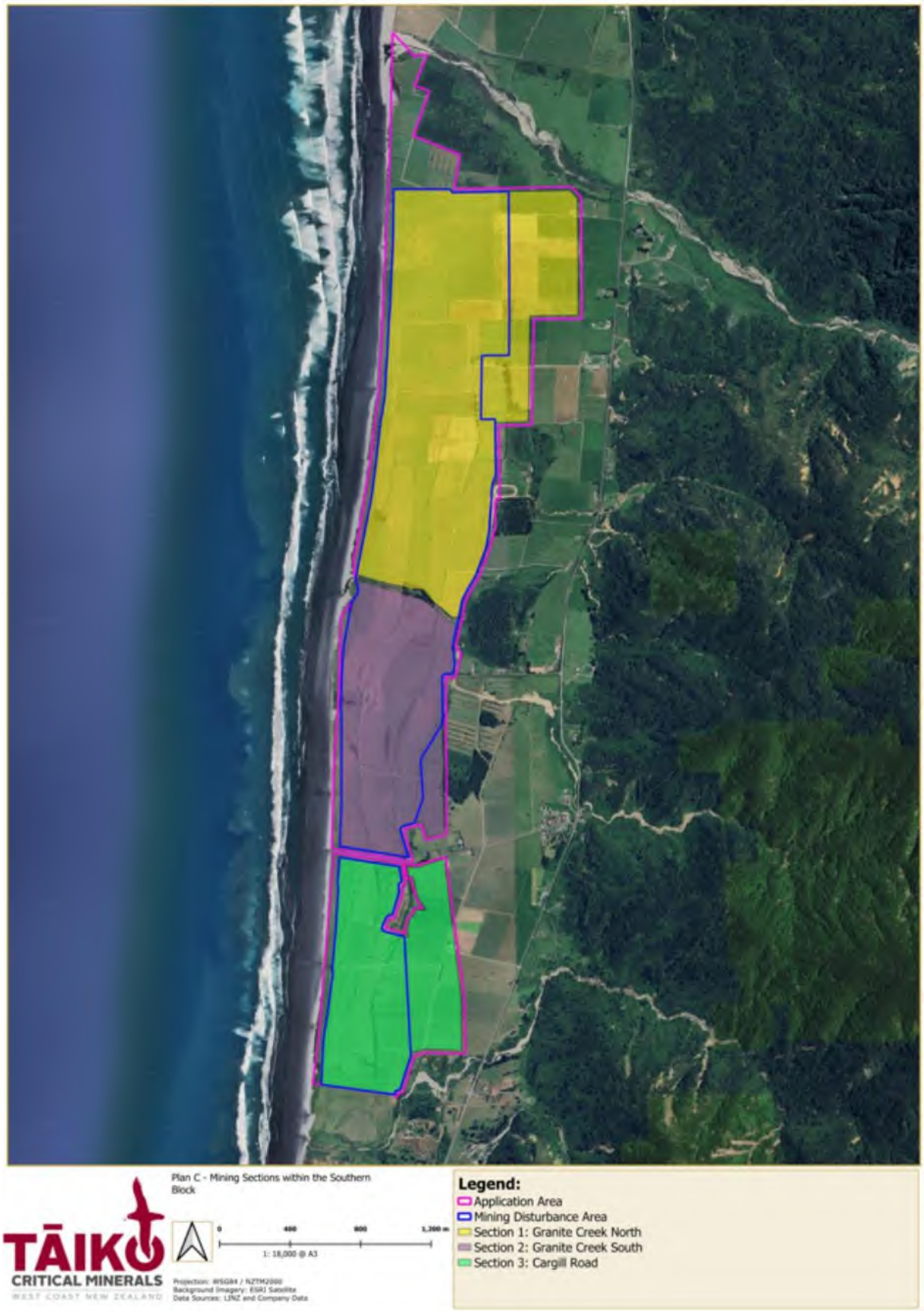

Figure 3: Mining sections within the Southern Block, Barrytown.

- Mining will commence in the southwest corner of Section 1 (Granite Creek North) and progress east then north. Mining will generally progress in a north/south direction within a dredge pond (dimensions = 100 m wide x 100 m length). An exception will be when the floating dredge needs to turn along a strip as it reaches the northern or southern extents of the mining disturbance area and travel in an east/west direction to commence a new strip in a north/south direction.
- Each strip will be approximately 100 m wide and excavated up to a depth of 10 m below ground level noting that the depth of mining is dependent on the ore distribution. The total disturbed land area at any one time will be no more than 16 ha.
- Once the mine starter pit has been constructed, the following steps will be undertaken to enable the extraction of ore:
    - (a) Removal of pasture, and small areas of other vegetation.
    - (b) Stripping of topsoil and overburden.
    - (c) Diversion of creeks and drains (collectively for the purposes of this report called “watercourses”).
    - (d) Extraction of run of mine (ROM) material.
    - (e) Initial screening of ROM material and deposit of waste material.
    - (f) Pumping of run of mine material to WCP.
- Fauna management (i.e., lizards, birds) will be implemented prior to the removal of vegetation/habitat. Once completed, vegetation will be removed.
- Temporary watercourse diversions will be constructed to convey surface water in creeks and artificial drains during mining. Exceptions will be Granite Creek and Little Granite Creek, which will not be diverted. The diversion methodology will differ for each creek or artificial drain depending on the orientation of the channel (i.e., north/south or east/west), sequence of mining activities and future purpose of the land. Fish management will be implemented prior to and during the diversion of watercourses.
- Following the implementation of fauna management (if required), removal of vegetation, topsoil and overburden and diversion of watercourses, the floating dredge will extract ROM material from the newly stripped area in the dredge pond and pump it as a slurry to the WCP.
- ROM material will be pumped from the floating dredge as a slurry to a Field Screening Unit to screen coarse material before entering the desliming circuit to remove very fine silt and clay particles (i.e., slimes) to improve recovery of valuable heavy minerals and reduce load on the WCP. After screening and desliming, ROM will be pumped as a slurry to the WCP to extract HMC and then transported to the MSP at Rapahoe for further processing.
- Tailings produced by the initial screening of ROM material at the Field Screening Unit, tailings from the WCP after extracting HMC from ROM material, and tailings from the MSP at Rapahoe will be pumped back to the rear of the mining void. Tailings deposited back into the mining void will be levelled and contoured. Overburden and topsoil stripped during pre-mining preparation will be placed over the tailings to complete the mining sequence and allow rehabilitation to commence.
- After an area has been mined and the land contoured and rehabilitated, creeks will be reconstructed in accordance with the conditions of consent, and Rehabilitation Management Plan (RMP) (Tai Poutini Resources Limited 2026). Some artificial

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drains may be reinstated if contouring alone does not provide sufficient drainage.

- Progressive rehabilitation of the mining void will take place at the same time as mining occurs and is expected to be completed within 12 months after mining at a given location has been completed and after mining voids are filled with tailings, overburden and topsoil (that was stripped pre-mining) and contoured.
- As mining in each of the three sections (i.e., Granite Creek North, Granite Creek South, Cargill Road) is completed, each section will be rehabilitated to its final landform and will include the construction of a proposed wetland of approximately 53.7 ha that will be planted with indigenous species and fenced to exclude livestock.
- The five diverted creeks (i.e., Northern Creek, Central Creek, Clarke Creek, Wasabi Creek, Southern Creek) will be reconstructed with more natural meandering flow paths than currently. Watercourses will discharge to the coast at the same location as currently, since they are within the 50 m mining setback from MHWS and therefore will not be modified.

2.0 Ecological Setting

2.1 Site Description and History

The SB is located within the Punakaiki Ecological District (ED) and North Westland Ecological Region as shown in Figure 4 (McEwen 1987) within an area known as the Barrytown Flats. The Barrytown Flats are an elongated area approximately 17 km long (North–South) and 2 km wide (East–West), flanked to the east by the Paparoa Ranges and to the west by the Tasman Sea (Burlet and Lee 2019). The Barrytown Flats are comprised of a complex sequence of old dune ridges and alluvial deposits, which would have been entirely covered in lowland (coastal) forest and wetland before clearance for mining and farming. Some wetlands, including high value wetlands such as Maher Swamp, remain within the Barrytown Flats as shown in Figure 4, with the majority of the steeper areas in the ED remaining in indigenous forest vegetation.

Nearly all of the vegetation on the Barrytown Flats has been removed or modified by historical forest clearance and drainage for timber harvesting, flax milling and mining. Most of the Barrytown area has at some time been under licence for prospecting ilmenite and gold (Wilms 1985). During the 1930s and 1940s dredging of most of both the central and southern portions of the SB occurred. This has contributed to the current landform, including creating three large areas of lower relief that display signs of a higher water table than adjoining farmland. Additional drainage, including humping and hollowing, has occurred since the 1990s. Vegetation clearance over the past 50 years has removed large areas of gorse (*Ulex europaeus*) as part of farming the area. A small cluster of over mature pine (*Pinus radiata*) trees situated on the banks of Little Granite Creek, scattered isolated southern rātā (*Metrosideros umbellata*) and a row of over-mature pine trees along a farm laneway are the only tall vegetation present within the SB.

Land within the SB is currently used for dairy farming and mostly comprises highly modified ‘humped and hollowed’ ground vegetated with pasture. Canoe Creek Scenic Reserve adjoins the northern application boundary of the site (but not within the mining area) as shown in Figure 4. Granite Creek and Little Granite Creek, along with several smaller tributaries, flow through the proposed mining area to the coast. A number of small springs and farm drains are located throughout the site which currently provide water supply for livestock. Fagan Creek is situated on the southern boundary of the Cargill Road Barrytown Limited property. The mining permit boundary is situated approximately 20 m away from Fagan Creek at its closest point.

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Figure 4: West Coast Regional Plan Land and Water Plan Schedule 1 and 2 wetlands.

Granite Creek and Little Granite Creek have been fenced to prevent livestock access; however, the majority of the watercourses and wetlands within the site are unfenced. The banks of these unfenced areas are typically unstable and subject to erosion and/or pugging because of the limited riparian vegetation and unrestricted livestock access. Many of the watercourses, including Granite Creek, have been modified and/or diverted to varying degrees over time and are therefore characterised by straight lines and hard corners rather than natural meanders. A small coastal lagoon occurs in the northern part of the SB, but is located outside of the proposed mining area.

There is an area identified in the proposed Te Tai o Poutini Plan (TTPP) as a Significant Natural Area (SNA) immediately east of the SB. This area is identified as PUN-049 and the location is shown in Figure 5 (Section 2.2.2). PUN-049 is described in the TTPP as "*lowland kahikatea forest with some wetland character and scrub on the fringes. Provides a connecting stepping stone between the coast and the forested ranges".*

There are no Schedule 1 or Schedule 2 wetlands identified in the West Coast Regional Land and Water Plan (RLWP) within or adjacent to the SB. The closest Schedule 1 wetland is Maher Swamp, located to the north of the Central Block (CB) (see Figure 4).

2.2 Punakaiki Ecological District

2.2.1 Ecological setting

The Punakaiki ED was distinguished on the basis of geology, climate, land use, topography and vegetation (McEwen 1987). Punakaiki ED includes the western slopes and alpine crests of the Paparoa Ranges and associated synclines, as well as the coastal plains to the west ('the Barrytown Flats'). The Punakaiki ED also includes extensive areas of pākihi in previously logged areas like that of the Tiropahi Valley (McEwen 1987).

McEwen (1987) considered that there was a very high diversity of vegetation types throughout the Punakaiki ED according to the variety of drainage and fertility presented by an equally high diversity of landforms. She also considered the district unusual in the variety and quality of the indigenous forests that remain. Partly because of the diversity of habitat types, McEwen considered that there was a high diversity of invertebrates and birds remaining within the ED. The ED is also home to the only known breeding colony of tāiko (Westland petrel, *Procellaria westlandica*) (McEwen 1987).

Maher Swamp, north of the SB at Barrytown, was originally set aside as a Flax Reserve and flax was harvested there (and at Razorback Swamp at the northern end of the Barrytown Flats) until the early 1950s and milled at Barrytown (Gardner 1992). Unlike most swamps in the region, Maher Swamp is comparatively nutrient rich (Gardner 1992). Gardner (1992) reported that the presence of characteristic pākihi species such as wire rush (*Empodisma minus*), tangle fern (*Gleichenia dicarpa*) and Centrolepis (*C. pallida*) were lacking at Maher Swamp and mānuka (*Leptospermum scoparium* agg.), bracken (*Pteridium esculentum*) and square sedge (*Lepidosperma australe*) were very infrequent. He also recorded only one species of *Sphagnum* (*S. cristatum*). At that time, Maher Swamp had large areas of raupō (*Typha orientalis*) and harakeke/flax (*Phormium tenax*) with smaller areas of Sinclair's sedge (*Carex sinclairii*) with *Coprosma tenuicaulis*, *Machaerina rubiginosa* and the exotic *Juncus canadensis* with sphagnum growing on the almost dry places. There was no willow. Gardner considered that *J. canadensis* had become the primary invader of disturbed peat there and that the floristic diversity was concentrated at the swamp's edges.

Plant species of interest at Maher Swamp included *Myriophyllum robustum* (At Risk – Naturally Uncommon; de Lange et al. 2024) in the large drain on the eastern side and swamp millet (*Isachne globosa*) and *Amphibromus fluitans*, which are both uncommon in

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the South Island. Norton (1991[1]) also recorded sand coprosma (*Coprosma acerosa*) at Maher Swamp. Sand coprosma is regarded as 'At Risk – Declining' by de Lange et al. (2024).

Since approximately 2010, there has been a concerted effort to rehabilitate sand plain forest on the 80 ha former Rio Tinto property at the northern end of the Barrytown Flats (adjoining Nīkau Scenic Reserve and known as Te Ara Tāiko Nature Reserve) with the aim of restoring ecological connection between the coast and habitats inland.

Because of the topography and elevation of the Barrytown Flats, original freshwater habitats in the area would have been characterised by low order, moderate energy watercourses connected to large wetland swamps and perhaps fens. The steep upper catchments would have increased water velocity in streams, whilst nearer the coast, occasional flooding combined with poorly drained soils and high groundwater levels would have maintained large wetlands. These wetlands functioned to attenuate water flows and acted as slow-release water storage areas, minimising flooding and reducing sediment load at the coast. Wetlands would have harboured a variety of native terrestrial and aquatic flora and fauna, including a high diversity of native macroinvertebrates and fish species as well as birds.

Onley (1980) carried out 117 bird counts in five different low altitude forest types in the Punakaiki ED including Karst forest, Coastal forest, Old Tertiary forest, Limestone talus forest and cutover forest. The forests were all located below 170 m asl. Coastal forest was dominated by kāmahi (*Pterophylla racemosa*) with emergent rimu (*Dacrydium cupressinum*) and conspicuous northern rātā (*Metrosideros robusta*) and hīnau (*Elaeocarpus dentatus*). Coastal forest had the lowest number of bird species per count overall (9), with Old Tertiary forest having 10 native species and Karst forest having 13. These observations combined with information from the Land Environments of New Zealand and Threatened Environments Classification, indicate that the Punakaiki ED is relatively intact with respect to species, habitats and ecological functioning.

2.2.2 Significant Natural Areas within the Punakaiki Ecological District

Boffa Miskell identified potential significant natural areas within the Grey District on behalf of GDC in 2006/2007. Significant Natural Areas (SNAs) in the vicinity of the site identified in the TTPP are shown in Figure 5. There are no SNAs within the application area, but there are a number of SNAs identified on the wider Barrytown Flats, which are summarised in Table 1. The locations of the areas summarise in Table 1 are shown in Figure 5.

An area of indigenous vegetation to the east of the SB is identified in Schedule 4 (Significant Natural Areas) of the Proposed Te Tai o Poutini Plan as Site PUN-049. It is described as lowland kahikatea forest with some wetland character and scrub on the fringes (West Coast Regional Council 2021).

Canoe Creek Lagoon, adjoining the Central Block, is also identified as an SNA (PUN-W034), consisting of a lagoon and series of small lakes bordered by flax wetlands and coastal forest. Maher Swamp is located on public conservation land and identified as a significant wetland in the RLWP. An area adjacent to Maher Swamp is identified in Schedule 4 (Significant Natural Areas) of the TTPP as Site PUN-044 and contains kahikatea forest, coastal hill forest, and areas of flax and sedgeland. PUN-043 comprises dune forest and wetland with forest on dune ridges and harakeke (*Phormium tenax*)-dominated wetland in dune hollows.

To the north and west, the Central Block (CB) is bordered by PUN-W034 Punakaiki Lagoon and Coastal Wetland sequence, which is described as "a lagoon and series of small lakes bordered by flax wetlands and coastal forest. Significant vegetation and ecosystem

[1] https://www.nzpcn.org.nz/publications/plant-lists/plant-lists-by-region/maher-swamp-barrytown-mahy/

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sequence."

The northern boundary of the SB is approximately 4 km south of the only known tāiko (Westland petrel) colony which is located between Punakaiki River and Waiwhero Creek (and identified as PUN-124 in the TTPP). Tāiko have a conservation threat status of 'At Risk (naturally uncommon)' with the qualifiers "one location" and "stable" (referring to the population, Robertson et al. 2021). The total population of tāiko is estimated to be 7,900–13,700 individuals or around 4,000 breeding pairs (Waugh and Bartle 2013, Birdlife International 2021). One of the largest causes of tāiko mortality identified to date is grounding due to disorientation caused by artificial lighting. Of 296 tāiko discovered after a grounding between 2007 and 2023 where the location was known, 180 (61%) were collected in the Punakaiki area, 61 (21%) in and around Greymouth, 34 (11%) from the Westport area and 21 (7%) from the Hokitika or Charleston area (data supplied by S van Smit, Department of Conservation, pers. comm. 27 March 2023). Thus, the Punakaiki area is important core habitat for tāiko.

In the TTPP, the area identified as PUN-W033 is described as a flax dominated wetland with some coastal forest extending from Nīkau Scenic Reserve to the northern end of Barrytown Flats. The wetland is known to support a population of brown mudfish. The area identified in the TTPP as PUN-123 is described as broadleaved and rimu forest with occasional northern rata and hard beech and acts as an ecological corridor between the Paparoa Ranges and Maher Swamp.

Table 1: Potential Significant Natural Areas (SNAs) on the wider Barrytown Flats.

SNA Identifier	Location	Description	Proximity to site
PUN -W033	Punakaiki/Barrytown Flats Punakaiki Ecological District	Flax dominated wetland and some coastal forest that extends from Nikau Scenic Reserve to the northern tip of Barrytown Flats. The wetland supports a brown mudfish population which are nationally threatened.	7 km North
PUN-W034	Punakaiki/Barrytown Flats Punakaiki Ecological District	Punakaiki Lagoon and Coastal Wetland sequence. A lagoon and series of small lakes bordered by flax wetlands and coastal forest. Significant vegetation and ecosystem sequence.	500 m north. Adjacent to Central Block
PUN -123	Punakaiki/Barrytown Flats Punakaiki Ecological District	Large area of broadleaved and rimu forest with occasional northern rata and hard beech. Serves as an ecological corridor between Paparoa National Park and Mayer Swamp.	4 km North
PUN - 124	Punakaiki/Barrytown Flats Punakaiki Ecological District	Coastal forest dominated by broadleaves and rimu with occasional nikau. This is an important breeding site for the Westland petrel.	7 km North
PUN 043	Punakaiki/Barrytown Flats Maher Swamp Punakaiki Ecological District	Raupō and harakeke/flax swamp.	2.5 km North
PUN 044	Punakaiki/Barrytown Flats	Lowland forest and wetland	2.5 km North

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	Punakaiki Ecological District	adjoining Maher Swamp with adjacent coastal hill forest. Mix of kahikatea forest with northern rata and sparse rimu in places, but also extensive areas of flax and sedgeland. Provides an ecological corridor between the Maher Swamp and the forested land to the east of the road.	
PUN 049	Barrytown Punakaiki Ecological District	Lowland kahikatea forest with some wetland character and scrub on the fringes. Provides a connecting stepping stone between the coast and the forested ranges.	Adjacent to application area. 140 m East of the Mining Area

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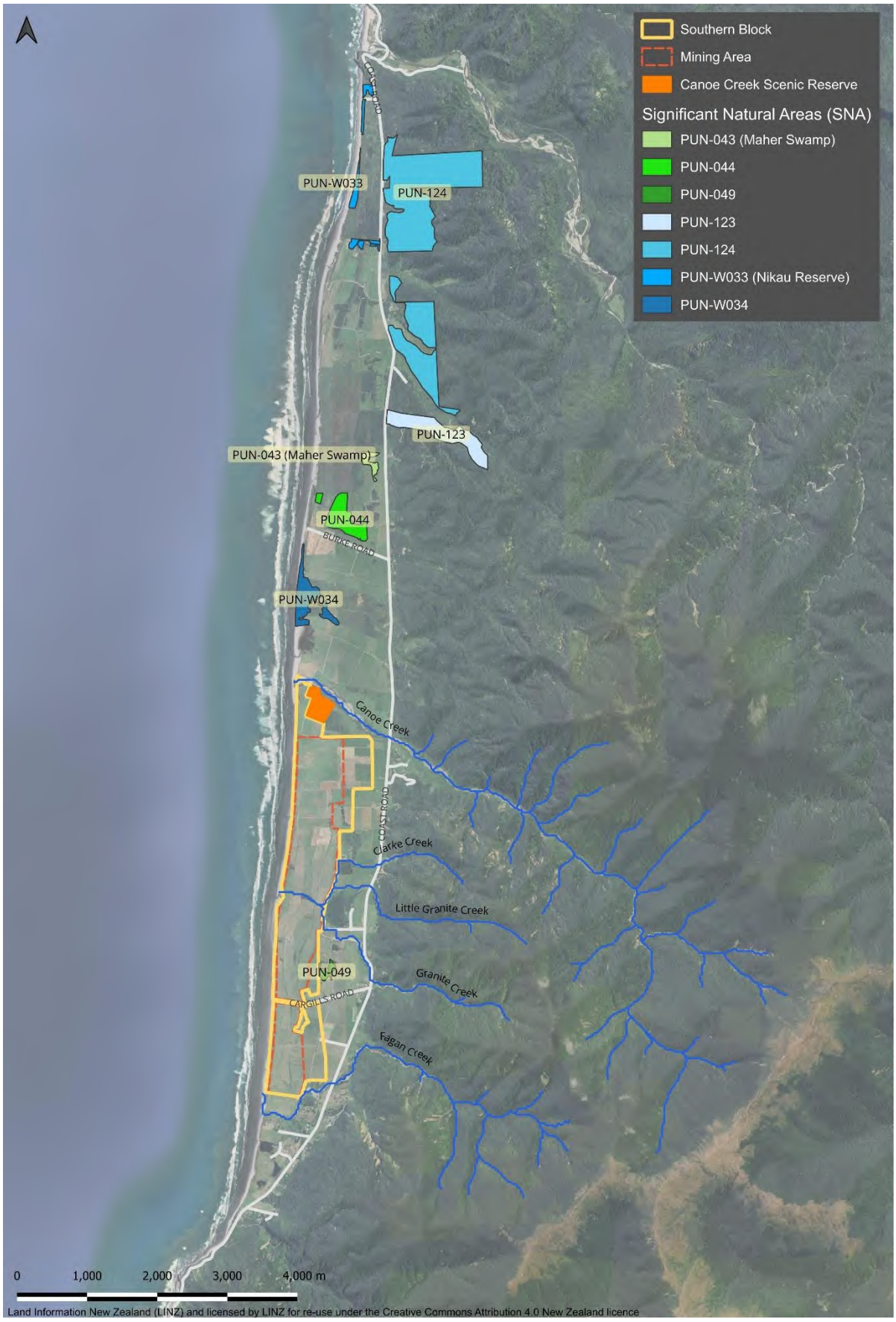

Figure 5: Significant Natural Areas near the Barrytown Flats identified in the Te Tai o Poutini Proposed Plan.

3.0 Methods

3.1 Terrestrial Flora and Fauna

3.1.1 Vegetation

A desktop assessment of aerial imagery (Google Earth, Retrolens), topographic maps, GIS datasets (including Land Cover Database version 5.0 (LCDB V5.0) and West Coast Regional Council data) and a review of available previous studies (summarised by Ecological Solutions Limited 2023) was used to inform an assessment of historic landcover and vegetation types as well as current landcover and vegetation types within the SB and the Punakaiki ED more generally. Vegetation at the site was surveyed during two walk-through surveys undertaken on 17–19 June 2024 and 21–23 January 2025. Vegetation was photographed and described in terms of composition, value, structure, and integrity. Any 'Threatened' or 'At Risk' plant species encountered were recorded. Vegetation within wetlands was surveyed as set out in Section 3.2 below.

3.1.2 Avifauna

A list of birds recorded from within 10 km of the site prior to December 2024 was compiled from the eBird database. Two surveys were undertaken within the SB in July (winter) and October (spring) 2024. During the winter survey, 13 acoustic recorders (AR4s) were deployed within the SB, with another acoustic recorder (REY23 73), deployed during the spring survey (October 2024) bringing the number used in that survey to 14. In addition to the AR4s, 22 five-minute bird counts (5MBCs) were undertaken across the habitats present at the site. Each acoustic recorder was given a unique identifier and deployed for at least ten nights per survey. The recorders were set to record between 19:00 hrs and 07:30 hrs (i.e., overnight). The monitoring locations used in the surveys are described in Table 2 and shown in Figure 6.

Table 2: Avifauna monitoring locations within the SB.

Station [1]	Monitoring method		Predominant Habitat Type	Easting	Northing
	AR	5MBC			
REY01	-	✓	Grassland	1460915.00	5324825.00
REY02	-	✓	Grassland	1460933.37	5324617.81
REY03 52	✓	✓	Grassland	1460887.00	5324226.00
REY04 49	✓	✓	Grassland	1460886.00	5323989.99
REY05 43	✓	✓	Pond/shrubland/grassland	1460872.00	5323699.00
REY06 34	✓	✓	Scrubland/grassland	1460856.00	5323515.99
REY08 68	✓	✓	Scrubland/wetland	1461332.00	5324385.00
REY09 36	✓	✓	Grass/treeland	1461531.00	5324377.00
REY10 60	✓	✓	Grass/treeland	1461545.00	5324181.00
REY11	-	✓	Grassland	1461370.00	5324183.00
REY12	-	✓	Grassland	1461369.00	5323985.00
REY13	-	✓	Grassland	1461314.85	5323792.78
REY14	-	✓	Grassland	1461277.13	5323595.21
REY15	-	✓	Shrubland/grassland	1461230.10	5323401.55
REY16 51	✓	✓	Scrubland/grassland	1461206.00	5323203.00
REY17 57	✓	✓	Shrubland/grassland	1461401.00	5323162.00
REY18 82	✓	✓	Treeland/grassland	1461158.00	5323018.00
REY19 80	✓	✓	Shrubland/grassland	1460974.00	5323141.00
REY20 61	✓	✓	Pond/shrubland/grassland	1461095.00	5323611.99
REY21 63	✓	✓	Grassland	1461036.00	5322848.00
REY22	-	✓	Pond/shrubland/grassland	1460845.00	5322777.00
REY23 73	✓	✓	Grassland	1460831.04	5322207.98

Note: [1] Codes include REY then location (first 2 #s) and unique AR identifier (second 2 #s) where both methods were used.

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Figure 6: Avifauna monitoring sites within the SB, Barrytown.

3.1.3 Herpetofauna

A search of the Department of Conservation (DOC) Bioweb herpetofauna database records within 10 km of the site was undertaken with data retrieved on March 2024.

Potential herpetofauna habitat on or near the SB was recorded during two walk-through surveys undertaken on 17–19 June 2024 and 21–23 January 2025. Any potential habitat was photographed and its location recorded.

3.1.4 Bats

Published and unpublished reports and the national bat database records (data retrieved on 4 February 2025) were reviewed to identify records of bats within 25 km of the SB. The information gathered was used to describe bat distribution and activity in relation to the SB.

Potential bat habitat (e.g., roosts, commuting routes and foraging sites) within the SB was identified and recorded during the two walk-through surveys undertaken on the 17–19 June 2024 and 21–23 January 2025. Any potential habitat was photographed and its location recorded.

3.2 Wetlands

An initial desktop assessment was carried out using aerial imagery (Google Earth, Retrolens), topographic maps and GIS datasets (i.e., LCDB V5.0, West Coast Regional Council). These were used to assist in assessing historic hydrological conditions and identifying possible wetland locations and extents within the SB for subsequent field survey.

Wetlands are defined in the Resource Management Act (RMA) as "Permanently or intermittently wet areas, shallow water, and land water margins that support a natural ecosystem of plants and animals that are adapted to wet conditions".

The West Coast Regional Council defines wetlands in the glossary of the RLWP as:

> *"Wetland includes permanently or intermittently wet areas, shallow water, and land water margins that support a natural ecosystem of native plants and animals that are adapted to wet conditions and excludes areas of pasture where water ponds after rain".*

The NPS-FM defines natural inland wetlands as a wetland (as defined in the Act) that is not:

(a) in the coastal marine area; or

(b) a deliberately constructed wetland, other than a wetland constructed to offset impacts on, or to restore, an existing or former natural inland wetland; or

(c) a wetland that has developed in or around a deliberately constructed water body, since the construction of the water body; or

(d) a geothermal wetland; or

(e) a wetland that:

- *(i) is within an area of pasture used for grazing; and*
- *(ii) has vegetation cover comprising more than 50% exotic pasture species (as identified in the National List of Exotic Pasture Species using the Pasture Exclusion Assessment Methodology (see clause 1.8)); unless*
- *(iii) the wetland is a location of a habitat of a threatened species identified under clause 3.8 of the NPS-FM, in which case the exclusion in (e) does not apply.*

Wetlands within the SB were identified, delineated and described during surveys on 17–19 June 2024 and 21–23 January 2025. Wetlands were identified in accordance with the

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National Policy Statement for Freshwater Management (2020) (NPS-FM) and wetland delineations carried out in accordance with MfE Wetland Delineation Protocols (2022).

Wetlands were mapped during field surveys by annotating printed aerial photographs from recent aerial imagery. Coordinates of wetland plots were also recorded.

Wetland surveys were completed throughout the SB. Wetlands within 100 m of the site were not assessed directly because permission to access them was not obtained.

3.3 Watercourses

3.3.1 Sampling sites

Granite Creek, Little Granite Creek and Clarke Creek originate in the hills east of SH6 and flow through the site before discharging to the sea. All other watercourses originate within the SB as shown in Figure 7. Ten sites were surveyed within the SB during the watercourse survey undertaken on 22 and 23 January 2025. Sites are described in Table 3 with locations shown in Figure 7.

Sites 1, 7 and 8 were located on artificial drains within the SB which were either constructed to drain land for farming or constructed as part of historical mining at the site.

Sites 5 and 6 were located on Granite Creek whilst site 4 was located on Clarke Creek, which joins Granite Creek as a channelised watercourse within the SB.

Site 2 was located on the lower reaches of an unnamed natural watercourse (referred to here as Northern Creek). Site 3 was located in the lower reaches of a highly modified unnamed natural watercourse (referred to here as Central Creek). Site 9 was located on a highly modified unnamed watercourse (referred to here as Wasabi Creek) in the southern area of the site. Site 10 was also located on a highly modified unnamed natural watercourse (referred to here as Southern Creek).

Table 3: Aquatic ecology sampling site details.

Site	Stream	Description	NZTM 2000	
			Northing	Easting
1	Artificial drain	Drain receiving water from natural wetland to the north of the site	5325644.08	1461038.64
2	Northern Creek	Natural catchment in the northern portion of the site	5325053.19	1460889.15
3	Central Creek	Unnamed creek in the northern portion of site	5324223.38	1460886.48
4	Clarke Creek	Highly modified natural stream with catchment originating in hills east of SH6	5323133.50	1460791.85
5	Granite Creek	Lower tidally influenced reaches	5322928.20	1461215.78
6	Granite Creek	Above tidally influenced reach and below Little Granite Creek and Granite Creek confluence	5323235.20	1461190.68
7	Artificial drain	Drain with soft-bottomed bed	5322578.99	1461085.31
8	Artificial drain	Lower reaches of drain network in southern portion of site	5321925.98	1460664.95
9	Wasabi Creek	Good flow and gravel/cobble bed	5320966.96	1460688.15
10	Southern Creek	Lower reaches of unnamed creek with artificial network in southern portion of site	5320413.25	1460613.54

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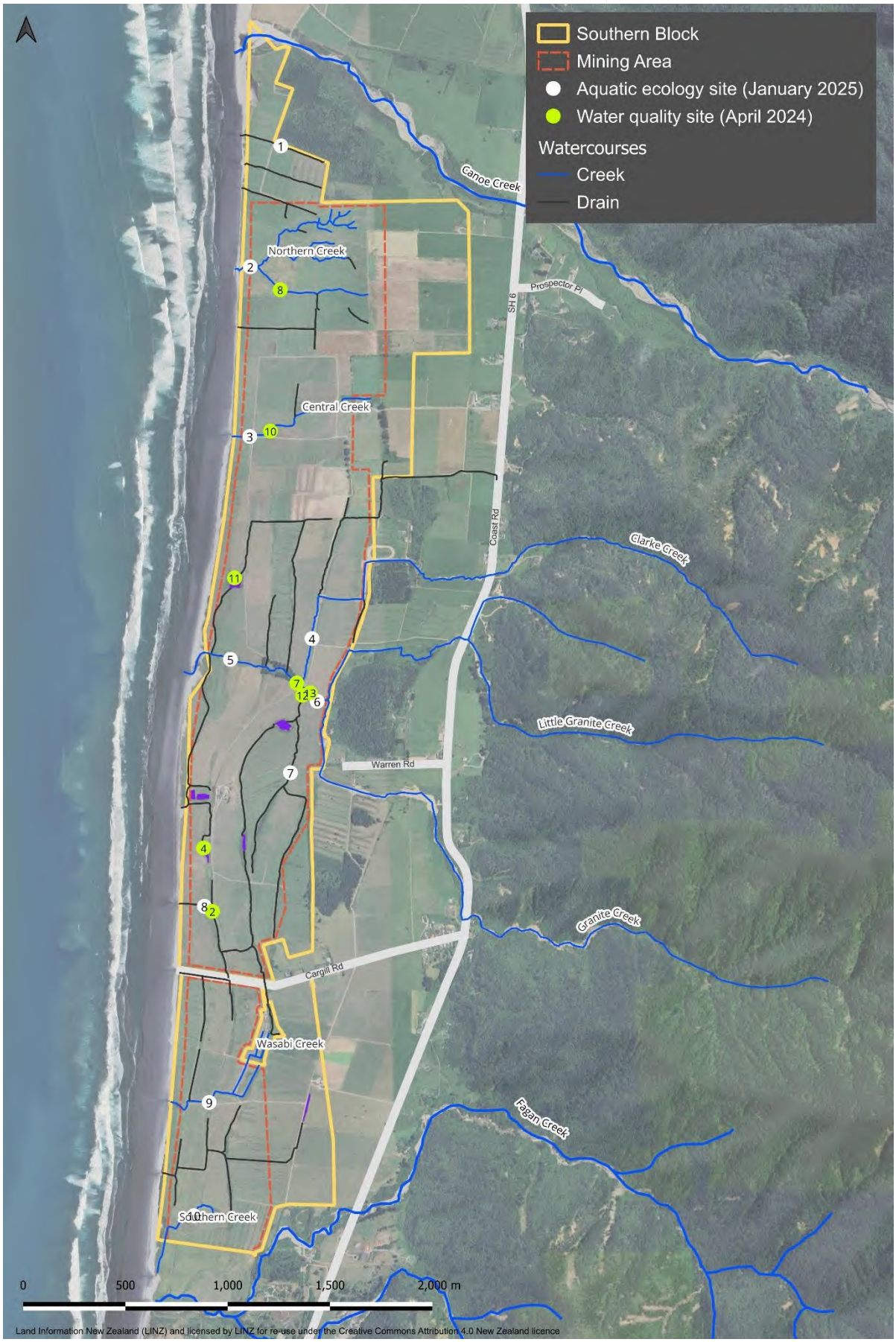

Figure 7: Location of water quality and aquatic ecology sampling sites, Barrytown.

3.3.2 Water quality

In April 2024, surface water quality samples were collected for a suite of broad analyses from the eight sites shown in Figure 7. Samples were collected using standardised sampling techniques (USGS, 2014), which included shipping of samples iced and without delay. Laboratory analyses were conduction by Hill Laboratories, Hamilton.

Physico-chemical data including temperature, dissolved oxygen, conductivity and pH were also recorded at sites during the April 2024 survey using a calibrated hand held YSI meter. Physico-chemical data was also recorded at the ten aquatic ecology sites during the January 2025 survey using a calibrated hand held YSI meter. The time of day at which physico-chemical parameter data was collected was also recorded.

3.3.3 Watercourse classification

Flowing freshwater habitats within the site were classified in accordance with the definitions outlined in the glossary of the RLWP and were used to describe their status, which are:

> ***Drain*** *refers to an artificial channel or subsurface conduit (e.g. mole drain, tile drain or drainage tunnel, or roadside swale) constructed for the purpose of:*
>
> - *Collecting and diverting surface runoff, but also includes water collected from sealed surfaces with no associated reticulated stormwater system such as roadside swales and concrete dish swales, or*
> - *Intercepting groundwater in order to lower the water table or divert water (excluding a water race), and directing it to a receiving water body.*
>
> *The channel must not incorporate the bed of an existing river or creek, or the water from the bed of an existing river or creek. The hollows of humped and hollowed land are considered drains.*
>
> ***Ephemeral water body*** *a water body, which has the physical characteristics of the bed of a river, that dries up periodically, typically holding water for only a few days to months.*
>
> ***Main stem*** *refers to the principal course of a river (i.e., does not include tributaries).*
>
> ***Major farm drain*** *refers to the primary drain that:*
>
> *(a) Collects water from humped, hollowed, and flipped pasture;*
>
> *(b) Has a defined channel;*
>
> *(c) Carries water the majority of the time.*
>
> ***River*** *means a continually or intermittently flowing body of fresh water; and includes a stream and modified watercourse; but does not include an artificial watercourse (including an irrigation canal, water supply race, canal for the supply of water for electricity power generation, and farm drainage canal) or ephemeral water bodies. A storm flowpath that carries flow only for a short period after heavy rain is not considered to be a river.*

3.3.4 Habitat characteristics

Freshwater and riparian habitat data was collected at each of the ten aquatic ecology survey sites. Habitat can influence periphyton and benthic invertebrate communities so this data was collected to assist in the interpretation of results. The following habitat data was collected:

- Wetted channel width and water depth at transects on each stream.
- Water velocity.

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- Habitat type (run, riffle, pool).
- Streambed substrate composition.
- Streambank erosion and bed scour (%).
- Organic matter content (leaf litter, woody debris).
- Riparian habitat characteristics.
- Channel shade (%).

3.3.5 Freshwater flora

Macrophyte (aquatic plants) and periphyton cover was assessed at each of the ten aquatic ecology survey sites. Macrophyte species were identified and the cover of each species was recorded. The type of periphyton and the cover of each type was also recorded.

3.3.6 Benthic macroinvertebrates

Five benthic macroinvertebrate samples were collected from the ten aquatic ecology survey sites using a kick net in accordance with the National Environmental Monitoring Standards for Macroinvertebrates (NEMS 2020). Samples were processed following Protocol P3 (full count with subsampling) outlined in Stark et al. (2001).

The following invertebrate metrics and indices were calculated from community data:

- *Community composition* – relative abundance of the main taxonomic groups making up the macroinvertebrate communities recorded from each watercourse. This metric can be used to provide a general indication of stream health based on the relative proportions of water quality and habitat sensitive and tolerant taxonomic groups.
- *Taxa number* – a measure of the overall health of the benthic macroinvertebrate community and habitat and water quality. In general, a high taxa number can be an indication of a healthy waterway. The number of taxa present at a site can be highly variable and can fluctuate depending on many factors including habitat, water quality and sampling effort.
- *Abundance* – a measure of the total number of individuals in a sample. Total abundance tends to increase in the presence of organic/nutrient enrichment, but declines in the presence of toxic pollution.
- *Macroinvertebrate Community Index (MCI)* – presence/absence-based index for measuring stream health in soft-bottomed streams. Individual taxa scores range from 1 (pollution tolerant) to 10 (highly pollution sensitive). The National Policy Statement for Freshwater Management 2020 (MfE 2020) (NPS-FM) presents MCI thresholds that categorise stream health into four attribute bands (A, B, C and D) as set out in Table 4 (MfE 2020).
- *Quantitative Macroinvertebrate Community Index (QMCI)* – the QMCI is a quantitative variant of the MCI and used to measure stream health for soft-bottomed streams. The NPS-FM (MfE 2020) also presents QMCI thresholds that categorise stream health into the four attribute bands (A, B, C and D) defined by MfE (2020) and set out in Table 4.
- *EPT taxa number* – a measure of the overall health of the community and of habitat and water quality. A community that has a higher number of water quality and habitat sensitive taxa from the groups Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies) (EPT) indicates a healthier waterway.
- *Percent EPT (%EPT)* – another measure of suitability of the waterway for supporting

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water quality and habitat sensitive taxa. A benthic macroinvertebrate community that has a higher percentage of water quality and habitat sensitive taxa from the EPT groups indicates a healthier waterway.

- *Average Score Per Metric (ASPM)* – average score of the normalised MCI-sb, EPT and %EPT. ASPM was introduced into the NPS-FM (MfE 2020). Scores range between 0 (low ecological integrity) and 1 (high ecological integrity) and interpreted based on the guidelines outlined in Table 4.

Table 4: MCI, QMCI and ASPM attribute bands (MfE 2020).

Attribute	Description [a,b]	MCI	QMCI	Description [c]	ASPM
A	Macroinvertebrate community indicative of pristine conditions with almost no organic pollution or nutrient enrichment.	≥130	≥6.50	Macroinvertebrate communities have high ecological integrity, similar to that expected in reference condition.	≥0.6
B	Macroinvertebrate community indicative of mild organic pollution or nutrient enrichment. Largely composed of taxa sensitive to organic pollution / nutrient enrichment.	≥110 and <130	≥5.5 and <6.5	Macroinvertebrate communities have mild-to-moderate loss of ecological integrity.	<0.6 and ≥0.4
C	Macroinvertebrate community indicative of moderate organic pollution or nutrient enrichment. There is a mixture of taxa sensitive and insensitive to organic pollution / nutrient enrichment.	≥90 and <110	≥4.5 and <5.5	Macroinvertebrate communities have moderate-to-severe loss of ecological integrity.	<0.4 and ≥0.3
National bottom line (NBL)		**90**	**4.5**		**0.3**
D	Macroinvertebrate community indicative of severe organic pollution or nutrient enrichment. Communities are largely composed of taxa insensitive to organic pollution / nutrient enrichment.	<90	<4.50	Macroinvertebrate communities have severe loss of ecological integrity.	<0.3

Note: [a] MCI; [b] QMCI; [c] ASPM.

3.3.7 Fish

A search of the New Zealand Freshwater Fish Database (NZFFD) was carried out for existing records of fish obtained since 1985 within the site and wider catchments. In addition, fish were surveyed at each sampling site using an electric fishing machine (EFM300). The fishing effort and area fished at each site was standardised (30 m^2). All fish captured were identified, measured and returned to the watercourses. A single environmental DNA (eDNA) sample was collected at each site to provide an indication of fish species present and to complement electric fishing data. Samples were filtered, preserved and sent to Wilderlab laboratory for analysis using the multi-species test.

3.4 Surface Water and Groundwater Hydrology

The surface water and groundwater hydrology has been reviewed by Kōmanawa Solutions Limited (2025a) who drew primarily on three investigations: Coffey Partners (1991), Vidanovich (2008) and Rekker (2020).

Coffey Partners (1991) reported surface water flows based on spot gauging, which was critically reviewed (Kōmanawa Solutions 2025a), and discussed in Section 6.2. Coffey Partners (1991), Vidanovich (2008) and Rekker (2020) defined aquifer properties and water level patterns to the immediate north and south of the proposed mining area. In addition, Kōmanawa Solutions Ltd conducted further groundwater investigations at five piezometers within the SB in 2022 with a focus on the proposed mining area and this included the determination of groundwater levels and flows and hydrological properties. The locations of the five piezometers (PZ-101, PZ-102, PZ-103, PZ-104, PZ-105) are shown in Figure 8.

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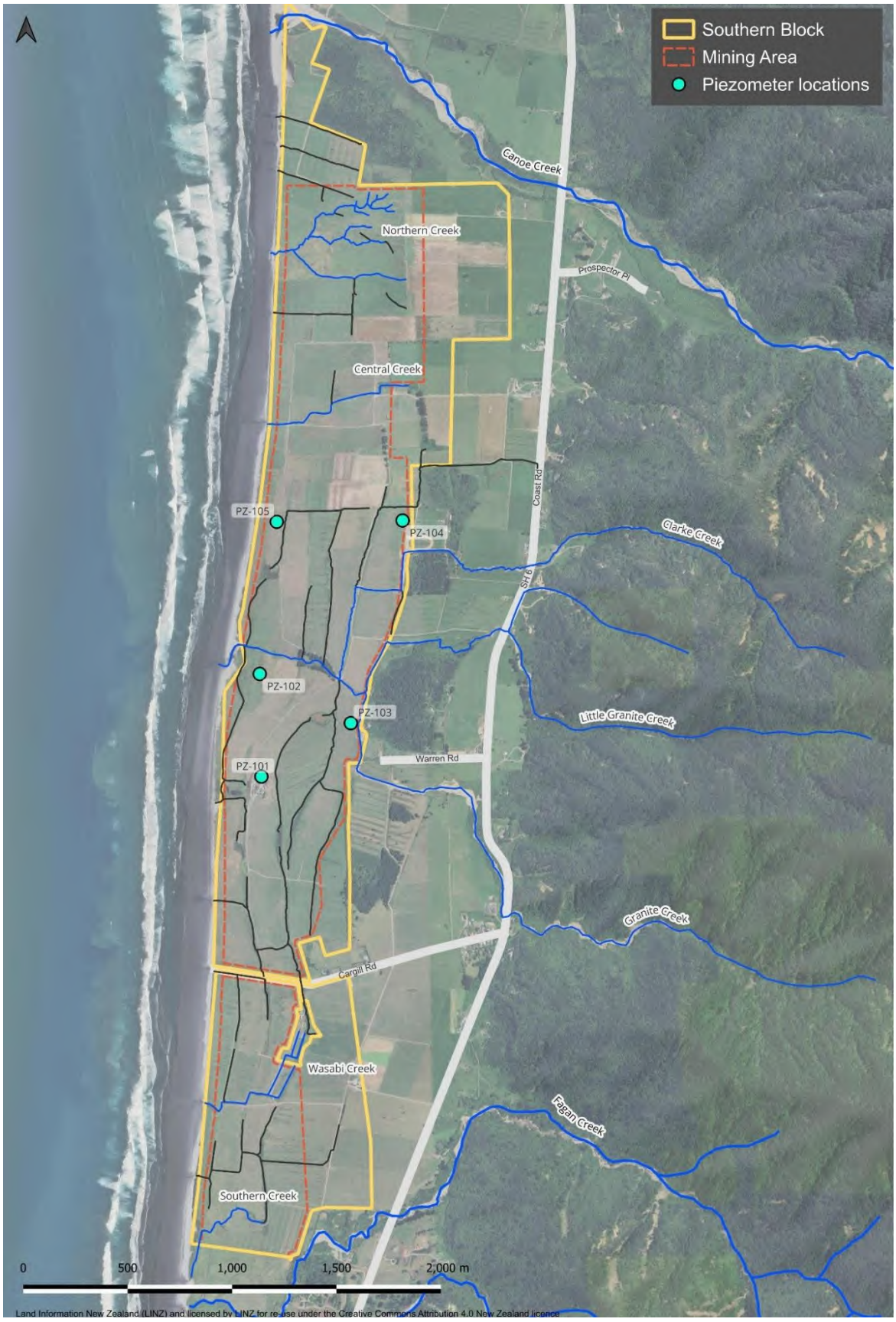

Figure 8: Location of piezometers within SB, Barrytown (Kōmanawa Solutions Ltd, 2025a).

The understanding of surface water and groundwater hydrology set out in this report has been informed by the conclusions presented by Kōmanawa Solutions Ltd (2025a, 2025b). Surface water and groundwater quality data was obtained from sampling in April 2024 where groundwater bores were purged of approximately 50 L before collection of samples, which were shipped to Hill Laboratories, Christchurch, for analysis.

3.5 Assessment of Effects

The ecological value of features identified in the SB were assigned following the approach outlined in the Environment Institute of Australia and New Zealand's (EIANZ) Ecological Impact Assessment Guidelines (EcIAG) (Roper-Lindsay et al. 2018). The EcIAG outlines a standardised approach for defining terrestrial and freshwater ecological values. The approach involves assessing four matters including: representativeness, rarity/distinctiveness, diversity/pattern and ecological context with consideration of the attributes outlined in Table 5 and/or Table 7 of the EcIAG. The overall ecological value of the features identified within the SB were then assigned based on the four matters outlined above and using the scoring system outlined in Table 6 of the EcIAG.

The level of effects (both direct and indirect) on the values identified were assessed using the method outlined in the EcIAG. This involved determining the magnitude of effects based on criteria outlined in Table 8 of the EcIAG, reproduced as Table 5 below, and assigning the overall level of effect using the matrix in Table 10 of the EcIAG, provided as Table 6 below. The magnitude of the effects was considered at the ED scale unless otherwise indicated.

Table 5: Criteria for describing magnitude of effect.

Magnitude	Description
Very high	Total loss or very major alteration to key elements/ features of the baseline conditions such that the post development character/ composition/ attributes will be fundamentally changed and may be lost from the site altogether; AND/OR Loss of a very high proportion of the known population or range of the element/feature.
High	Major loss or major alteration to key elements/ features of the baseline (pre-development) conditions such that post development character/ composition/ attributes will be fundamentally changed; AND/OR Loss of a high proportion of the known population or range of the element/feature.
Moderate	Loss or alteration to one or more key elements/features of the baseline conditions such that post development character/composition/attributes of baseline will be partially changed; AND/OR Loss of a moderate proportion of the known population or range of the element/feature.
Low	Minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible but underlying character/composition/attributes of baseline condition will be similar to pre-development circumstances/patterns; AND/OR having a minor effect on the known population or range of the element/feature.
Negligible	Very slight change from baseline condition. Change barely distinguishable, approximating to the "no change" situation; AND/OR having negligible effect on the known population or range of the element/feature.

Table 6: Criteria for describing level of effects.

Effect level ▼	Ecological value ▶				
	Very high	***High***	***Moderate***	***Low***	***Negligible***
Very high	Very high	Very high	High	Moderate	Low
High	Very high	Very high	Moderate	Low	Very low
Moderate	High	High	Moderate	Low	Very low
Low	Moderate	Low	Low	Very low	Very low
Negligible	Low	Very low	Very low	Very low	Very low
Positive	Net gain	Net gain	Net gain	Net gain	Net gain

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4.0 Terrestrial Flora and Fauna

4.1 Vegetation

4.1.1 Desktop assessment

Information from the Land Environments of New Zealand, Threatened Environments Classification, and previous studies (e.g., Onley 1980, McEwen 1987) indicate that outside the Barrytown Flats, the Punakaiki ED is relatively intact with respect to species, habitats and ecological functioning. A high diversity of vegetation types has been retained, including coastal forest, karst forest, old tertiary forest and limestone talus forest.

The predictive historic vegetation mapping by Leathwick et al. (2001) indicates that the vegetation within the SB would have comprised lowland coastal forest and wetland prior to forest clearance and land drainage to facilitate timber harvesting, flax milling, mining, dredging and livestock farming.

According to the LCDB V5.0, the majority of the SB currently comprises high producing exotic pasture, with small amounts of other land cover types including herbaceous freshwater vegetation (i.e., wetlands), broadleaved indigenous hardwoods, exotic forest and exposed sand/gravel. The Threatened Environment Classification for the level IV land environments within the SB is less reduced and better protected (Category 6: >30% remaining and >20% protected).

4.1.2 Site surveys

4.1.2.1 Summary

A description of the vegetation types present within the proposed mining area and their extent is summarised in Table 7. The location and distribution of each vegetation type is shown in Figure 9. Descriptions of each vegetation type are provided in Sections 4.1.2.2–4.1.2.7 below. A full list of vascular plants recorded within the SB is presented in Appendix A.

Table 7: Vegetation Cover within the SB and Proposed Mining Area.

Vegetation Type	Description	SB (ha)	Mining area	
			Area (ha)	% of Mining Area
Grazed exotic pasture	Low stature exotic pasture species and crops.	395.5	273.5	97.9
Rough exotic pasture	Exotic pasture grasses and other exotic vegetation including gorse and blackberry. Higher stature than grazed exotic pasture above.	6.0	3.5	1.3
Indigenous coastal shrubland	Nīkau and cabbage tree over low stature indigenous species including māhoe, kāmahi and tree ferns. Exotic vegetation present in gaps and edges. Species present with a conservation status included native broom (*Carmichaelia australis,* 'At Risk – Declining') and *Solanum aviculare var. aviculare* (Threatened – Nationally Endangered).	2.0	0.8	0.3
Isolated Southern rātā	Snags of isolated Southern rātā up to 15 m high with indigenous epiphytes. Potential bat roost habitat.	0.03	0	0.00
Exotic pine	Over-mature pines, either isolated or present as sparse shelterbelts.	2.2	1.3	0.5
Flaxland	Coastal fringe	0.4	0.3	0.1
Non-vegetation	Riverbed or coastal areas	1.5	0	0.0
Total		**407.5**	**279.2**	**100**

Note: Total Area of SB = 408 ha (rounded up), Total Mining area within SB = 280 ha (rounded up).

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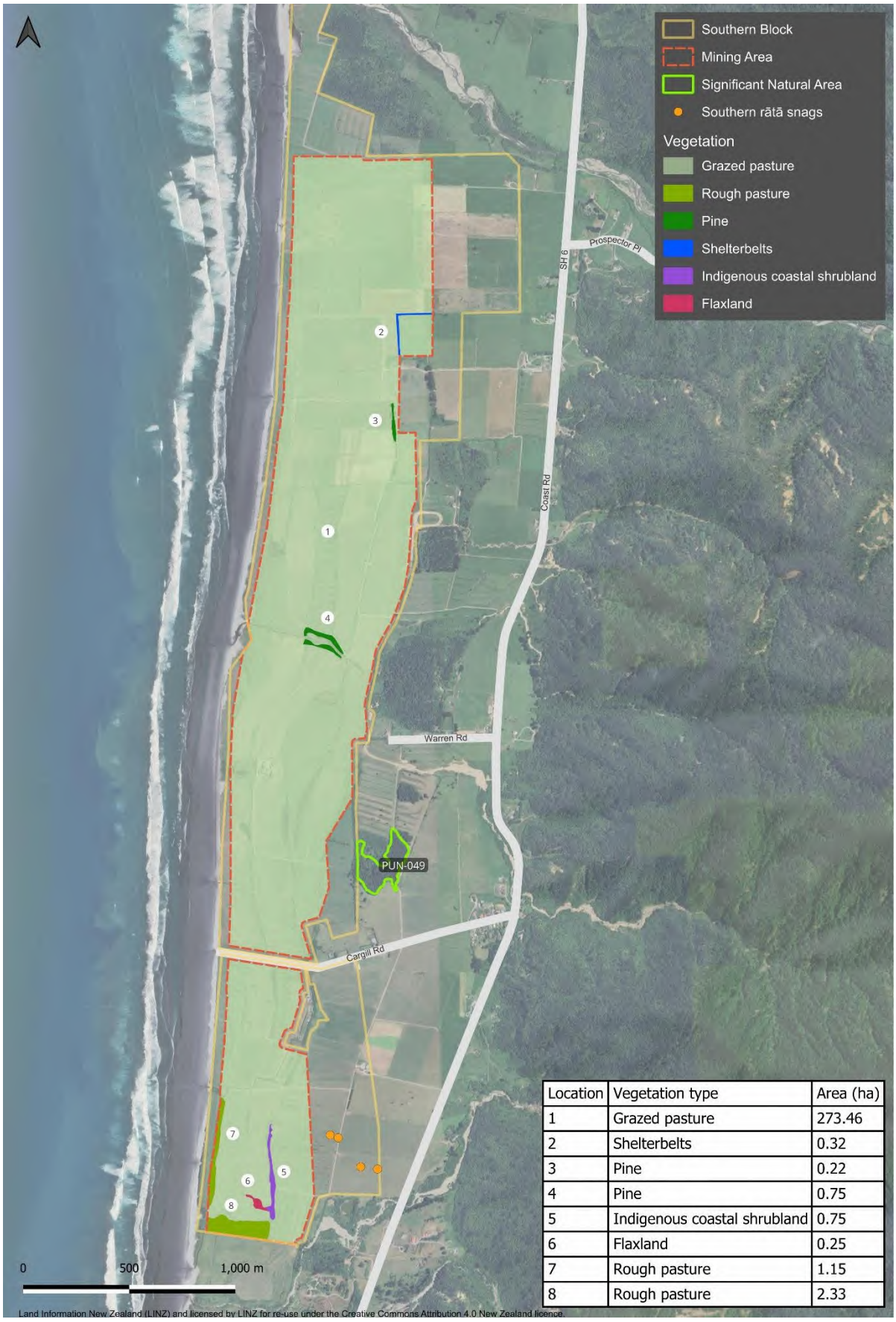

Location	Vegetation type	Area (ha)
1	Grazed pasture	273.46
2	Shelterbelts	0.32
3	Pine	0.22
4	Pine	0.75
5	Indigenous coastal shrubland	0.75
6	Flaxland	0.25
7	Rough pasture	1.15
8	Rough pasture	2.33

Figure 9: Vegetation types present within the mining area of the SB, Barrytown.

4.1.2.2 Grazed exotic pasture

Vegetation across the majority (~98%) of the SB and proposed mining area comprised grazed exotic pasture used for dairying and dairy support as shown in Figure 10. Pasture species present included perennial ryegrass (*Lolium perenne*), annual ryegrass (*Lolium rigidum*), browntop (*Agrostis capillaris*) and annual poa (*Poa annua*). Kale crops (*Brassica oleracea*) were also present in some paddocks. Occasional soft rush (*Juncus effusus*), wīwī (*Juncus edgariae*), ragwort (*Jacobea vulgaris*), lotus (*Lotus pedunculatus*), buttercup (*Ranunculus repens*) and dock (*Rumex* spp.), along with other common herbaceous pasture weeds, were scattered throughout the grazed pasture.

Figure 10: Grazed exotic pasture within the SB, Barrytown.

4.1.2.3 Rough exotic pasture

South of Cargill Road, in the southern part of the proposed mining area, areas of pasture that have been less intensively grazed were occasionally present around watercourses. Species present included those mentioned above as well as other exotic pasture weeds such as *Carex ovalis*, gorse (*Ulex europaeus*) and blackberry (*Rubus fruticosis agg.*). The native sedge *Carex comans* was occasionally present in drier areas. At the time of survey, these sections of pasture were taller than the intensively grazed exotic pasture and therefore may provide more suitable habitat for lizards while in an ungrazed state. An example of areas of rough exotic pasture is shown in Figure 11.

Figure 11: Exotic pasture at the southern extent of the SB, Barrytown.

4.1.2.4 Indigenous coastal shrubland

Some indigenous vegetation was present south of Cargill Road, in the southern part of the SB and proposed mining area, where narrow strips of secondary coastal shrubland were present growing along parts of the hump and hollow systems, drains and historic dredge pits. In addition, a small strip of coastal indigenous shrubland was present along the eastern boundary of the proposed mining area near the proposed mining access route as shown in Figure 9. An example of the coastal shrubland vegetation type is shown in Figure 12.

The indigenous coastal shrubland was dominated by emergent nīkau (*Rhopalostylis sapida*) and cabbage tree (*Cordyline australis*) with māhoe (*Melicytus ramiflorus*), kāmahi (*Pterophylla racemosa*), tree fern (*Dicksonia squarrosa, Cyathea medullaris*) and kiekie (*Freycinetia banksii*) making up the understorey. Pōhuehue (*Muehlenbeckia australis*) formed a dense covering growing epiphytically over much of this vegetation. Flax (*Phormium tenax*) was common in places at the edges. Native broom (*Carmichaelia australis* – 'At Risk – Declining'), poroporo (*Solanum laciniatum*), *Coprosma propinqua*, kawakawa (*Piper excelsum*) and wineberry (*Aristotelia serrata*) were occasional, and swamp astelia (*Astelia grandis*) was patchily distributed. A single individual of *Solanum aviculare var. aviculare* ('Threatened – Nationally Endangered') was recorded in the area south of Cargill Road. Areas of indigenous coastal shrubland were affected by livestock grazing, fragmentation and weed incursion.

Figure 12: Indigenous coastal shrubland within the southern SB, Barrytown.

4.1.2.5 Isolated Southern rātā

Four snags (i.e., dead standing trees) of Southern rātā (*Metrosideros umbellata*) with surviving epiphytes of tank lily (*Astelia hastata*), akatea (*Metrosideros perforata*) and puka (*Griselinia lucida*) as shown in Figure 13, were present in the southeastern portion of the SB, outside the proposed mining area (see Figure 9). One Southern rātā, approximately 15 m high, contained a cavity, and another approximately 4 m high had evidence of bird roosting.

Figure 13: Isolated Southern rātā with indigenous epiphytes within the southern SB, outside the proposed mining area, Barrytown.

4.1.2.6 Pine shelterbelts and isolated trees

Sparse shelterbelts and isolated over-mature *Pinus radiata* were primarily centrally located within the proposed mining area (see Figure 9) surrounded by grazed exotic pasture as shown in Figure 14. The canopy of these trees was sparse, and there were no epiphytes or regenerating indigenous plants around the base of any trees.

Figure 14: Isolated over-mature pines with a pine shelterbelt in the background within the SB, Barrytown.

4.1.2.7 Flaxland

Riparian vegetation dominated by flax with occasional māhoe, whekī, cabbage tree and *Carex geminata* was present along the raised riparian margin of Wasabi Creek, centrally located within the southern portion of the proposed mining area (see Figure 9). An example of this flaxland is shown in Figure 15.

Figure 15: Flaxland vegetation on the margins of Wasabi Creek.

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4.2 Avifauna (Birds)

4.2.1 Desktop assessment

The eBird database included 8,723 records comprising 104 taxa (i.e., records identified to species or genus level) including seabirds, coastal birds and land birds. A list of bird species recorded in provided in Appendix B. Surveys undertaken in the Central Block (CB), immediately to the north of the SB, from 2021-2023 recorded forty-nine species of birds, including 15 considered to be 'threatened' or 'at risk', many of which were coastal birds. The majority of these coastal birds are unlikely to be using large areas of the SB or proposed mining area for feeding or nesting, instead occupying the small lagoon adjoining the SB and/or visiting nearby wetland and other habitats.

The threatened and at risk bird species likely to use the SB or proposed mining area, even as occasional visitors, are listed in Table 8.

Table 8: Threatened and At Risk birds recorded in eBird or during CB surveys and considered likely to use the SB.

Common name	Scientific name	Conservation status (Robertson et al. 2021)
Banded dotterel	*Charadrius b. bicinctus*	Threatened – Nationally Vulnerable
Black billed gull	*Chroicocephalus bulleri*	At Risk – Declining
Black shag	*Phalacrocorax carbo novaehollandiae*	At Risk – Relict
Caspian tern	*Hydroprogne caspia*	Threatened – Nationally Vulnerable
Little shag	*Microcarbo melanoleucos brevirostris*	At Risk – Relict
Little blue penguin	*Eudyptula minor*	At Risk - Declining
Long-tailed cuckoo	*Eudynamys taitensis*	Threatened – Nationally Vulnerable
Red-billed gull	*Chroicocephalus novaehollandiae*	At Risk – Declining
Royal spoonbill	*Platalea regia*	At Risk – Naturally Uncommon
South Island fernbird	*Poodytes p. punctatus*	At Risk – Declining
South Island pied oystercatcher	*Haematopus finschi*	At Risk – Declining
New Zealand Falcon ('south')	*Falco novaeseelandiae*	Threatened (Nationally Endangered)
Variable oystercatcher	*Haematopus unicolor*	At Risk – Recovering
Pacific Black Duck	*Anas superciliosa*	Threatened - Nationally Vulnerable
White-fronted tern	*Sterna s. striata*	At Risk – Declining

4.2.2 Site surveys

Thirty-three bird species were recorded during the surveys undertaken to date at the SB. The species observed were generally exotic or common native species and the avifauna community generally reflects the highly modified state of the habitats within the SB. Most of the species recorded were typical of urban and rural environments, but four (shown in Table 9) are considered 'Threatened' or 'At Risk' by Robertson et al. (2021). These include great spotted kiwi (*Apteryx maxima,* Threatened - Nationally Vulnerable), red-billed gull (*Chroicocephalus novaehollandiae*, At Risk – Declining), South Island pied oystercatcher (*Haematopus finschii*, At Risk – Declining) and variable oystercatcher (*Haematopus unicolor,* At Risk – Recovering). None of these four species are likely to rely on the pasture habitat present in the proposed mining area, but all may visit such areas for feeding (especially in disturbed soil) or loafing. It is unlikely that great spotted kiwi will use the site given the lack of habitat and vegetated cover, and their presence in acoustic surveys is considered likely to result from a distant source, located in the vegetated hills outside of the site.

The audio records of ducks (*Anas* spp.) were unable to be identified as either exotic mallard (*Anas platyrhynchos*) or the native grey duck (*Anas superciliosa)* which is Threatened - Nationally Vulnerable) and are indistinguishable audibly. They are also difficult to tell apart visually. It is possible that the birds heard were hybrids between the two, which are regarded as 'not threatened' (Robertson et al. 2021). Mallards were confirmed as present during 5MBCs.

Of the species listed in Table 8, kororā (little blue penguin, *Eudyptula minor*), are known to use the adjoining habitats and may cross the site to reach nests inland. No potential penguin burrows were detected during the field surveys and the vegetation across the majority of the site was unsuitable for penguin nesting, although they are known to nest under buildings at some locations.

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Table 9: Threatened and At Risk birds recorded during SB surveys.

Common name	Scientific name	Conservation status (Robertson et al. 2021)
Great Spotted kiwi*	*Apteryx maxima*	Threatened - Nationally Vulnerable
Red-billed gull	*Chroicocephalus novaehollandiae*	At Risk - Declining
South Island pied oystercatcher	*Haematopus finschi*	At Risk - Declining
Variable oystercatcher	*Haematopus unicolor*	At Risk - Recovering

4.3 Lizards

4.3.1 Desktop assessment

There were three lizard species recorded on the Department of Conservation database within the Punakaiki ED. Two species of native gecko (forest gecko - *Mokopirirakau granulatus* and West Coast green gecko - *Naultinus tuberculatus*) and one species of native skink (Newman's speckled skink - *Oligosoma* aff. *newmani* "Westland"). Distribution maps (from the New Zealand Herpetological Society website) also indicate that the SB is within the known distribution of Canterbury grass skink (*Oligosoma aff. polychroma Clade 4*) bringing the number of lizard species in the Punakaiki ED to four.

Records included one unidentified skink species (two records) located between 5.5-8km from the site, one record of Newman's speckled skink (At Risk – Declining) located 8.8km from the site, one record of a West Coast *green gecko* (Threatened - Nationally Vulnerable) located 9.3km from the site, and four records of forest gecko (At Risk – Declining) located 7-10km from the site, as summarised in Table 10.

Table 10: Lizard records within 10 km of the SB.

Common Name	Scientific Name	Conservation Status Hitchmough et al (2021)
West Coast green gecko	*Naultinus tuberculatus*	Threatened – Nationally Vulnerable
Forest gecko	*Mokopirirakau granulatus*	At Risk – Declining
Newman's speckled skink	*Oligosoma* aff. *newmani* "Westland"	At Risk – Declining

4.3.2 Site walkover

As described above, the vegetation across the majority of the SB, including most of the proposed mining area, comprised grazed exotic pasture. This vegetation does not provide suitable habitat for lizards. Rough exotic pasture may provide intermittent, low-quality refuge for skinks while in an ungrazed state. There were areas of higher quality potential lizard habitat outside, but adjoining, the proposed mining area, including rock piles, rank pasture and cobble along the western coastal boundary (as shown in Figure 16), woody debris (as shown in Figure 17), remnant forest vegetation along the true-left of Canoe Creek and tall forest on the eastern boundary. These grassland and rocky areas may support Newman's speckled skinks and Canterbury grass skink whilst more vegetated areas may support Forest and/or West Coast green geckos and possibly skinks in the understorey. These higher quality areas are outside the proposed mining area and would not be directly affected by the proposed mining activity.

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Figure 16: Rough vegetation and cobble habitat outside the proposed mining area providing potential Newman's speckled skink habitat.

Figure 17: Woody debris and cobble habitat outside the proposed mining area providing potential Newman's speckled skink habitat.

4.4 Bats

4.4.1 Desktop assessment

The national bat database indicates surveys at about 70 locations have been carried out within 25 km of the SB since 1992 (shown in Figure 19). These surveys have detected lesser short-tailed bat (*Mystacina tuberculata* - Threatened – Nationally Increasing). An additional survey undertaken by Ecological Solutions Limited in 2023, and not uploaded to the national database yet, include records from one location approximately 10 km south of the SB as shown in Figure 19. These records were of long-tailed bats (*Chalinolobus tuberculatus* - Threatened – Nationally Critical).

4.4.2 Site walkover

The nearest contiguous indigenous forest cover to the SB is within the upper catchments of Canoe Creek, Clarke Creek, Little Granite Creek, Granite Creek and Fagan Creek east of State Highway 6 (SH6). This forest cover changes abruptly at the interface with SH6; whereby, to the west of SH6 the landscape is an expansive agricultural one dominated by open pasture with scattered forest remnants, watercourses with limited riparian vegetation and wetlands. Several small ponds/dams and associated wetlands are also scattered across the SB and proposed mining area.

With respect to potential bat roost sites, two isolated stands/shelterbelts of over-mature exotic pine trees were present within the proposed mining area; however, these would be retained. Outside the mining area, but within the SB, the dead indigenous trees near the southern boundary could also be suitable for bat roosting. In addition, relatively small indigenous forest fragments adjoin the boundary outside the SB to the north, east and south. Examples of the types of habitats present that long-tailed bats (if present) may use for foraging, navigation or roosting are shown in Figure 18 and Figure 20.

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Figure 18: The lower reaches of the streams across the SB may provide potential foraging habitat for bats.

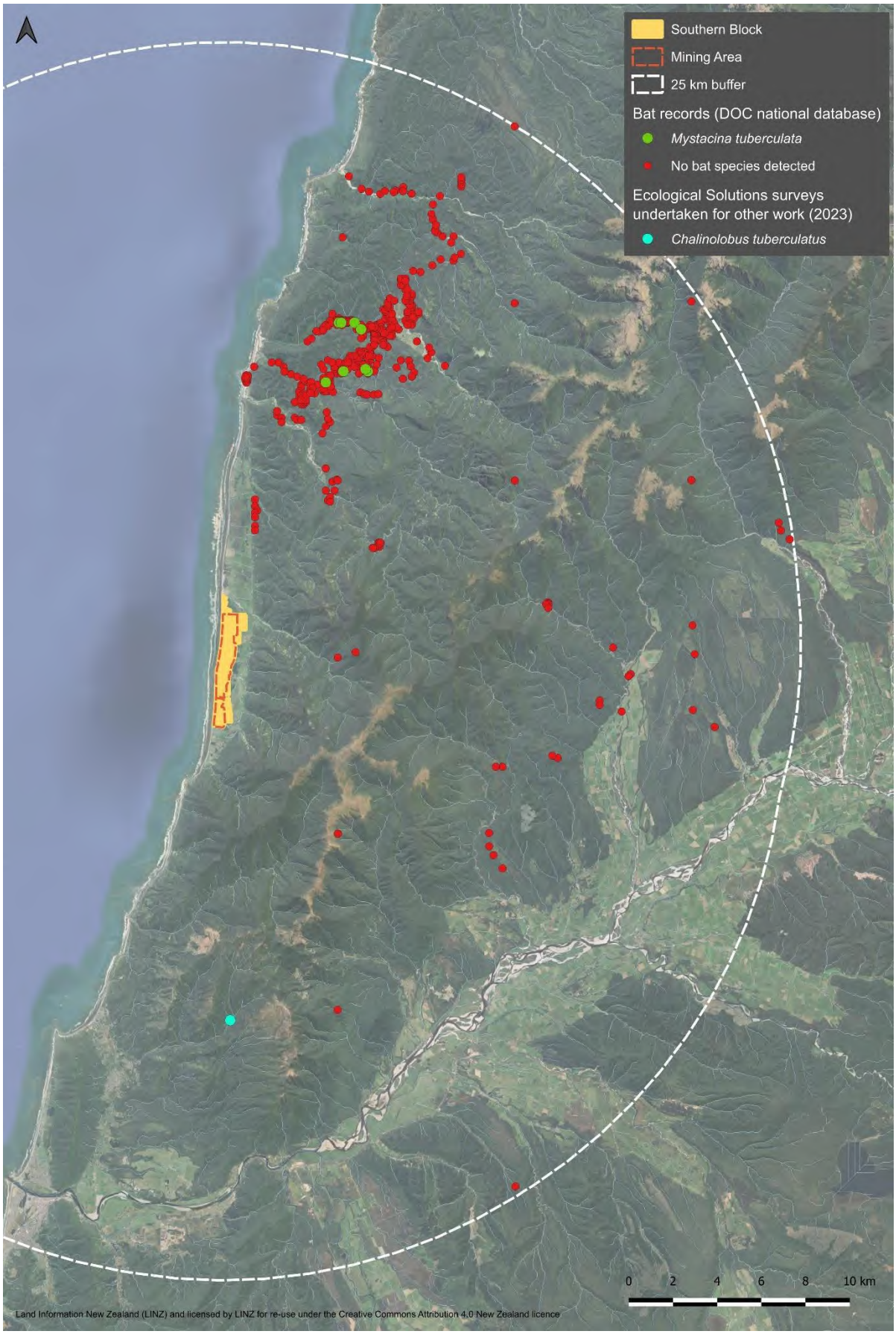

Figure 19: Bat records within 25 km of the SB, Barrytown.

Figure 20: Indigenous forest remnants located outside the SB provides suitable bat roosting, foraging and commuting habitat.

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5.0 Wetlands

5.1 Introduction

Natural inland wetlands were present within both the SB and the proposed mining area and are shown in Figure 21. Many wetlands within the SB were associated with deliberately constructed drains (e.g., hump and hollows, historical dredge pits from previous mining) and therefore do not meet the RMA or RLWP definitions of a wetland, including wetlands associated with hump and hollow and historical dredge pits or the definition of a 'natural inland wetland' outlined in the NPS-FM. Some of these wetlands (e.g. dredge pits) have been in existence a comparatively long time and some include indigenous vegetation. The longstanding presence of these wetlands, and their value, have been considered when assessing the effects and developing the rehabilitation plan for the site.

A total of c. 42.1 ha of wetland was present within the SB and 35.8 ha within the proposed mining area as set out in Table 11. This includes c. 6.7 ha which is considered 'natural inland wetland' (Table 11) and is therefore is subject to the National Environmental Standards for Freshwater (NES-F) and the NPS-FM and a further c. 29.0 ha of wetland associated with deliberately constructed drains (e.g., poorly maintained hump and hollows, historical dredge pits) which are not subject to those regulations, but the removal of which could still have adverse ecological effects as detailed in Section 8.2.

Wetlands within the proposed mining area were similar to those in the wider SB. In terms of vegetation, the wetlands were characterised by common and widespread rush, sedge, grass and herb species typical of modified wetlands within the New Zealand agricultural landscape.

For assessment purposes, wetlands were grouped into five categories based on vegetation

and landform types as follows: floodplain, palustrine, coastal lagoon, hump and hollow, and dredge pit (see Table 11). Each of these wetland types are discussed in more detail in the following sections.

Table 11: Wetlands within the SB and proposed mining area.

Wetland type	Description	SB (ha)	Mining area	
			Mining (ha)	% of total Mining area*
Natural inland wetlands				
Palustrine	Small isolated depressions throughout site. Vegetation dominated by *Juncus* and *Isolepis*.	4.0	3.7	1.3
Floodplain	Floodplains of small watercourses; vegetation typically dominated by *Carex*, *Isolepis prolifera* and watercress.	3.7	3.0	1.1
Coastal Lagoon	Small body of open water with *Isolepis prolifera* at the margins.	0.4	0.00	0.00
Subtotal		*8.1*	*6.7*	*2.4*
Wetlands associated with deliberately constructed drains				
Hump and Hollow	Vegetation dominated by *Isolepis* and *Juncus* rushland in poorly drained hollows of hump and hollowed paddocks. Watercress (*Nasturtium officinale*), water pepper (*Persicaria hydropiper*) and exotic grasses were frequent.	22.9	18.4	6.6
Dredge Pit	Long channels of wetland vegetation comprising mainly water pepper, *Isolepis prolifera*, watercress and *Carex*. Occasional open water.	11.1	10.6	3.8
Subtotal		*34.0*	*29.0*	*10.4*
Total (ha)		**42.1**	**35.8**	**12.8**

Note: * Total mine disturbance area = 280 ha.

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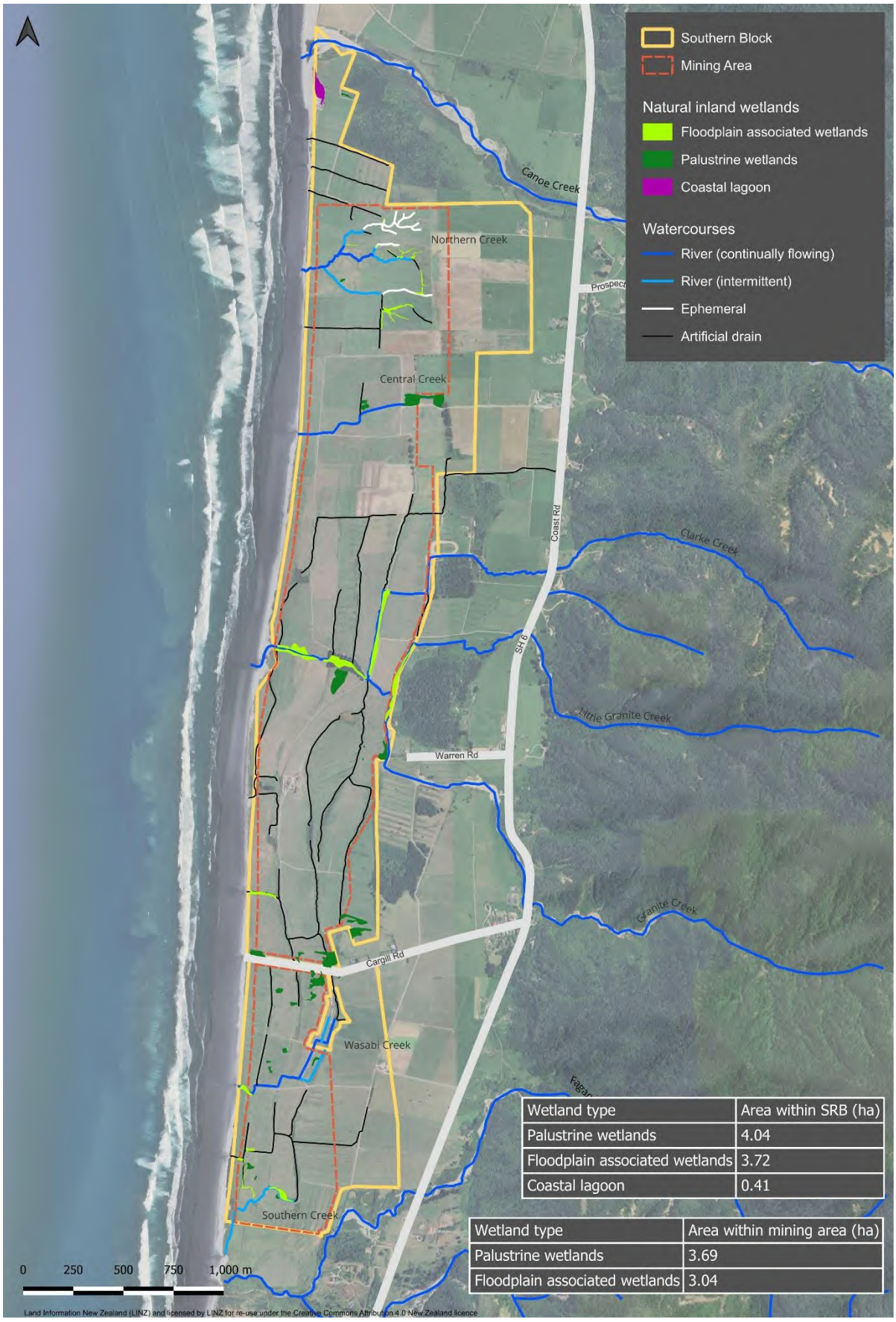
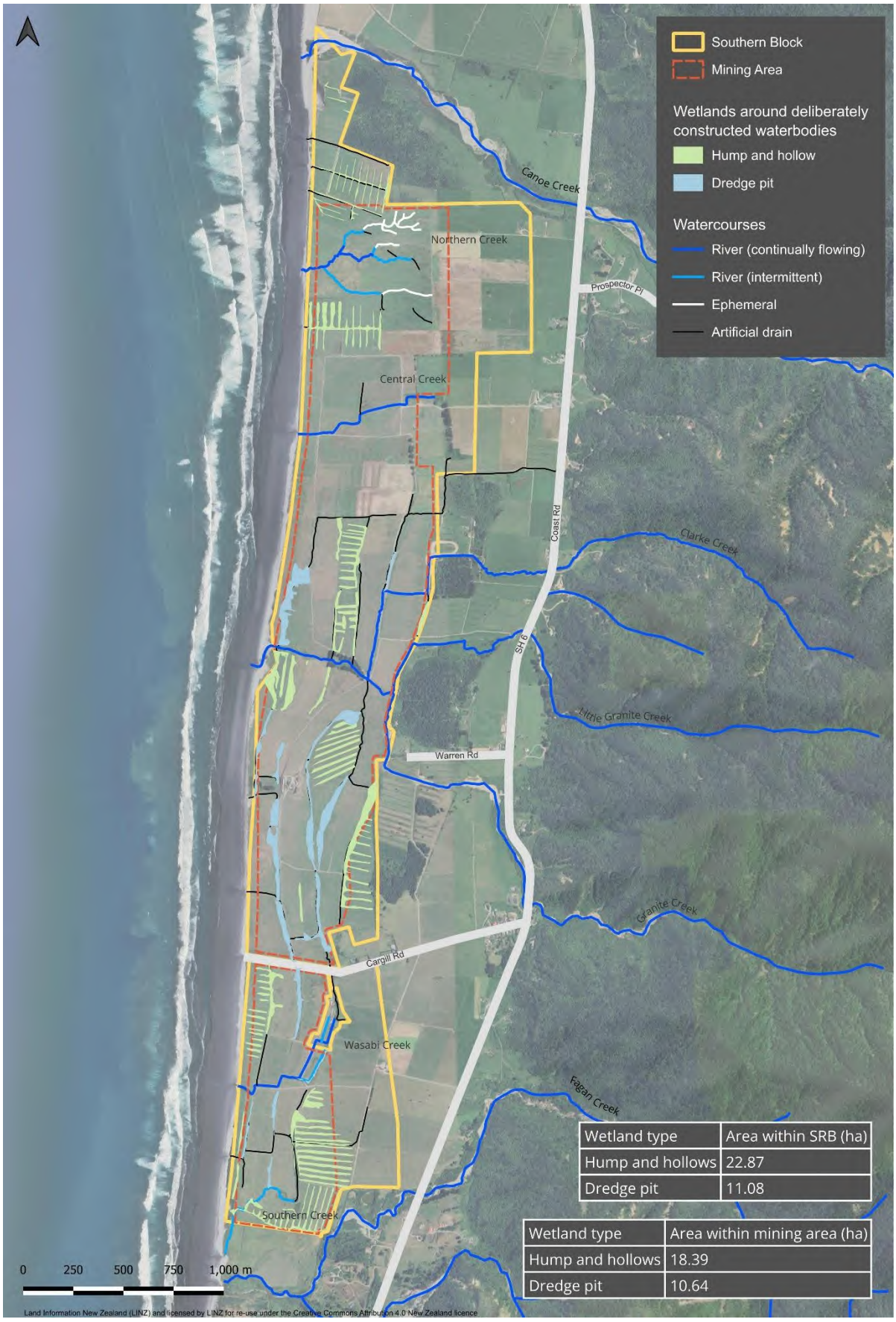


Wetland type	Area within SRB (ha)
Palustrine wetlands	4.04
Floodplain associated wetlands	3.72
Coastal lagoon	0.41

Wetland type	Area within mining area (ha)
Palustrine wetlands	3.69
Floodplain associated wetlands	3.04

Figure 21: Location of natural inland wetlands within the SB, Barrytown.



Wetland type	Area within SRB (ha)
Hump and hollows	22.87
Dredge pit	11.08

Wetland type	Area within mining area (ha)
Hump and hollows	18.39
Dredge pit	10.64

Figure 22: Location of wetlands associated with deliberately constructed drains within the SB, Barrytown.

5.2 Natural inland wetlands

5.2.1 Floodplain wetlands

Floodplain wetlands associated with some watercourses were variable in size and species composition. South of Cargill Road, vegetation within floodplain wetlands consisted of *Carex geminata*, *Carex virgata, gorse* and flax as shown in Figure 23. Floodplain wetlands were also present at the northern extent of the SB, where the vegetation consisted mainly of *Isolepis prolifera*, water pepper, water speedwell and occasional jointed rush (*Juncus articulatus*) and soft rush as shown in Figure 24.

Figure 23: Example of vegetation within a floodplain wetland south of Cargill Road.

Figure 24: Example of vegetation within a floodplain wetland in the northern SB.

5.2.2 Palustrine wetlands

A number of wetlands not influenced by flowing water were present in isolated depressions throughout the SB and proposed mining area. These wetlands appeared to be naturally occurring rather than caused by historic gold dredging, farm drainage systems or other human modifications.

One of these wetlands was a small pond with soft rush and wīwī growing along the margins as shown in Figure 25. Pied stilt were recorded at this wetland. Vegetation at other palustrine wetlands was dominated by soft rush, wīwī and *Isolepis prolifera* and occasionally pure stands of water pepper. Palustrine wetlands were scattered throughout the SB in localised areas of poor drainage.

Exotic pasture species such as lotus, Yorkshire fog, white clover (*Trifolium repens*) and perennial ryegrass (*Lolium perenne*) were also present to a lesser extent within palustrine wetlands. Native obligate wetland species, including *Eleocharis acuta*, *Elecocharis gracilis* and *Isolepis cernua* were occasionally encountered.

Figure 25: Palustrine wetland within the southern portion of the SB.

Figure 26: Palustrine wetland dominated by soft rush and water pepper.

5.2.3 Coastal lagoon

A small coastal lagoon was present at the north-western extent of the SB, outside the proposed mining disturbance area but within 100 m of its boundary, as shown in Figure 27. The lagoon is fed by various sources including Canoe Creek and two drains that form part of the hump and hollow drainage system directly east of the lagoon. Vegetation surrounding the coastal lagoon was similar to other wetland vegetation throughout the site, comprising mainly *Isolepis prolifera* with occasional *Juncus articulatus*, giant umbrella sedge (*Cyperus ustulatus*), *Carex geminata* and exotic pasture species. A stand of watercress was present at the outlet of a watercourse supplying the lagoon.

Figure 27: Coastal lagoon at the northern extent of the SB.

5.3 Wetlands Associated with Deliberately Constructed Drains

5.3.1 Hump and hollow wetlands

Vegetation within wetlands associated with hump and hollow and historical dredge pits was dominated by varying proportions of *Juncus* species (mainly *J. effusus* and *J. articulatus*), *Isolepis prolifera*, watercress (*Nasturtium officinale*, *N. microphyllum*), water pepper (*Persicaria hydropiper*) and pasture species. The area south of Cargill Road appeared to be less intensively grazed than the remainder of the site, with soft rush (*Juncus effusus*), wīwī (*Juncus edgariae*), *Carex* species and gorse (*Ulex europaeus*) more common than elsewhere at the site. North of Cargill Road *Isolepis prolifera* and water pepper dominated. Other species commonly encountered within these wetlands included jointed rush (*Juncus articulatus*), water speedwell (*Veronica anagallis-aquatica*), Yorkshire fog (*Holcus lanatus*), lotus (*Lotus pedunculatus*) and creeping buttercup (*Ranunculus repens*). The presence of soil saturation, cracked mud and occasional surface water confirmed wetland hydrology at these constructed wetlands.

In areas subject to recent, or more intensive, livestock activity or maintenance, these hollows tended to be narrower and have a higher component of pasture species such as lotus and Yorkshire fog.

5.3.2 Dredge pits

The extensive dredging of the central and southern parts of the SB in the 1930s and 1940s, including within the proposed mining area, resulted in the creation of long channels of lower relief that have since developed wetland vegetation. The ‘dredge pit wetlands’ were clearly defined due to steep banks and a stark change from hydrophytic wetland vegetation within the former dredge pit to exotic pasture outside. Open water with red azolla (*Azolla rubra*)

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was present in some, generally larger and deeper, parts of the historic dredge channels. Dominant species included water pepper, *Isolepis prolifera*, watercress and *Carex geminata*. Occasional flax, soft rush, *Carex virgata* and wīwī were also present. A stand of raupō (*Typha orientalis*) was present at a dredge pit wetland south of Cargill Road

6.0 Watercourses

6.1 Watercourse Classification

There are seven highly modified natural creeks and several artificial drains within the SB. Modified natural rivers within the SB include, from north to south, an unnamed creek in the northern area of the SB (referred to here as Northern Creek), unnamed creek in the north-central area (referred to here as Central Creek), Clarke Creek, Little Granite Creek, Granite Creek, the unnamed creek referred to here as Wasabi Creek and an unnamed creek in the southern area (referred to here as Southern Creek).

Watercourses within the SB and proposed mining area were classified in accordance with definitions in the RLWP and are shown on Figure 28 with the total lengths of each watercourse type summarised in Table 12. There was approximately 5.46 km of continually or intermittently flowing river habitat within the SB (3.98 and 1.48 km, respectively) and 4.28 km within the proposed mining area (2.88 and 1.40 km, respectively) associated with Northern Creek, Central Creek, Clarke Creek, Little Granite Creek, Granite Creek, Wasabi Creek and Southern Creek (Table 12). There was approximately 1.05 km of ephemeral watercourse associated with Northern Creek within the SB and proposed mining area.

There was approximately 13.62 km of artificial drain (including major farm drains) within the SB and 11.17 km within the mining area (Table 12).

Table 12: Watercourse lengths within the SB and proposed mining area.

Watercourse	SB (km)	Mining area (km)
Creeks (continually flowing)	3.98	2.88
Creeks (intermittent)	1.48	1.40
Ephemeral water body	1.05	1.05
Drain (artificial and major farm drain)	13.62	11.17
Total	**20.13**	**16.50**

There is a long history of modification to the landform within the SB due to gold dredging activity in the 1930s and 1940s and also through farming practices to further drain the land (e.g., humping and hollowing, drain construction). The network of artificial drains and dredge pits constructed during gold dredging activity in the 1930s and 1940s is shown on an aerial image from 1951 along with the current alignment of watercourses for reference in Figure 29. Figure 29 indicates that the current alignment of the east-west flowing section of Granite Creek within the SB did not exist in 1951, with surface water appearing to flow laterally between artificial drains. Many of the artificial drains that currently exist are located within the alignment of remnant features associated with historical gold dredging activity.

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Figure 28: Status of watercourses based on RLWP definitions within the SB, Barrytown.

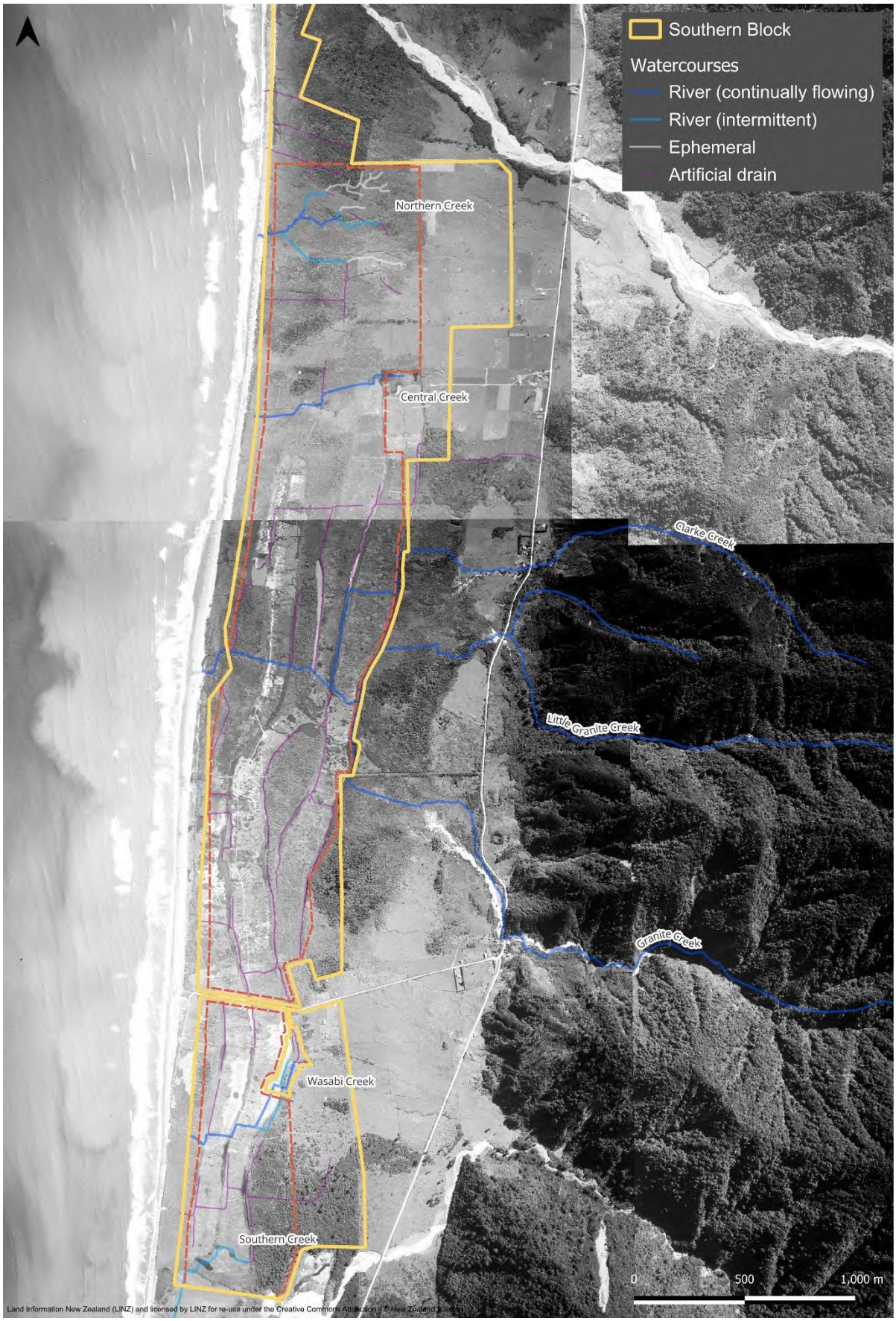

Figure 29: Historic (1951) aerial photograph showing extent of artificial drains constructed during gold dredge mining and current drain alignments.

6.2 Surface Water Hydrology

Surface water flows and hydrology within the proposed mining footprint were reviewed by Kōmanawa Solutions (2025a), taking into account previous gauging data (Coffey and Partners 1991) alongside NZ River Maps flow modelling (Whitehead and Booker 2020). While the previously estimated flow regime of Granite Creek downstream of the confluence with Little Granite Creek is considered broadly accurate, the modelled flows of surface waters outside the central zone are higher than previously estimated.

In addition, the review noted that while Granite Creek and Clarke Creek have moderate base flow retention, base flows were interpreted via an arbitrary but logical division of the mining footprint into three groundwater sub blocks: North (north of Granite Creek), Central (Granite Creek to Cargill Road) and South (Cargill Road to Fagan Creek).

While surface base flows in the North and South sub blocks of the proposed mining area may be negligible during dry periods, groundwater flows are not insignificant. The estimated groundwater flows at the front of the three sub blocks at a mean depth of 15 m are: North = 1,352 m^3/d; Central = 1,422 m^3/d; and, South = 2,411 m^3/d (Kōmanawa Solutions 2025a, 2025b). This forms the basis for conservative modelling of surface water quality under low flow conditions when base flows may, nevertheless, still contribute to stream flows.

6.3 Surface Water Quality

Surface water sampling was conducted on 8–9 April 2024 at sites shown in Figure 7 (refer to Section 3.3.2). Site descriptions including visual observations are provided in Table 13. The full laboratory report is provided in Appendix C and the key parameters, notably those used in water quality modelling, are summarised in Table 14 and Table 15. For pH and conductivity, field measurements at the time of sampling are reported in preference to laboratory measurement due to the potential for changes in transit, which can be pronounced for samples that may have strong geochemical signatures due to groundwater influence. While the flows of streams or drains site sampled were not measured, sampling was only undertaken on such systems where flows were visibly greater than 1 L/s.

The results indicate that stream sites exhibited near neutral pH, low to moderate electrical conductivity and total dissolved solids (TDS) concentrations, and generally low turbidity and total suspended solids concentrations. Dissolved oxygen was expectedly 77.3–90.0% of saturation at sites with visible flows, the exception being 69.2% in a drain near aquatic ecology Site 2. All surface waters were low to moderate alkalinity and soft (<50 g/m^3 hardness, as $CaCO_3$), with low to moderate major cation and anion concentrations.

Table 13: Surface water site descriptions and qualitative visual characteristics.

Sites		Watercourses	RLWP status	Time	Clarity	Colour	Flow
WQ	Ecology						
8	2	Northern Creek	River	2:10 p.m.	High	Zero	Low
10	3	Central Creek	River	2:40 p.m.	High	Zero	Low
7	5	Granite Creek D/S of ford	River	12:45 p.m.	High	Slight brown	Moderate
13	6	Granite Creek U/S of ford	River	8:55 a.m.	High	Zero	Low-Moderate
12	7	Drain south of Granite Creek	Artificial drain	8:45 a.m.	High	Zero	Low-Moderate
2	8	Southern Drain at coast	Artificial drain	10:30 a.m.	High	Zero	Low
11	-	Pond	Pond	3:00 p.m.	Moderate	Slight brown	NA
4	-	Lagoon	Lagoon	11:00 a.m.	Moderate	Slight brown	NA

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Table 14: Summary of key surface water quality parameters – physico-chemical and nutrients (April 2024).

Parameter / WQ site[#]	8 (2) (Northern Cr.)	10 (3) (Central Cr.)	7 (5) (Granite Cr.)	13 (6) (Granite Cr.)	12 (7) (Drain)	2 (8) (Drain)	11 (Pond)	4 (Lagoon)	Guideline
pH (pH units)*	7.1	7.1	6.8	6.8	6.9	6.6	6.8	6.8	6-9[A]
Temperature (°C)*	14.9	14.2	13.6	12.25	12.65	11.5	16.4	15.2	NA
Electrical conductivity (mS/m)*	7.3	7.9	9.2	7.8	9.0	7.5	14.3	12.5	NA
Turbidity (NTU)	0.89	1.2	3.7	2.2	5.9	1.4	18	3.5	5.6[B]
Total Suspended solids (TSS)	3	<3	5	<3	3	<4	23	10	NA
Total Dissolved solids (TDS)	58	65	67	66	78	61	118	97	NA
Dissolved oxygen (DO)*	6.99	9.22	8.38	9.26	8.21	9.09	9.89	7.55	?[A]
DO (%)*	69.2	90.0	80.6	86.5	77.3	83.4	101	75.2	?[A]
Total Alkalinity (as $CaCO_3$)	31	29	31	25	32	31	25	34	NA
Bicarbonate (at 25°C)	37	36	38	30	39	37	31	41	NA
Total nitrogen (TN)	0.17	0.28	0.46	0.26	0.50	0.36	0.97	0.51	NA
Total ammoniacal nitrogen (Amm-N)	<0.010	0.016	0.091	0.018	0.094	0.013	<0.010	<0.010	[C]refer text
Nitrate + nitrite nitrogen (NOx-N)	0.032	0.23	0.29	0.21	0.31	0.31	<0.002	<0.002	≤1.0[C], refer text
Total Kjeldahl nitrogen (TKN)	0.14	<0.10	0.17	<0.10	0.19	<0.10	0.97	0.51	NA
Total phosphorus (TP)	0.026	0.007	0.007	0.004	0.012	0.006	0.13	0.047	NA
Dissolved reactive phosphorus DRP)	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	0.005	<0.004	≤1.0[C], refer text
Dissolved organic carbon (DOC)	0.9	0.7	1.0	0.8	2.3	0.7	10.3	6.3	NA

Notes: [#] Site in brackets represents ecological survey site; units g/m^3 unless stated; *Field measurement; [A]WCRC (2014); [B]ANZECC (2000); [C]NPS-FWM (2020).

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Table 15: Summary of key surface water quality parameters – metals/metalloids and major ions (April 2024).

Parameter/Site[#]	8 (2) (Northern Cr.)	10 (3) (Central Cr.)	7 (5) (Granite Cr.)	13 (6) (Granite Cr.)	12 (7) (Drain)	2 (8) (Drain)	11 (Pond)	4 (Lagoon)	Guideline
Aluminium	0.004	0.005	0.004	0.015	0.005	<0.003	0.013	<0.003	0.40[A,B]
Arsenic	<0.0010	<0.0010	0.0014	0.0014	0.0017	<0.0010	<0.0010	0.0011	0.013[C]
Boron	0.008	0.010	0.011	0.011	0.011	0.008	0.016	0.010	0.94[D]
Cadmium	<0.0005	<0.0005	<0.0005	0.0006	<0.0005	<0.0005	<0.0005	<0.0005	NA
Chromium	<0.0005	<0.0005	<0.0005	0.0006	<0.0005	<0.0005	0.0013	<0.0005	0.0033[E]
Cobalt	<0.0002	<0.0002	0.0003	0.0004	0.0002	<0.0002	0.0006	<0.0002	NA
Copper	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0009	<0.0005	0.0039[F,G]
Iron (total)	0.28	0.11	1.3	0.63	1.2	0.46	3.5	1.82	1.0[H]
Iron	0.05	0.06	0.51	0.48	0.62	0.19	1.2	0.86	NA
Lead	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	0.00039	< 0.00010	0.0034[I]
Mercury (total)	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	NA
Mercury	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008	NA
Manganese	0.0034	0.0056	0.065	0.044	0.065	0.0087	0.083	0.026	1.9[J]
Molybdenum	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	NA
Nickel	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0012	0.0006	0.011[I]
Zinc	0.018	0.0040	<0.0010	0.0020	0.0016	0.0013	0.0018	0.0013	0.011[I]
Silver	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	NA
Calcium	7.6	9.4	9.2	6.9	9.1	8.2	9.2	12	NA
Magnesium	2.6	2.3	2.5	2.0	2.6	2.8	3.1	2.9	NA
Potassium	1.2	1.2	1.1	0.86	1.1	0.87	3.8	2.7	NA
Sodium	6.6	6.8	9.4	9.3	9.1	7.0	18.3	12.6	NA
Chloride	7.8	9.5	13	13	13	9.4	30	24	NA
Sulfate	2.3	3.2	3.1	3.8	3.0	2.9	7.5	1.6	NA

Notes: [#] Site in brackets represents ecological survey site; Dissolved fraction unless stated; [A]USEPA (2018); [B]hardness=40 g/m^3 $CaCO_3$, pH=7.0, Dissolved Organic Carbon (DOC)=2 g/m^3; [C]As(V), ANZECC (2000); [D]ANZECC (2018); [E]hardness=30 g/m^3 $CaCO_3$;Cr(III), ANZECC (2000); [F]USEPA (2007); [G]hardness=25 g/m^3 $CaCO_3$, pH=7.0, DOC=2.0 g/m^3; [H]USEPA (1986); [I]hardness=30 g/m^3, ANZECC (2000); [J]ANZECC (2000).

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Nutrient concentrations were also either low or moderate. Ammoniacal nitrogen (Amm-N) concentrations placed Sites 2, 3, 6 and 8 in the annual median A-attribute state, whereas Site 5 (Granite Creek downstream of the ford) and Site 7 (the drain feeding from the south of Granite Creek) were in the annual median B-attribute state. Nitrate + nitrate (NOx-N) concentrations were below that defined as the annual median A-attribute state (≤1.0 g/m^3) and, similarly, dissolved reactive phosphorus (DRP) concentrations were below that defined as the five-year monthly median A-attribute state (≤0.006 g/m^3), at all sites.

Concentrations of dissolved metals and metalloids were low across all sites and almost totally met relevant guideline value concentrations. One exception was zinc at Site 2, which showed slight exceedance versus the hardness adjusted ANZECC (2000) 95%-ile trigger value on two occasions; viz., 0.018 g/m^3 versus 0.008 g/m^3.

The major points of difference at the pond sites, 11 and 4, were the tendencies to higher turbidity, TSS and major cation and anion concentrations, which in turn result in greater TDS concentrations and electrical conductivities. Most notable was the slight elevation of chloride, which is indicative of seawater influence. In addition, total nitrogen (TN) concentrations were elevated at these sites compared to the other surface water sites, due to organic nitrogen, and organic inputs are also apparent via an elevation in dissolved organic carbon (DOC).

6.4 Physico-chemistry – January 2025

There was 0.8 mm of rainfall within 7-days prior to the survey and 23.8 mm of rain within the two-week period prior to the survey recorded at the Greymouth Aero EWS (NIWA). Spot measurements of water physico-chemistry were made during base flow conditions. A summary of spot measurements of water physico-chemistry at sites on artificial drains and modified rivers (i.e., Northern Creek, Central Creek, Clarke Creek, Granite Creek, Wasabi Creek and Southern Creek) during the survey are summarised in Table 16. Measurements were made between 8:50 a.m. and 3:00 p.m.

Table 16: Water physico-chemistry during the ecological survey.

Ecology site	Watercourses	Time	Temp. (°C)	Dissolved oxygen		pH	Conductivity (µS/m)
				(g/m^3)	(%)		
1	Artificial drain (northern area)	3:00 p.m.	14.4	9.5	93	7.3	78
7	Artificial drain (central area)	9:50 a.m.	13.1	8.4	80	7.1	108
8	Artificial drain (southern area)	11:00 a.m.	12.2	8.7	81	6.8	104
2	Northern Creek	1:30 p.m.	14.0	9.1	88	7.0	83
3	Central Creek	1:40 p.m.	19.1	10.2	111	7.2	108
4	Clarke Creek	8:50 a.m.	15.8	8.3	83	7.0	140
5	Granite Creek (lower)	2:30 p.m.	18.9	8.7	94	7.0	116
6	Granite Creek (upper)	3:20 p.m.	15.4	8.8	88	6.8	97
9	Wasabi Creek	9:45 a.m.	11.7	9.7	89	6.9	87
10	Southern Creek	11:40 a.m.	14.5	9.5	93	7.3	87

Stream temperatures ranged between 11.7 and 19.1°C. All sites were moderately to well oxygenated with dissolved oxygen (DO) concentrations ranging between 8.3 to 10.2 g/m^3 and saturations between 80 and 111%. Stream pH was near-neutral and ranged between 6.8 and 7.3. Electrical conductivity was low at all sites and ranged between 78 and

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140 µS/m. Water physico-chemistry recorded at all sites would not have been limiting aquatic biota at the time of the survey. Poor channel shade and slow flow in some drains mean water temperatures have the potential to be elevated during low flow conditions in summer and result in stressful conditions for certain aquatic biota.

6.5 Habitat Characteristics

6.5.1 Overview

Watercourse habitat results are summarised in Table 17. Habitat characteristics are described separately for artificial drains (Sites 1, 7 and 8) and continually or intermittently flowing rivers (Sites 2, 3, 4, 5, 6, 9 and 10) within the SB.

Table 17: Stream habitat characteristics at sites within the SB during the survey.

Site	Watercourse	Mean depth (m)	Mean width (m)	Mean velocity (m/s)	Shade (%)	Habitat (%)[1]	Streambed (%)[2]
1	Artificial drain	0.2	1.4	0.2	40	Po=20, Ri=10, Ru=70	Br=30, Bo=3, Co=7, Gr=20, Sa/si=40
7	Artificial drain	0.5	2.0	0.2	20	Ru=100	Gr=5, Sa/si=95
8	Artificial drain	0.5	1.9	0.4	5	Ri=5, Ru=95	Co=5, Gr=55, Sa/si=40
2	Northern Creek	0.3	2.2	0.5	15	Po=20, Ri=10, Ru=70	Br=3, Bo=2, Co=15, Gr=70, Sa/si=10
3	Central Creek	0.7	2.1	0.1	10	Po=40, Ru=60	Gr=30, Sa/si=70
4	Clarke Creek	0.1	1.0	0.4	10	Po=3, Ru=95, Ch=2	Gr=5, Sa/si=95
5	Granite Creek (lower)	1.9	7.0	0.0	0	Ru=100	Co=30, Gr=30, Sa/si=40
6	Granite Creek (upper)	0.2	2.7	0.5	30	Po=30, Ri=50, Ru=20	Bo=1, Co=25, Gr=34, Sa/si=40
9	Wasabi Creek	0.2	3.5	0.7	15	Po=20, Ri=40, Ru=40	Bo=5, Co=45, Gr=50
10	Southern Creek	0.2	1.5	0.4	20	Po=30, Ru=70	Co=40, Gr=40, Sa/si=20

Note: [1] Habitat: Po = pool, Ri = riffle, Ru = run, Ch = chute; [2] Streambed: Br = weathered clay bedrock, Bo = boulder, Co = cobble, Gr = gravel, Sa/si = sand/silt.

6.5.2 Artificial drains

There are numerous artificial drains with an approximate total length of 13.62 km within the SB, including 11.17 km within the mining area. Artificial drains within the SB are remnant aquatic features of historical dredge mining activity or were constructed to drain low-lying farmland. Artificial drains within the SB do not incorporate the bed of an existing river or creek, or water from the bed of an existing river or creek, and meet the definition of an artificial drain in the RLWP. Artificial drains generally had straight channel alignments and provided aquatic habitat that was typically dominated by moderate-slow flowing runs and pools with shallower riffle habitat forming in some drains with flowing water and coarser hard-bottomed streambeds (e.g., Site 1). A selection of artificial drains was surveyed to provide an indication of ecological characteristics in this watercourse type within the site.

Site 1 was located on an artificial drain fed by the wetland to the immediate north of the SB and was a narrow (mean = 1.4 m), straight aligned drain that provided moderately diverse habitat (i.e., runs, riffles, small pools) due to variable water depths (0.08–0.43 m), diverse streambed and woody debris derived from the wetland as shown in Figure 30. The narrow channel meant it was moderate-well shaded by overhanging rank grass with a narrow strip of ungrazed rank grass between the channel and fenced wetland to the north. Streambanks were generally stable and undercut in places (i.e., providing cover for fish). Habitat at Site 1 was of moderate quality for macroinvertebrates and fish.

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Figure 30: Aquatic habitat in artificial drain at Site 1.

Site 7, shown in Figure 31, was located on an artificial drain in the central area of the SB and flowed into Granite Creek. The channel was U-shaped and stable, moderately wide (1.9–2.0 m), moderately deep (0.5 m), had sluggish flow (0.1 m/s) and dominated by uniformly deep run habitat (100%) with flow constrained by steep/incised streambanks. The streambed was sand/silt (95%) with some gravel (5%) and woody debris. The drain was fenced, but poorly shaded by overhanging low stature exotic vegetation. Habitat was poor for macroinvertebrates, but overhanging vegetation, undercut banks and deep run habitat provided moderate-good quality habitat for some native fish species (e.g., eel, īnanga).

Site 8 (Figure 32), was located in the lower reaches of an artificial drain network. The drain at Site 8 had a moderately wide (1.8–2.3 m), deep (mean = 0.5 m) and U-shaped channel with small floodplains and habitat dominated by uniform runs (95%) with moderate flow velocity (0.4 m/s). The streambed was mostly gravel (55%) and sand/silt (40%) with occasional cobble (5%). The channel and streambanks were stable, fenced and poorly shaded due to the riparian margin comprising rank exotic grasses and occasional shrubs. The drain provided moderate-poor quality habitat for macroinvertebrates and native fish.

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Figure 31: Habitat in artificial drain at Site 7.

Figure 32: Habitat in artificial drain at Site 8.

6.5.3 Modified rivers

There are seven rivers that flow through the SB including Northern Creek, Clarke Creek, Little Granite Creek and Granite Creek and include 790 m of ephemeral flow paths (on Northern Creek), 3.13 km within the SB and 2.2 km within the mining area.

Northern Creek

Site 2 was located on the lower reaches of a natural, but modified, drainage system referred to as Northern Creek which originates within the SB. The upper reaches had ephemeral flow paths that transitioned into intermittently flowing river sections that seasonally hold water and then into continually flowing mid-lower river reaches that hold water year-round. The lower reaches at Site 2 was deeply incised, had variable widths (1.3–3.0 m), depths (0.15–0.5 m) and steep and eroding streambanks (Figure 33). The streambed comprised a diverse mix of weathered clay (3%), boulder (2%), cobble (15%), gravel (70%) and sand/silt (10%). Habitat was diverse with run (80%), riffle (15%), pool (5%), woody debris and with variable flow velocities (0.2–0.8 m/s) reflecting diverse habitat. The channel was fenced but poorly shaded (15%) by steep incised streambanks and overhanging rank grass. The lower reaches of the stream provided moderate quality habitat for invertebrates and native fish.

Figure 33: Habitat in Northern Creek at Site 2.

Central Creek

Site 3 was located in the lower reaches of Southern Creek that was moderately wide (1.6–2.5 m), deep (mean = 0.7 m), had sluggish flow (0.1 m/s), a high proportion of sand/silt (70%) and habitat dominated by runs and pools (Figure 34). The creek was fenced but open, poorly shaded and choked with macrophytes that restricted flow. Habitat at Site 3 was poor for macroinvertebrates and moderate for some native fish species (e.g., eel).

Figure 34: Habitat in lower reaches of Central Creek at Site 3.

Clarke Creek

Site 4 was located on Clarke Creek, which is a highly modified, but natural, river that originates in the hills east of SH6 and flows onto Barrytown Flats and into Granite Creek within the SB. The channel had a modified straight alignment, was incised, narrow (0.65–1.30 m), shallow (0.1–0.25 m) and dominated by run (95%) habitat with moderate flow velocity (0.4 m/s) (Figure 35). The streambed comprised sand/silt (95%) and gravel (5%). The channel was fenced but poorly shaded (10%) by steep banks and rank grass. The highly modified section of Clarke Creek within the SB provided poor quality habitat for invertebrates and native fish.

Figure 35: Habitat in Clarke Creek at Site 4.

Little Granite Creek

Little Granite Creek originates to the east of SH6 and flows onto Barrytown Flats before entering the SB (Figure 36). The section of Little Granite Creek within the SB was classified as a highly modified river according to definitions in the RLWP and has been realigned prior to joining Granite Creek.

Figure 36: Habitat in Little Granite Creek at Site 4.

Granite Creek

Granite Creek originates in the hills east of SH6 and flows onto the Barrytown Flats and into the SB before discharging at the coast. The section of Granite Creek within the SB is a highly modified, but natural, river according to definitions in the RLWP (West Coast Regional Council 2014). Granite Creek was sampled at Sites 5 and 6 below the Little Granite Creek confluence. The channel at the upstream Site 6 was moderately wide (2.1–3.2 m) with variable depths (0.07–0.5 m) and velocities (0.2–0.7 m/s; mean = 0.5 m/s) across run (20%), riffle (50%) and pool (30%) habitats. The streambed was diverse comprising boulder (1%), cobbles (25%), gravel (34%) and sand/silt (40%). The high proportion of sand/silt smothering instream surfaces was likely due to slips in the upper catchment being transported and deposited into the lower gradient lower reaches within the site (Figure 37). The channel was fenced with variable shade ranging from low-moderate. Habitat at Site 6 was moderate-poor for macroinvertebrates due to silt smothering instream surfaces and moderate for native fish.

The lower reaches of Granite Creek were surveyed at Site 5. Flow and habitat in the lower reaches of Granite Creek was influenced by a low weir constructed across the riverbed using bed material at the river mouth (Figure 38). The low weir held water up and resulted in the unnatural formation of very slow flowing (<0.1 m/s), wide (~7 m) and deep (>1.5 m) run/pool habitat. The streambed was coarse, comprising cobbles (30%), gravel (30%) and sand/silt (40%). The channel was fenced but poorly shaded and was lined with overhanging rank grass, flax and sedges that formed a wetland. The presence of a constructed low weir from bed material across the river mouth influenced flow and habitat

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conditions resulting in the lower reaches providing uniform and poor-quality habitat for macroinvertebrates in its current state. The lower reaches of Granite Creek may provide potential īnanga spawning habitat, but fish access could be affected by the weir.

Figure 37: Habitat at upper Site 6 (top) and lower Site 5 (below) on Granite Creek.

Figure 38: Low weir at the river mouth of Granite Creek.

Wasabi Creek

Site 9 was located on Wasabi Creek south of Cargill Road and drained an area that was modified during historical dredge mining activity. Flow within Wasabi Creek was spring fed as the channel was well below the natural ground level resulting in good flow and moderate-high flow velocities (0.5–1.0 m/s) during base flow conditions. Habitat was diverse and characterised by run (40%), riffle (40%) and pool (20%) habitat with the streambed comprising cobble (45%), gravel (50%) and boulder (5%) (Figure 39). Wasabi Creek was fenced with riparian vegetation comprising rank grass, exotic shrubs (e.g., gorse) and occasional native ferns, which provided poor channel shade (15%). Wasabi Creek provided good quality habitat for invertebrates and native fish species.

Figure 39: Habitat in Wasabi Creek at Site 9.

Southern Creek

Site 10 was located on Southern Creek, which is a small watercourse draining the southern portion of the SB. The channel was incised, narrow (1.2–1.8 m) and shallow (mean = 0.2 m) with moderate flow velocities (0.4 m/s). Habitat was dominated by shallow runs (70%) and pools (30%) with a diverse streambed comprising cobble (40%), gravel (40%) and sand/silt (20%). The creek was fenced but low stature rank grass, exotic shrub (e.g., gorse) and occasional native fern vegetation provided limited shade (20%) as shown in Figure 40. Habitat was of moderate-poor quality for macroinvertebrates and native fish species.

Figure 40: Habitat at Site 10.

6.6 Macrophytes and Periphyton

6.6.1.1 Macrophytes

Macrophyte cover was generally low in artificial drains and macrophytes were not recorded in Granite Creek (Sites 5 and 6) or the highly modified Clarke Creek (Site 7). Emergent macrophyte cover was low (<30%) at drain sites with watercress (*Nasturtium officinale*), monkey musk (*Erythranthe guttata*) and water pepper (*Persicaria hydropiper*) being the most common species recorded. An exception was high (80%) cover of watercress, monkey musk and water pepper choking the channel in Central Creek (Site 3), which reflected sluggish flow and sand/silt dominated streambed. The only submerged species recorded was low cover (10%) of the introduced curly pondweed (*Potamogeton crispus*) in an artificial drain (Site 7).

The macrophyte flora recorded in watercourses within the SB was typical of streams draining grazed pasture catchments with moderate-poor shade and dominated by common exotic species. The high proportion of gravel/cobble making up streambeds in most

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watercourses within the SB limited macrophyte cover despite poor channel shade.

6.6.1.2 Periphyton

Periphyton cover was low-moderate in watercourses draining the SB. Periphyton communities were made up by thin films in watercourses with gravel/cobble streambeds and riffles (i.e., Sites 1 and 7 on artificial drains, Northern Creek, Wasabi Creek), low cover (<1%) of medium-thick mat including *Phormidium* cyanobacteria (i.e., Site 1) and moderate-low cover (0–20%) of filamentous algae in artificial drains (i.e., Sites 1 and 8) and creeks (e.g., Northern Creek, Clarke Creek, Granite Creek, Wasabi Creek, Southern Creek). Filamentous algae cover was highest at Sites 2 and 8 (15–20% cover) and in watercourses with gravel/cobble streambeds, shallow riffles and poor channel shade.

Wasabi Creek (Site 9) had a clean gravel/cobble dominated streambed, shallow riffles and was poorly shaded, but supported thin film algae and very low (<5%) cover of thick mat and filamentous algae. The presence of thin films in this poorly shaded drain indicates a low nutrient environment and provided a good source of food for grazing macroinvertebrate taxa (e.g., mayflies, stoneflies, caddisflies).

Overall, periphyton cover recorded in watercourses within the SB were not at nuisance levels, but the presence of low-moderate cover of thick mat and filamentous algae in some drains had potential to influence macroinvertebrate community composition and favour taxa that tolerate nutrient enrichment and algal growth (e.g., Sites 1, 2, 4, 6, 8, 9 and 10).

6.7 Macroinvertebrates

6.7.1 Artificial drains

6.7.1.1 Community composition

Raw macroinvertebrate data is presented in Appendix D. Macroinvertebrate communities recorded at sites on artificial drains (Sites 1, 7 and 8) were dominated by Crustacea (amphipods, ostracods), Diptera (true-flies) or Mollusca (snails) (Figure 41). The communities recorded at Sites 7 and 8 that had deeper water in run/pool habitats, slow flow velocities, higher proportions of sand/silt and higher macrophyte cover had higher relative abundance of Crustacea (32–41%).

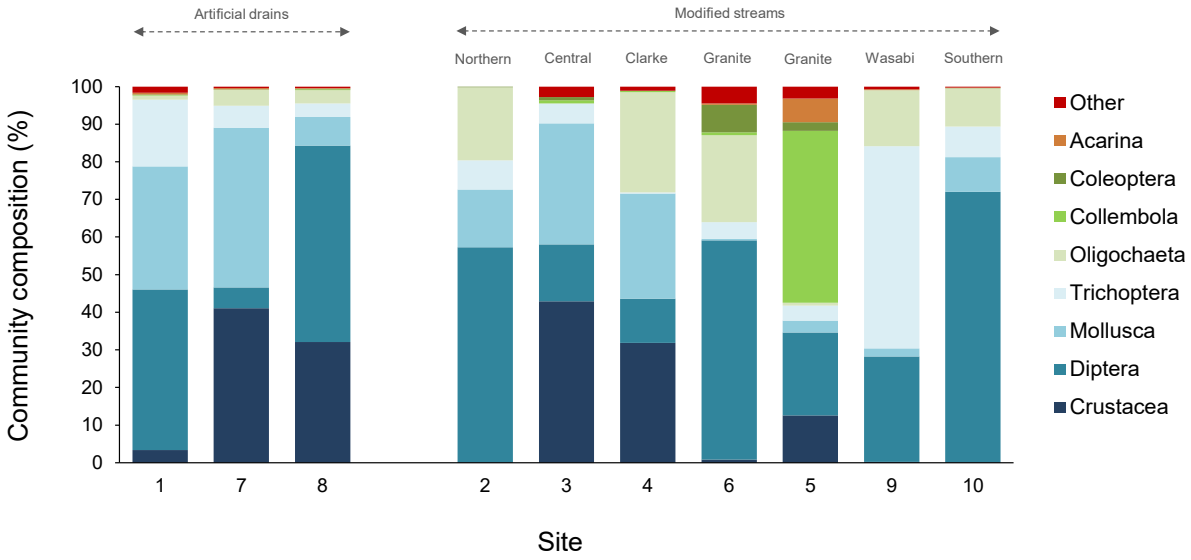

Figure 41: Relative abundance (%) of the main taxonomic groups recorded at sites on artificial drains and modified rivers.

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Site 1 had a gravel/cobble dominated streambed and a higher proportion of shallow riffle habitat and was dominated by Diptera (43%). No kōura (freshwater crayfish) were recorded from artificial drains.

6.7.1.2 Taxa richness and abundance

A moderate number of taxa (24–26 taxa, Figure 42) were recorded in artificial drains (Sites 1, 7 and 8). The most diverse taxonomic groups were dipterans and caddisflies. Artificial drains supported moderate-high invertebrate abundance (654–1,988 individuals).

6.7.1.3 EPT taxa richness and percent EPT abundance

The number of water and habitat sensitive EPT taxa in artificial drains ranged between 4–9 (Figure 42). Highest EPT diversity was recorded at Site 1 due to the number of caddisfly taxa. The relative abundance of EPT taxa (%EPT) at Sites 7 and 8 was low (<2%) and moderate at Site 1 (19%) (Figure 42) due to relative abundance of *Triplectides* caddisflies.

6.7.1.4 MCI, QMCI and ASPM

MCI scores were similar in artificial drains and ranged between 85 and 90 (Figure 42) whilst QMCI scores ranged between 3.2 and 4.1 (Figure 42). MCI and QMCI scores were in Attribute Band D and below the NPS-FM National Bottom Line (NBL) (i.e., MCI <90, QMCI <4.5) and indicative of severe nutrient enrichment. ASPM scores ranged between 0.19 and 0.32 (Figure 42). The ASPM score for Site 1 was in Attribute Band C indicating moderate-to severe loss of ecological integrity whilst those for Sites 7 and 8 were in Attribute Band D (below NBL; <0.3) and indicative of severe loss of ecological integrity.

6.7.1.5 Summary

Artificial drains within the site were man-made aquatic environments and supported macroinvertebrate communities that reflected uniform habitat conditions and dominated by taxonomic groups that tolerate degraded water quality and habitat conditions. The drain where Site 1 was located supported moderate taxonomic diversity, moderate EPT diversity, moderate EPT abundance and supported a community that indicated ‘fair’ to ‘good’ health.

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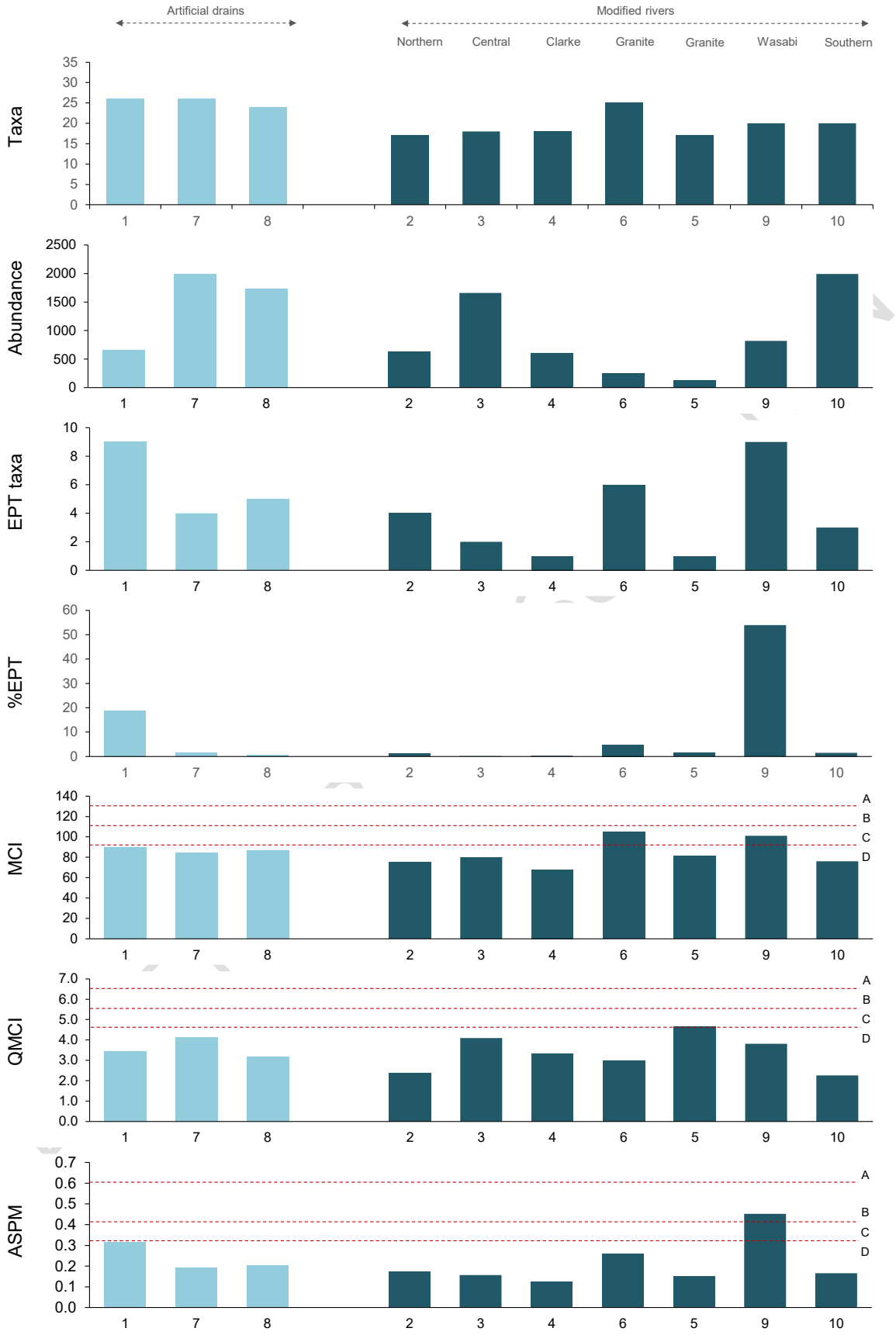

Note: NPS-FM: A = Excellent, B = Good, C = Fair, D = Poor (below national bottom line).

Figure 42: Biological index scores for sites on artificial drains and modified rivers during the survey.

6.7.2 Modified rivers

6.7.2.1 Community composition

Macroinvertebrate communities recorded from modified rivers were characterised by moderate-high proportions of Diptera (12–72%), Crustacea (0–43%), Mollusca (0–32%) and Oligochaeta (0–27%) (Figure 41). Wasabi Creek supported a higher proportion of Trichoptera (54%) than other creeks and reflected the clean gravel/cobble bed in riffles and low periphyton cover. Higher abundance of crustaceans in Central Creek, Clarke Creek and lower Granite Creek reflected slower flow velocities, run habitat and higher macrophyte cover. Other than Wasabi Creek, modified rivers within the site supported communities dominated by taxa that tolerate degraded conditions or nutrient enrichment. No kōura (freshwater crayfish) were recorded from modified rivers during the survey.

6.7.2.2 Taxa richness and abundance

Modified rivers within the SB supported communities with moderate taxa richness (17–25 taxa) (Figure 42) and variable abundance ranging from 127–247 individuals at Granite Creek sites (5 and 6) to 1,991 individuals in Southern Creek (Figure 42).

6.7.2.3 EPT taxa richness and percent EPT abundance

EPT taxa richness was variable across sites on modified rivers (Figure 42). Lowest EPT taxa richness was recorded in Clarke Creek and lower Granite Creek (1 EPT taxa) whilst highest EPT taxa richness was recorded in upper Granite Creek (6 EPT taxa) and Wasabi Creek (9 EPT taxa).

Percent EPT taxa abundance was generally low in all creeks with the exception of Wasabi Creek where water quality and habitat sensitive EPT taxa made up 54% of community abundance (Figure 42). The most abundance EPT taxa recorded across sites were *Triplectides* caddisflies in Northern Creek and *Pycnocentrodes*, *Pycnocentria* and *Hydrobiosis* caddisflies in Wasabi Creek. Mayflies and stoneflies were very rare and only recorded in very low abundance in upper Granite Creek and Wasabi Creek.

6.7.2.4 MCI, QMCI and ASPM

MCI scores were variable across modified rivers within the SB and ranged between 68 for Clarke Creek and 105 for upper Granite Creek. MCI scores for all sites except upper Granite Creek (Site 6) and Wasabi Creek (Site 9) were in NPS-FM Attribute Band D, below the NBL and indicating 'poor' stream health (Figure 42). The MCI scores for upper Granite Creek (MCI = 105) and Wasabi Creek (MCI = 101) were in NPS-FM Attribute Band C and indicating 'fair' stream health.

QMCI scores ranged between 2.3 and 4.7 for Southern Creek (Site 10) and lower Granite Creek (Site 5). The higher QMCI score for lower Granite Creek reflected the abundance of moderate scoring Collembola (MCI = 6). QMCI scores for all modified rivers with the exception of lower Granite Creek were in Attribute Band D and indicating 'poor' stream health (Figure 42). The QMCI scores for lower Granite Creek (QMCI = 4.7) was in NPS-FM Attribute Band C and indicating 'fair' stream health.

ASPM scores were low for all modified rivers (ASPM = 0.13–0.26) within the SB with the exception of Wasabi Creek (ASPM = 0.45) (Figure 42). All modified rivers (except Wasabi Creek) had ASPM scores in Attribute Band D (below NBL) and indicated severe loss of ecological integrity. The ASPM score for Wasabi Creek was in Attribute Band B and indicated mild-moderate loss of ecological integrity.

6.7.2.5 Summary

Modified rivers within the SB generally supported macroinvertebrate communities

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dominated by taxonomic groups that tolerate modified or degraded water quality and habitat conditions. Exceptions were the communities in Wasabi Creek that supported moderate EPT taxa richness and abundance so had higher MC, QMCI and ASPM scores. Upper Granite Creek supported moderate EPT taxa richness so had a similar MCI score to Wasabi Creek, but had low QMCI and ASPM scores due to low EPT abundance. Kōura (freshwater crayfish) were not recorded from modified rivers during the survey.

6.8 Fish Fauna

6.8.1 New Zealand Freshwater Fish Database

There are no records in the New Zealand Freshwater Fish Database (NZFFD) for watercourses within the site (Figure 43). There are NZFFD records of longfin eel (*Anguilla dieffenbachii*), banded kōkopu (*Galaxias fasciatus*), kōaro (*Galaxias brevipinnis*) and shortjaw kōkopu (*Galaxias postvectis*) in the mid-upper reaches of Granite Creek to the east of SH6 during surveys by the Department of Conservation in 1998 and 2022. These three native species are diadromous and migrate between the sea and freshwater to complete their life cycles so would have migrated up the highly modified lower reaches of Granite Creek to reach this habitat. These records also indicate there are no substantial barriers within the site for these species with 'good to excellent' climbing ability.

Additional fish species listed in the NZFFD from Canoe Creek to the immediate north of the SB and Fagan Creek to the immediate south of the SB include shortfin eel (*Anguilla australis*), torrentfish (*Cheimarrichthys fosteri*), common bully (*Gobiomorphus cotidianus*), bluegill bully (*Gobiomorphus hubbsi*), redfin bully (*Gobiomorphus huttoni*) and the introduced brown trout (*Salmo trutta*).

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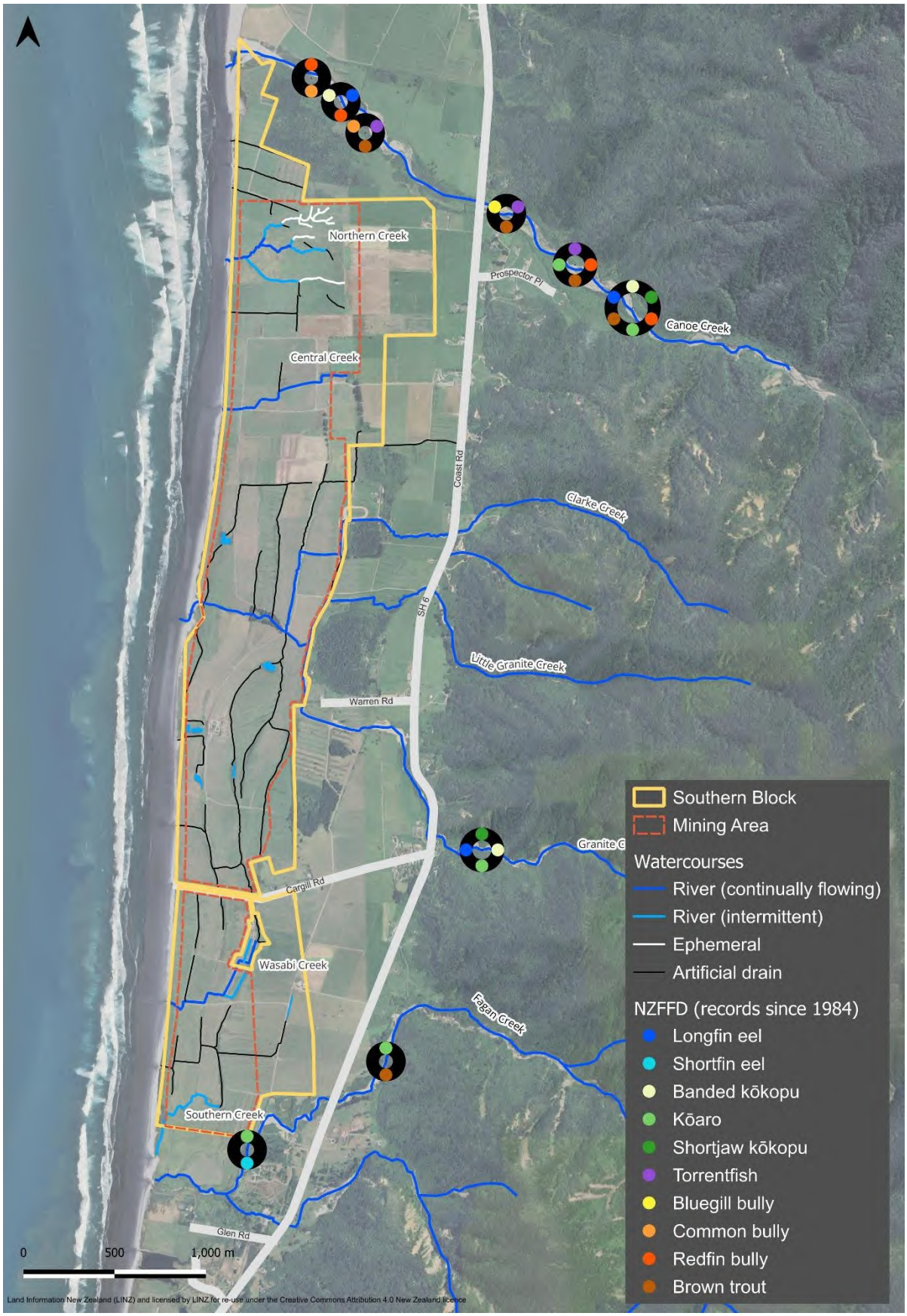

Figure 43: New Zealand Freshwater Fish Database records since 1984 for watercourses draining through the site and in adjacent catchments.

Canoe Creek and Fagan Creek are in a comparatively natural state and provide dissimilar habitat to watercourses within the SB. Fish records for Canoe Creek and Fagan Creek are therefore not directly comparable but provide an indication of fish species present in the vicinity of the SB.

Of the species listed in the NZFFD for the Granite Creek catchment, or in immediately adjacent catchments (i.e., Canoe Creek, Fagan Creek), shortjaw kōkopu are considered by Dunn et al. (2025) to be 'Threatened – Nationally Vulnerable'. Longfin eel and kōaro are considered to be 'At Risk – Declining', whilst torrentfish and bluegill bully are considered 'At Risk – Naturally Uncommon' (Dunn et al. 2025). Of these species, torrentfish and shortjaw kōkopu were not recorded within the SB during the EFM survey.

6.8.2 Electric fishing survey results

Eight fish species were recorded during an electric fishing machine (EFM) survey across ten sites within the SB on artificial drains and modified natural rivers. The number of each species caught, along with the range in fish length, is summarised in Table 18. The sites at which each species was recorded is also shown in Figure 44. Fish species recorded were longfin eel, shortfin eel, kōaro, banded kōkopu, īnanga (*Galaxias maculatus*), common bully, bluegill bully and redfin bully (Figure 45 and Figure 46).

The most abundant and widespread species recorded during the EFM survey were longfin eel (70 individuals across eight sites), redfin bully (57 individuals across eight sites) and īnanga (49 individuals across eight sites). The least abundant species recorded across sites were common bully (one individual at Site 1 on an artificial drain) and kōaro (three individuals at Site 9 on Wasabi Creek).

6.8.2.1 Artificial drains

Artificial drains within the SB supported 3–4 fish species based on the EFM survey. Four species including īnanga, banded kōkopu, redfin bully and bluegill bully were recorded at Site 1 on the artificial drain fed by a wetland to the immediate north of the SB. There species were recorded at Sites 7 and 8 on artificial drains and included shortfin eel, longfin eel and īnanga at Site 7 and longfin eel, banded kōkopu and redfin bully at Site 8. Fish diversity in drains was generally comparable with the number recorded from modified rivers within the site.

Fish species of conservation interest recorded from artificial drains included īnanga (Threatened – Nationally Vulnerable), longfin eel (At Risk – Declining), and banded kōkopu, redfin bully and bluegill bully (At Risk Naturally Uncommon) (Dunn et al. 2025). The artificial drains electric fished supported between 2–3 species of conservation interest. Although the artificial drains within the SB were man-made aquatic environments, they supported moderate-low native fish diversity including species of conservation interest.

6.8.2.2 Modified rivers

Based on the EFM survey, Site 2 (Northern Creek) and Site 4 (Clarke Creek) on modified natural rivers within the SB supported between 3–5 native fish species including shortfin eel, longfin eel, īnanga, banded kōkopu, kōaro, redfin bully, bluegill bully and common bully.

Southern Creek (Site 2) and upper Granite Creek (Site 6) had highest fish diversity (5 species) whilst lower Granite Creek (Site 5) had lowest diversity (1 species). The lower Granite Creek site was unable to be surveyed by EFM because it was un-wadeable due to the low rock weir constructed across the river mouth backing water up. A school of īnanga were observed in this lower reach above the weir indicating that, assuming that the weir has been present for more than one year, fish passage was still possible at some stage.

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Table 18: Results of electric fishing machine survey at sites on artificial drains and modified natural creeks during the survey.

Common name	Scientific name	Conservation status (Dunn et al. 2025)	Artificial drains			Modifiedcreeks						
						Northern	Central	Clarke	Wasabi	Granite		Southern
			1	7	8	2	3	4	9	5	6	10
Longfin eel	*Anguilla dieffenbachii*	At Risk – Declining	2 (100–150)	3 (200–1,110)	3 (120–190)	33 (70–800)	1 (1,100)	24 (55–1,000)	-	-	3 (110–130)	1 (950)
Shortfin eel	*Anguilla australis*	Not Threatened	-	1 (250)	-	-	4 (120–400)	2 (200–220)	7 (70–140)	-	-	6 (110–450)
Kōaro	*Galaxias brevipinnis*	At Risk – Declining	-	-	-	-	-	-	3 (50–115)	-	-	-
Banded kōkopu	*Galaxias fasciatus*	At Risk – Naturally Uncommon	8 (52–120)	-	1 (85)	-	-	-	-	-	2 (125–140)	-
Īnanga	*Galaxias maculatus*	Threatened – Nationally Vulnerable	1 (80)	1 (60)	-	6 (60–80)	20[1]	4 (60–70)	-	10[2]	4 (53–70)	3 (60–75)
Common bully	*Gobiomorphus cotidianus*	Not Threatened	-	-	-	-	1 (130)	-	-	-	-	-
Bluegill bully	*Gobiomorphus hubbsi*	At Risk – Naturally Uncommon	4 (60–66)	-	-	-	-	-	9 (50–67)	-	7 (45–60)	-
Redfin bully	*Gobiomorphus huttoni*	At Risk – Naturally Uncommon	4 (36–80)	-	2 (62–70)	5 (32–45)	2 (55–60)	6 (25–75)	7 (38–85)	-	19 (30–75)	12 (25–65)
Total number of species			**5**	**3**	**3**	**3**	**5**	**4**	**4**	**1**	**5**	**4**

Note: Size range in brackets. Lengths measured in mm. [1] 70 mm average. [2] No lengths recorded.

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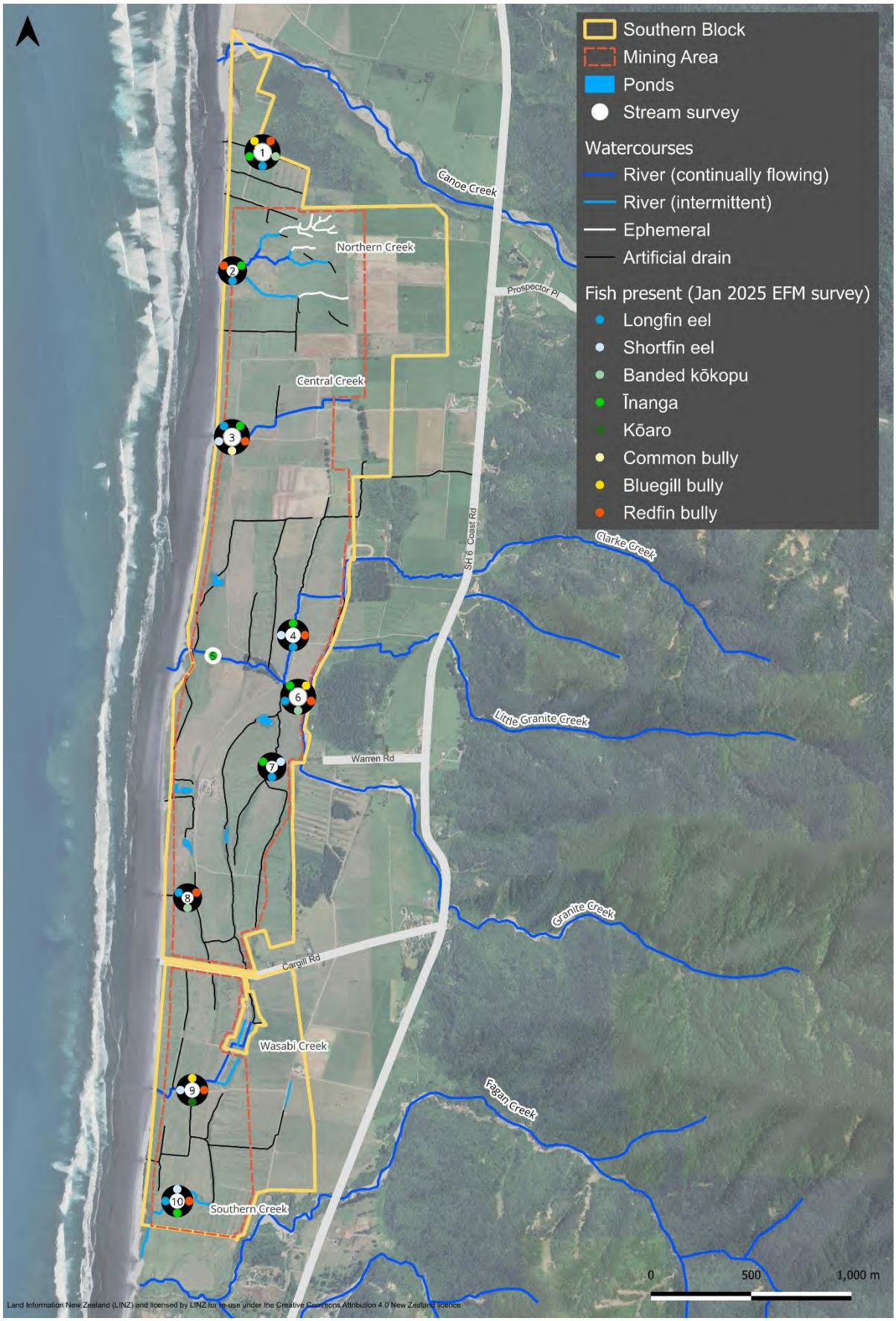

Figure 44: Fish species recorded during the EFM survey within the SB, Barrytown.

Figure 45: Kōaro at Site 9, redfin bully, common bully and banded kōkopu (from top to bottom) recorded at selected sites during the survey.

Figure 46: Adult longfin eel at Site 3 and bluegill bully at Site 1 (from top to bottom) recorded during the survey.

The most widespread species recorded across modified river sites were īnanga and redfin bully. The least widespread species across sites were banded kōkopu (upper Granite Creek), kōaro (Wasabi Creek) and common bully (Central Creek). The presence of kōaro in Wasabi Creek was of interest given it did not provide the type of habitat typically preferred by kōaro (i.e., turbulent boulder habitat with high cover).

Fish species of conservation interest recorded from modified rivers within the SB included īnanga (Threatened – Nationally Vulnerable), longfin eel and kōaro (At Risk – Declining), and banded kōkopu, redfin bully and bluegill bully (At Risk Naturally Uncommon) (Dunn et al. 2025).

6.8.3 Environmental DNA results

Results of environmental DNA (eDNA) sampling at sites on artificial drains (Sites 1, 7, 8) and modified rivers (Sites 2, 3, 4, 5, 6, 9, 10) are presented in Table 19. Environmental DNA results provide an indication of the fish species present in each watercourse either at or near the point of sampling or upstream. For watercourses that originate within the SB (e.g., Sites 1, 2, 3, 7, 8, 9, 10), eDNA results are likely to accurately reflect what species occur within the SB. For sites on watercourses that originate outside the SB in hills to the east of SH6, it is possible eDNA in samples could have originated from outside the SB (i.e., upstream), meaning that the species recorded may not be present within the area to be mined, but do occur in the wider catchment. Results of eDNA sampling indicated the presence of more species within the SB than were captured during the EFM survey.

Of particular interest was the potential wide presence of the ‘At Risk – Declining’ giant kōkopu in watercourses across the SB including in artificial drains (Sites 7 and 8) and modified rivers including Northern Creek, Clarke Creek, Granite Creek, Wasabi Creek and Southern Creek. Giant kōkopu were not captured or observed during the EFM survey.

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Results received from Wilderlab Ltd, where the samples were processed, do not differentiate shortjaw kōkopu from giant kōkopu. Based on habitat at Site 1, the record of 'shortjaw kōkopu or giant kōkopu' in this artificial drain is likely to be giant kōkopu based on habitat in the drain and connectivity with the wetland to the north of the SB.

Results show banded kōkopu and common bully are more widespread in watercourses within the SB than the EFM survey results indicated. There were weak counts for the 'Threatened – Nationally Vulnerable' lamprey (*Geotria australis*) in Granite Creek (Sites 5 and 6) and also in an artificial drain (Site 7), which indicates that they may be present, or at least pass through the SB.

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Table 19: Results of eDNA sampling at sites on artificial drains and modified rivers within the SB during the survey.

Common name	Scientific name	Conservation status (Dunn et al. 2025)	Sequence count								
			Artificial drains			Modified rivers					
						Northern	Central	Clarke	Granite	Granite	Wasabi	Southern
			1	7	8	2	3	4	5	6	9	10
Longfin eel	*Anguilla dieffenbachii*	At Risk – Declining	4,738 Y	864 Y	1,245 Y	6,032 Y	1,940 Y	1,135 Y	1,093 N	2,560 Y	798 N	919 Y
Shortfin eel	*Anguilla australis*	Not Threatened	276 N	272 Y	363 N	1,121 N	957 Y	301 Y	170 N	287 N	196 Y	135 Y
Giant kōkopu	*Galaxias argenteus*	At Risk – Declining	-	71 N	202 N	103 N	-	26 N	45 N	175 N	51 N	16 N
Giant or shortjaw kōkopu	*Galaxias argenteus/postvectis*	At Risk – Declining / Threatened – Nationally Vulnerable	22 N	-	88 N	165 N	-	-	41 N	-	-	-
Kōaro	*Galaxias brevipinnis*	At Risk – Declining	112 N	-	-	226 N	-	-	-	-	141 Y	-
Banded kōkopu	*Galaxias fasciatus*	Not Threatened	4,816 Y	563 N	692 Y	516 N	259 N	969 N	892 N	4,754 Y	375 N	871 N
Īnanga	*Galaxias maculatus*	Threatened – Nationally Vulnerable	88 Y	11,747 Y	162 N	1,744 Y	3,870 Y	11,999 Y	15,347 Y	8,770 Y	-	21,192 Y
Lamprey	*Geotria australis*	Threatened – Nationally Vulnerable	-	55 N	-	-	-	-	8 N	5 N	-	-
Common bully	*Gobiomorphus cotidianus*	Not Threatened	-	213 N	-	268 N	Y	1,160 N	4,852 N	-	-	320 N
Bluegill bully	*Gobiomorphus hubbsi*	At Risk – Naturally Uncommon	2,122 Y	-	48 N	108 N	-	-	105 N	Y	2,453 Y	-
Redfin bully	*Gobiomorphus huttoni*	At Risk – Naturally Uncommon	14,840 Y	9,831 N	4,293 Y	7,909 Y	614 Y	6,323 Y	12,551 N	19,340 Y	4,745 Y	19,867 Y
Number of fish species detected in eDNA samples			**7 / 8**	**8**	**7 / 8**	**9 / 10**	**5**	**7**	**10**	**7**	**7**	**7**
Number of fish species captured during EFM survey			**5**	**3**	**3**	**3**	**5**	**4**	**1**	**5**	**4**	**4**

Note: Y = fish species recorded during EFM survey; N = fish species not recorded during EFM survey.

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7.0 Groundwater Quality

Groundwater sampling sites are identified in Figure 8 (Section 3.4), and site descriptions and qualitative visual comments are provided in Table 20 below. Samples were collected using standardised sampling techniques (USGS, 2014). The full laboratory report is provided in Appendix C and the key parameters, notably those used in water quality modelling, are summarised in Table 21 and Table 22. For pH and conductivity field measurements at the time of sampling are reported in preference to laboratory measurement due to the potential for changes in transit, which can be highly pronounced for groundwater samples.

All samples had water quality characteristics consistent with being drawn from shallow bores and there were clear distinctions between bores at the eastern edge of the proposed mining zone (PZ-104 and PZ105) and those adjacent to the western coastal boundary (PZ-102 and PZ-103). Notably, the eastern bore groundwater had a greater carbonaceous signature, contained higher concentrations of nutrients and was more oxygenated than eastern bore groundwater. While all waters were mildly alkaline, of low alkalinity and, with the exception of iron, had low metal/metalloid concentrations, the latter were higher in the less oxidising/more reducing coastal groundwaters. Iron concentrations in all bores requires reflection since, ordinarily in groundwater, dissolved iron concentrations should be largely dominant. Yet, shallow bores with even low oxygen infiltration will result in oxidation to ferric forms, which finds expression in the total iron fraction, and is evidenced by the appearance of iron oxyhydroxides in surface waters.

Bore PZ101, which was coastal, but in the vicinity of the lagoon, exhibited more complex groundwater quality, having some features of a reduced environment, such as slightly elevated metal/metalloid concentrations, but being more alkaline and of greater alkalinity than PZ-102 and PZ-103. Notably, PZ-101 also had elevated nitrogen of more oxidised species (i.e., nitrate-N versus ammoniacal and organic nitrogen) and greater chloride status, which is likely indicative of potential influence from the lagoon rather than direct seawater intrusion. The lack of any significant observed easterly seawater influence is consistent with the Kōmanawa Solutions Limited consideration that the coastal lagoons and creek mouths function as freshwater barriers against saline wedges, that process assisted by the topographic gradient of Barrytown Flats to the Tasman Sea (Kōmanawa Solutions 2025a).

Table 20: Groundwater site descriptions and qualitative visual characteristics during sampling on 8–9 April 2024.

Site	Description	Date/Time	Clarity	Appearance
PZ-101	Coastal, adjacent to small lagoon	11:35 a.m.	Low	Silty
PZ-102	Coastal, adjacent to lower Granite Creek	12:20 p.m.	Low	Silty
PZ-103	Coastal, east of PZ-104	9:45 a.m.	Low	Silty
PZ-104	Boggy ground, north of Clarke Creek	10:30 a.m.	Moderate[A]	Silty
PZ-105	Boggy ground, adjacent to Granite Creek	9:15 a.m.	Moderate[A]	Silty

Notes: Artesian flow or visible seepage of approximately 0.25 L/s.

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Table 21: Summary of groundwater physico-chemical and nutrients parameters.

Parameter/site	PZ-101	PZ-102	PZ-103	PZ-104	PZ-105
pH (pH units)**	5.92	5.67	5.70	5.71	5.78
Temperature (°C)**	15.7	15.5	14.8	13.8	12.1
Electrical conductivity (mS/m)**	16.4	9.5	10.3	10.7	7.9
Turbidity (NTU)	132	1,110	290	1,080	1,500
Total Suspended solids (TSS)	77	3,000	820	1,270	3,400
Total Dissolved solids (TDS)	145	90	70	98	100
Total Alkalinity (as $CaCO_3$)	23	11.3	22	31	34
Bicarbonate (at 25°C)	28	13.8	26	37	41
Total nitrogen (TN)	5.5	1.4	1.1	3.6	6.2
Total ammoniacal nitrogen (Amm-N)	<0.010	0.035	<0.010	0.36	<0.010
Nitrate + nitrite nitrogen (NOx-N)	4.2	<0.002	0.34	<0.002	1.79
Total Kjeldahl nitrogen (TKN)	1.3	1.4	0.77	3.6	4.4
Total phosphorus (TP)	0.60	1.20	0.45	2.2	8.6
Dissolved reactive phosphorus DRP)	0.004	<0.004	0.007	<0.004	0.013
Dissolved organic carbon *DOC)	13.7	6.8	6.1	12.2	10.2

Notes: Units g/m^3 unless stated; *Surface water quality guidelines for indicative purposes; **Field measurement; [A]WCRC (2014); [B]ANZECC (2000); [C]NPS-FWM (2020).

Table 22: Summary of key groundwater metals/metalloids and major ion parameters.

Parameter/site	PZ-101	PZ-102	PZ-103	PZ-104	PZ-105
Aluminium	0.13	0.24	0.17	0.029	0.024
Arsenic	0.0026	0.020	0.0042	< 0.0010	< 0.0010
Boron	0.011	0.009	0.010	0.016	0.012
Cadmium	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Chromium	0.0074	0.0118	0.0055	< 0.0005	< 0.0005
Cobalt	0.0006	0.0005	0.0009	< 0.0002	< 0.0002
Copper	0.0058	0.0026	0.0021	0.0010	0.0008
Iron (total)	42	96	118	106	37
Iron	0.44	3.3	7.7	0.05	0.06
Lead	0.00058	0.0018	0.00055	0.00015	0.00014
Manganese	0.035	0.11	0.26	0.0024	0.0065
Mercury (total)	<0.00008	<0.0021	<0.0021	<0.0021	<0.00008
Mercury	<0.00008	<0.00008	<0.00008	<0.00008	<0.00008
Molybdenum	0.0002	0.0008	0.0002	<0.0002	<0.0002
Nickel	0.0029	0.0021	0.0024	< 0.0005	< 0.0005
Silver	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Zinc	0.0080	0.0038	0.0023	0.0025	0.0015
Calcium	13	8.7	10	9.6	6.6
Magnesium	5.2	1.6	2.1	3.8	1.8
Potassium	5.5	2.0	2.7	1.7	0.91
Sodium	15	8.0	12	10	11
Chloride	27	13	20	12	16
Sulfate	13	18	3.4	7.2	3.5

Notes: All units g/m^3; Dissolved fraction unless stated

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8.0 Ecological Values

8.1 Terrestrial Flora and Fauna

8.1.1 Vegetation

The majority of vegetation (98%) within the SB was exotic, except for small isolated strips of indigenous coastal shrubland, Southern rātā snags and flaxland present along coastal and riparian margins. Southern rātā snags were located outside of the mine disturbance area.

The grazed exotic pasture at the site was considered to be of **'negligible'** ecological value as set out in Table 23. This vegetation occurred within highly modified habitats not representative of indigenous ecosystems, and lacked indigenous diversity and habitat complexity. It provided limited ecosystem services in the form of reducing sediment mobilisation to streams and the coast.

The rough exotic pasture at the site was less common than grazed exotic pasture, with only small isolated patches present (1.5% of the SB). This vegetation was dominated by exotic pasture and weed species, notably blackberry and gorse. It was taller with more structural diversity compared to areas of grazed exotic pasture. Because of the small extent, isolation, presence of weed species, high degree of modification and likelihood of intermittent disturbance by grazing livestock, its value as habitat for fauna (including lizards and nesting birds) was reduced and therefore the ecological value of this vegetation type was considered **'negligible'** as set out in Table 23.

Indigenous coastal shrubland was considered of **'moderate'** ecological value as set out in Table 23. This vegetation is representative of secondary coastal shrubland on the Barrytown Flats, and included nīkau and cabbage tree. One 'At Risk' species mākaka (*Carmichaelia australis*) and one 'Threatened' species poroporo (*Solanum aviculare var. aviculare*) (de Lange et al. 2024) were present. However, the vegetation was restricted in extent and was subject to edge effects and browsing impacts from livestock. The fragments of coastal shrubland were narrow, contained gaps dominated by exotic vegetation and were isolated from any other indigenous vegetation which reduced their overall value.

The isolated Southern rātā snags within the SB were deemed of **'negligible'** botanical ecological value (see Table 23). They were not considered permanent features of the landscape, and will disappear over time with continued exposure to prevailing westerly weather. Indigenous epiphyte species were present in the snags, although these species are common and widespread.

Pine shelterbelts and isolated pine trees were considered to have **'negligible'** ecological value as set out in Table 23. This vegetation was exotic, sparse and does not provide connectivity or buffers to indigenous vegetation.

The flaxland present along riparian and coastal margins at the site was considered to have **'moderate'** ecological value (see Table 23). The vegetation was limited in extent and not diverse, being dominated by flax, and the native species present were common and widespread. Weeds were present. Flaxland is reduced in extent within the Punkakaiki ED, and flaxland at the site was connected to both freshwater and coastal environments. The vegetation was dense and acted as a buffer to freshwater and coastal habitats from farming and other activities within the SB.

8.1.2 Avifauna (Birds)

The desktop assessment revealed 104 bird taxa (i.e., records identified to species or genus level), and 49 threatened or at-risk bird species, within 10 km of the SB. The majority of

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these were coastal or seabirds that are unlikely to be more than occasional visitors to the site. Fifteen bird species of conservation interest may use the habitats within the SB.

Given the lack of forested habitat within the site, including limited foraging habitat and no potential daytime roosts, it is unlikely that great spotted kiwi use the SB. The audio recordings collected during surveys likely originated from the foothills of the Paparoa Ranges <1 km east of the site.

Eleven of the species identified were not recorded in habitats within or adjoining the SB including fernbird/mātātā (*Poodytes punctatus*), Australasian bittern (*Botaurus poiciloptilus*) or Westland petrel/tāiko (*Procellaria westlandica*). Habitats within the SB were not well suited for cryptic species given their exposed and modified nature.

The overall ecological value of avifauna within the SB was considered **'high'** (Table 23) due to the possible presence of species with either At Risk (nine species) or Threatened (five species) conservation status in the vicinity. The bird habitats are considered to be of **'negligible'** value, comprising as they do farmland and exposed/open habitats with few indigenous species. The habitats are common across the Barrytown Flats.

8.1.3 Lizards

The desktop assessment revealed records of Newman's skink (At Risk - Declining), forest gecko (At Risk – Declining) and West Coast green gecko (Threatened - Nationally Vulnerable) within 10 km of the SB and proposed mining area. No lizards were observed during the walk-through and manual habitat searches undertaken within the SB. Habitats within the SB consisted primarily of grazed exotic pasture with low suitability for lizards. While a few small areas of marginally higher habitat suitability for ground dwelling skinks were present (e.g., rank pasture grass, organic debris), these were functionally isolated by frequently disturbed pasture areas, likely too small to support sustainable lizard populations and not in close proximity to a known seed population from which dispersal may originate. Both forest gecko and West Coast green gecko use shrubland and forest habitat, with West Coast green gecko in particular occupying the canopy of mānuka (*Leptospermum scoparium* agg.) and kānuka (*Kunzea* spp.) shrubland. The suitable habitat for geckos at the site is limited to the small area of coastal shrubland. Due to the rarity and distinctiveness of the species found in proximity to the site, the lizards are of **'high'** ecological value where they occur. The ecological value of lizard habitat within the proposed mining area is considered **'negligible'** (Table 23).

8.1.4 Bats

The desktop assessment of the national bat database did not identify any recent (<10 yrs) records of bat activity within 25 km of the SB. The vast majority of the acoustic bat surveys recorded in the database were undertaken in 2020 and were focussed around Bullock Creek approximately 15 km to the north (91% of surveys completed since 2014/15 were around Bullock Creek).

Ecological Solutions is aware of one location where long-tailed bat activity has been previously recorded within 25 km of the SB (Ecological Solutions 2023 unpublished). There were fewer than 10 bat passes recorded at this location in both 1997 and 2023. No bat activity was recorded during a 2024 survey conducted by Ecological Solutions at this same location. The low number and infrequent records indicate that any bat population in the area is unlikely to be large.

The SB contained some habitat features (e.g., adjoining forest, streams, ponds and wetlands) that could be used by long-tailed bats if present. These features may provide foraging, commuting and roosting opportunities for any resident extant long-tailed bat population. There are fewer of these features within the mining area itself, however

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potential roost trees are located within the wider mining footprint including stands of exotic over-mature trees. These trees would be retained under the current plans, and therefore the destruction of any potential roost trees is not anticipated.

In the absence of any site-specific bat activity data confirming presence within the proposed mining area, the size of long-tailed bat home ranges suggests that bats could use the wetlands and streams across the proposed mining area for foraging and commuting, although that use is likely to be infrequent. Potential roost features in the form of exotic mature trees were present inside and outside the mining area. Other landscape features that may be used by bats (watercourses, wetlands, vegetation) are present elsewhere on the Barrytown Flats. On that basis the ecological value of the bat habitat within the proposed mining area was considered **'low'** (Table 23).

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Table 23: Summary of terrestrial ecological values following the EclAG (Roper-Lindsay et al. 2018).

Feature	Representativeness	Rarity and Distinctiveness	Diversity and pattern	Ecological Context	Overall score	Comments
Grazed exotic pasture	Negligible	Negligible	Negligible	Negligible	Negligible	Exotic vegetation of low stature and diversity typical of agricultural land use.
Rough exotic pasture	Low	Low	Low	Low	Negligible	Higher stature, denser vegetation compared to highly grazed pasture. Dominated by exotic species.
Indigenous coastal shrubland	Moderate	Very High	Low	Low	Moderate	Represents secondary indigenous coastal shrubland community typical of the Barrytown Flats. Few remaining examples of this vegetation type. Threatened and At Risk species present, but value limited by small size, isolated location and high proportion of edge.
Isolated Southern rātā	Low	Low	Low	Low	Negligible	Isolated Southern rātā snags have retained native epiphytes that are common and widespread.
Pine shelterbelts and isolated trees	Negligible	Negligible	Negligible	Negligible	Negligible	Exotic vegetation typical of agricultural land use. Shelterbelts are sparse and do not provide connectivity to indigenous habitats.
Flaxland	Low	Moderate	Low	Moderate	Moderate	Dense indigenous dominated vegetation along riparian and coastal margins that provides a buffer to these habitats. Flaxland is present in the ED including to the north of the site, but is largely reduced in extent.
Bird habitat	Low	Low	Low	Low	Negligible	Site comprises mostly grazed pasture with small and isolated areas of indigenous vegetation. Habitat for kiwi foraging present, but separated from forest habitats by SH6. Kororā may travel across the site.
Bat habitat	Low	Low	Moderate	Low	Low	Suitable long-tailed bat foraging habitat (streams, wetlands) present within the SB. No suitable roost trees within the mining area.
Lizard habitat	Low	Low	Low	Low	Negligible	Small areas of potentially suitable, but low value, habitat for skinks exists within and around the proposed mining area.
Threatened species		Very high				No threatened species have been confirmed using the site. Threatened species present in the wider environment include long-tailed bats, West Coast green gecko and rōroa/great spotted kiwi. There are a small number of recent long-tailed bat records within 25 km, and records of `rōroa calls from within the site, but the origin of

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Feature	Representativeness	Rarity and Distinctiveness	Diversity and pattern	Ecological Context	Overall score	Comments
						these calls is most likely forests east of SH6 (i.e., outside the SB).
At Risk species		High				At risk bird species have been confirmed using the site. Kororā may travel across the site to burrows. Newman's skink are also considered At Risk.

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8.2 Wetlands

Wetland coverage in New Zealand has declined to less than 10% of the estimated pre-human extent. While the West Coast region of New Zealand retains the largest extent of freshwater wetlands relative to other regions, it also has experienced some of the highest proportional loss (Stats NZ, 2018). Consequently, freshwater wetlands are considered rare both nationally and regionally. The national guidance on wetland management outlined in the NPS-FM further supports this conclusion.

While all freshwater wetlands with indigenous vegetation have at least a 'high' value for rarity, the wetlands within the SB and proposed mining area were generally dominated by exotic and common native species and not representative of indigenous wetland communities. Wetland areas were also small, with most having been induced by historic land modifications such as dredging and land drainage. Most of the wetlands identified offered good connectivity to other areas of surface water habitat within the SB (e.g., hump and hollow wetlands and floodplain wetlands). Each of the wetland types identified within the SB were assigned values separately and have values ranging between **'negligible'** and **'moderate'** (Table 24) based on the representativeness, rarity and distinctiveness, diversity and pattern and ecological context, including current and potential value in accordance with the NPS-FM.

8.3 Watercourses

8.3.1 Artificial drains

All of the artificial drains within the SB are man-made aquatic habitats. Their entire catchments lie within the SB and they are primarily groundwater fed. The straight channel alignment and uniform cross section provide relatively homogenous aquatic habitat. Aquatic flora was limited to common exotic emergent macrophyte species (e.g., watercress) and filamentous algae in shallow/poorly shaded reaches.

Aquatic habitat provided by artificial drains was assessed as being of **'low'** ecological value as they were not representative of natural stream environments, not rare or distinctive aquatic environments, provided uniform rather than diverse habitat for aquatic biota and do not provide a migratory pathway for fish to or from upper catchments (Table 25).

The artificial drain where Site 1 was located provided slightly more diverse aquatic habitat (e.g., riffles, runs, pools), but its artificial nature, straight channel alignment and lack of native vegetated riparian margins meant habitat values were also **'low'** (Table 25).

Macroinvertebrate communities recorded from artificial drains were dominated by taxonomic groups that tolerate poor water quality (i.e., nutrient enrichment) and poor aquatic habitat (e.g., Crustacea, Diptera, Mollusca) and resulted in low EPT, %EPT, MCI, QMCI and ASPM scores that indicate 'poor' community health and **'low'** ecological value (Table 25).

Artificial drains within the SB supported moderate native fish diversity and reflected the close proximity and connection with the marine environment allowing diadromous native fish species to migrate into them as juveniles. No introduced fish species were recorded during the EFM survey or in eDNA samples. Artificial drains within the SB are groundwater fed and those that were surveyed held adequate surface water to support permanent fish communities. Artificial drains within the SB supported native fish species of conservation interest (i.e., two species at Sites 7 and 8, five species at Site 1) including longfin eel, īnanga, banded kōkopu, redfin bully and bluegill bully. eDNA sampling indicated the potential presence of giant kōkopu (or shortjaw kōkopu, but less likely due to habitat). Overall fish fauna values for artificial drains at Sites 7 and 8 were assessed as **'moderate'** whilst fish values for artificial drains at Site 1 was assessed as **'high'** (Table 25).

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8.3.2 Modified creeks

Modifiedcreeks within the SB included Northern Creek (Site 2), Central Creek (Site 3), Clarke Creek (Site 4), Little Granite Creek, Granite Creek (Sites 5 and 6), Wasabi Creek (Site 9) and Southern Creek (Site 10). All rivers within the SB are modified to some extent due to historical realignment of their channels.

Northern Creek, Little Granite Creek, Granite Creek and Wasabi Creek were highly modified due to channel realignment, but have retained some natural sections and were assessed as having habitat with '**moderate**' ecological value due to the gravel/cobble bed being representative of natural streams, and the moderately diverse habitat (e.g., runs, riffles, pools). Little Granite Creek and Granite Creek also provide a migratory pathway for diadromous native fish species into their upper catchments (Table 25).

Clarke Creek, Central Creek and Southern Creek were in a highly modified state due to realignment of their channels, had higher proportions of sand/silt due to grazing and erosion and provided uniform run habitat that is not representative of natural streams in the area. Clarke Creek extends east of SH6 so the section within the SB provides a migratory pathway for native diadromous fish into the upper catchment. Clarke Creek was assessed as having aquatic habitat of **'low'** ecological value (Table 25).

Modified natural rivers within the SB generally supported macroinvertebrate communities with high proportions of taxonomic groups that can tolerate poor water quality and habitat conditions (e.g., Diptera, Crustacea, Oligochaeta), low EPT taxa richness and %EPT, and low MCI, QMCI and ASPM scores. An exception was higher EPT taxa richness and abundance in Wasabi Creek that resulted in slightly higher MCI and ASPM scores within the 'fair' to 'good' categories. Macroinvertebrate communities in all modified rivers within the SB, despite higher EPT taxa scores in Wasabi Creek, were assessed as having **'low'** ecological value and reflected the modified habitat conditions (Table 25).

Modified rivers within the SB supported moderate native fish diversity and reflected the close proximity and connectivity with the marine environment allowing diadromous native fish species to migrate into them. No introduced fish species were recorded during the EFM survey or in eDNA samples. Based on eDNA sampling, the modified rivers within the SB supported native fish species of conservation interest including longfin eel, īnanga, kōaro, banded kōkopu, redfin bully and bluegill bully and potentially giant kōkopu and lamprey (in Granite Creek). Shortjaw kōkopu (Nationally Vulnerable) have been recorded from mid-upper reaches of Granite Creek in hills to the east of SH6 and would migrate through the lower reaches within the SB. The fish communities recorded from natural rivers within the SB are typical of West Coast streams in the vicinity and were assessed as having **'high'** ecological value (Table 25).

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Table 24: Summary of wetland ecological values following the EcIAG (Roper-Lindsay et al. 2018)

Feature	Representativeness	Rarity and Distinctiveness	Diversity and pattern	Ecological Context	Overall value	Comments
Hump and hollow wetlands	Low	Low	Low	Low	**Negligible**	Vegetation dominated by exotic and common widespread native species not representative of indigenous wetland communities. Wetlands are induced and degraded by livestock, resulting in little structural diversity. Some wetlands provide connectivity to the coastal lagoon, and are often connected to each other via drains or adjacent hollow wetlands. Hump and hollow wetlands are common on the West Coast.
Dredge pit wetlands	Low	Low	Low	Moderate	**Low**	Vegetation dominated by exotic and common widespread native species not representative of indigenous wetland communities. Induced wetlands. Provides some connectivity with other wetland types and freshwater environments, but mostly comprise isolated pits.
Floodplain wetlands	Low	Moderate	Low	Moderate	**Moderate**	Dominated by exotic and common widespread native species not representative of indigenous wetland communities. Small, isolated wetlands associated with riparian zones. Provides buffer to aquatic habitats. Good potential for restoration.
Palustrine wetlands	Low	Moderate	Low	Low	**Low**	Dominated by exotic and common widespread native species not representative of indigenous wetland communities. Small, isolated and not connected to other wetlands or indigenous vegetation. Limited potential for restoration.
Coastal lagoon	Moderate	Moderate	Low	Moderate	**Moderate**	Smaller in extent than the coastal lagoon near the Coates' Block. Vegetation not biologically or structurally diverse; however provides a stepping stone between other wetlands.

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Table 25: Summary of aquatic ecological values within the SB following the approach EclAG (Roper-Lindsay et al. 2018).

Feature	Representativeness	Rarity and Distinctiveness	Diversity and pattern	Ecological Context	Overall value	Comments
Artificial drains (Sites 7 and 8)						
Habitat and aquatic flora	Low	Low	Low	Low	**Low**	Artificially created watercourses that originate within the SB. Provide uniform habitat and are common habitat in areas of lowland agricultural land use. Supports macroinvertebrate taxa typical of degraded or modified aquatic habitats. Supports at least 2–3 fish species of conservation interest based on EFM survey.
Macroinvertebrates	Low	Low	Low	Low	**Low**	
Fish	Moderate	High	Low	Low	**Moderate**	
Artificial drains (Site 1)						
Habitat and aquatic flora	Low	Low	Moderate	Low	**Low**	Artificially created watercourse that provide slightly more diverse habitat than other drains within the SB. Supports low EPT taxa richness, low %EPT abundance and low MCI, QMCI and ASPM scores. Supports five fish species of conservation interest based on EFM survey.
Macroinvertebrates	Low	Low	Low	Low	**Low**	
Fish	Moderate	High	Moderate	Moderate	**High**	
Modified Rivers (Clarke, Central, Southern)						
Habitat and aquatic flora	Low	Low	Low	Moderate	**Low**	Highly modified natural rivers that provide aquatic habitat that is not representative of cobble/gravel streams common in the area due to realignment away from its natural flow path and higher proportion of sand/silt and affected by grazing. Supports macroinvertebrate communities dominated by tolerant taxa and have low EPT, %EPT, MCI, QMCI and ASPM scores indicative of 'poor' stream health. Supports three native fish species of conservation interest. Section of Clarke Creek within SB represents migratory pathway for diadromous native fish upstream.
Macroinvertebrates	Low	Low	Low	Low	**Low**	
Fish	Moderate	High	Moderate	Moderate	**High**	
Modified rivers (Northern, Little Granite, Granite, Wasabi)						
Habitat and aquatic flora	Moderate	Low	Moderate	Moderate	**Moderate**	Modified natural rivers that have been realigned but provides more diverse habitat than other modified rivers within the site. Lower Granite Creek blocked at the mouth by a low gravel/cobble weir. Natural gravel/cobble dominated streambed with evidence of

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Feature	Representativeness	Rarity and Distinctiveness	Diversity and pattern	Ecological Context	Overall value	Comments
Macroinvertebrates	Low	Low	Low	Low	**Low**	sand/silt sedimentation due to slips in steep upper catchment. Provides diverse aquatic habitat of moderate quality, but is affected by sedimentation. Supports macroinvertebrate community dominated by tolerant taxa with low moderate-EPT, %EPT, MCI, QMCI, ASPM scores indicating 'fair' to 'poor' stream health. Supports more diverse native fish fauna including 3–5 native species of conservation interest. Sections of Little Granite Creek and Granite Creek within the SB represent important migratory pathway into upper catchment east of SH6.
Fish	Moderate	High	Moderate	Moderate	**High**	

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9.0 Assessment of Effects

This section assesses the actual and potential ecological effects associated with constructing and operating the mine as summarised in project description (Section 0) and indicative mining path (Figure 47). Activities that have potential to result in adverse ecological effects in the terrestrial and aquatic environments are:

Terrestrial Flora and Fauna

- Terrestrial vegetation clearance.
- Effects on avifauna due to loss of potential habitat, potential for mortality of eggs, chicks and adults during vegetation clearance and other works, increased human disturbance and activity at the site affecting bird activity.
- Effects on lizards (if present) due to loss of potential habitat and potential injury or mortality during vegetation clearance.
- Effects on bats (if present) due to vegetation clearance resulting in the loss of potential roosting, foraging and commuting habitat and the potential for injury and mortality of roosting bats during vegetation clearance and wetland and stream drainage/diversion resulting in a loss of foraging habitat.
- Positive effects on botanical, avifauna, and wetland values, and perhaps lizard and bat habitats, resulting from remediation, in particular the construction and restoration of c. 52 ha of wetland.

Ground and Surface Water Quality and Quantity

Changes to the local hydrology, either within the site or extending beyond the site, have the potential to affect ecological values including flora and fauna in wetlands, modified rivers and artificial drains. The potential hydrological effects of the proposed sand extraction on ground and/or surface water quantity or relative levels have been assessed as negligible by Kōmanawa Solutions (2025a). As such, only the potential ecological effects of changes to water quality have been assessed here. Potential hydrological effects of the proposed sand extraction on water quality are:

- Changes to physico-chemical parameters, such as pH and alkalinity; and
- Mobilisation of metals/metalloids and nutrients to surface water bodies associated with the discharge of groundwater inflows that will take on the geochemical characteristics of deposited slimes and tailings.

Wetlands

Potential effects on wetlands and the small coastal lagoon adjoining the mining area include:

- Temporary loss of wetland extent.
- Positive effects as a result of the creation of wetlands with a greater area that currently exists within the SB as part of rehabilitation.

Watercourses

Potential effects on modified creeks and artificial drains within the SB include:

- Earthworks and sedimentation resulting in effects on water quality and biology within the modified creeks and artificial drains.
- Temporary loss or disturbance of aquatic habitat in the creeks and artificial drains within the SB prior to watercourses being re-established at their final location.
- Disturbance and/or mortality of native fish during site management as part of mining

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within the SB.

- Effects on native fish passage resulting from site management during mining within the SB.
- The potential for reduced flows in Canoe Creek as a result of the proposed water take.

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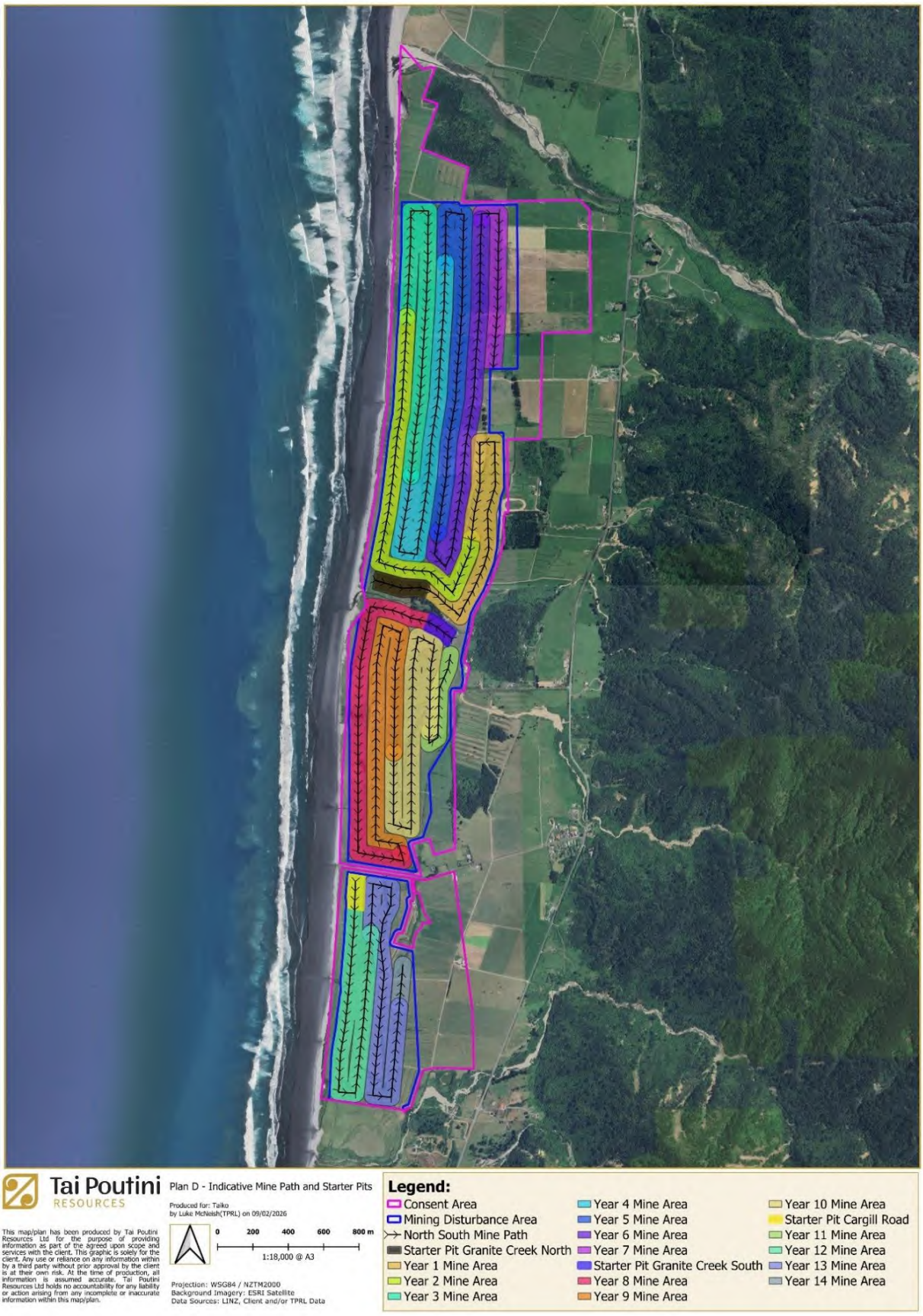

Figure 47: Indicative mine path including mine starter pits within the Southern Block, Barrytown (Tai Poutini Resources Limited 2026).

9.1 Effects on Terrestrial Flora and Fauna

9.1.1 Terrestrial vegetation clearance

The terrestrial ecological effects have been assessed at the scales of the Barrytown Flats, the SB or nationally (in the case of tāiko) as appropriate. The mining and associated rehabilitation will be staged, meaning that the time lag between loss of habitats and replacement with planting and/or wetland construction is expected to be relatively short term (less than 10 years).

Proposed mining activities will result in vegetation clearance of up to 16 ha at any one time. The majority of vegetation within the proposed mining area comprises grazed exotic pasture (c. 278.7 ha) with 'negligible' ecological value, with smaller areas of rough exotic pasture (3.5 ha) with similarly low ecological value. The remaining vegetation is of 'moderate' ecological value and comprises small isolated strips of indigenous coastal shrubland (0.9 ha) and flaxland (0.3 ha) along coastal and riparian margins.

Some mature pine and shelterbelt trees, also of 'negligible' ecological value will also be removed. The removal of 'negligible' or 'low' ecological value vegetation across the site is expected to result in a **'very low'** level of effect. No mitigation is considered necessary beyond what has been proposed with progressive rehabilitation.

The removal of indigenous coastal shrubland with 'moderate' ecological value has potential to result in a 'moderate' level of effect without effects management. Post-mining rehabilitation of the SB in accordance with the RMP prepared by Tai Poutini Resources Limited (2026) will re-establish more than 50ha of riparian and wetland vegetation, including indigenous coastal shrubland with similar or higher ecological value than the existing indigenous coastal shrubland and including the 'Threatened' and 'At Risk' species present at the site as set out in the Landscape Mitigation Package (Glasson Huxtable 2026). As a result, the overall level of effect is expected to be **'very low'** or more likely a **'net gain'** in ecological value of coastal shrubland (including riparian planting) at the conclusion of mining.

The removal of flaxland with 'moderate' ecological value along coastal margins has potential to result in a 'moderate' level of effect without effects management. Post-mining rehabilitation of the SB in accordance with the RMP prepared by Tai Poutini Resources Limited (2026) and as illustrated in the Landscape Mitigation Package (Glasson Huxtable 2026) will establish a larger area of well connected and buffered indigenous vegetation, including at least 13.4ha of flaxland. This vegetation will be predominantly indigenous and managed to control weeds. On that basis it will have higher ecological value than the existing flaxland. Given the nature of this vegetation, and the proposal to use vegetation direct transfer (VDT), vegetation establishment is expected to be achievable relatively quickly and the effects of vegetation removal will be temporary in nature. As a result, the overall level of effect is expected to be a **'very low'** in the short – medium term and a **'net gain'** in ecological value at the conclusion of mining.

9.1.2 Effects on avifauna

The bird species confirmed to be present within and surrounding the site are mainly species which would use the habitats within the site for foraging or only occasionally visit (e.g., oystercatchers, dotterels, gulls). Only common native and exotic birds are likely to be nesting within the proposed mining area, although there is the potential for little blue penguin to be crossing the area to reach burrows inland and tāiko, and perhaps other seabirds, could be affected by lighting at night if not properly managed. Although pipit (*Anthus novaeseelandiae*) which are considered 'At Risk – Declining' have not been recorded during surveys at the site, they have been recorded within 10 km and are one of the few native birds likely to be nesting in pasture. Other ground nesting species include banded dotterel, . The existing small amount of shrubland/tree habitat at the site would currently limit its potential as nesting habitat for species that nest in trees.

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Vegetation clearance could result in the permanent loss of suitable bird habitat without effects management. Post-mining rehabilitation of the SB in accordance with the RMP prepared by Tai Poutini Resources Limited (2026) will re-establish pasture similar to that present before mining across most of the site with an equivalent or larger area of shrubland, wetland and/or forest via the planted areas (including riparian plantings). These shrubland/forest and wetland habitats will provide additional habitat for species which nest in trees and most likely better habitat for species such as weka, pūkeko and harriers, which like dense cover and/or dense rush vegetation within which to construct their (ground based) nests. On that basis the post-mining vegetation will have similar or higher ecological value than the existing vegetation cover for birds. The effects will also be restricted to a relatively small proportion of the site which will move over time as mining proceeds and therefore be relatively short term and local in nature. As a result, the overall level of effect of terrestrial vegetation clearance on birds is expected to be **'low'**.

Vegetation clearance has the potential to result in mortality of nesting birds if it occurs during the breeding season. The likely presence of little blue penguins (which are considered 'At Risk – declining' (Robertson et al. 2021)) throughout the year in surrounding habitats and the proximity to the only known tāiko colony mean that management of mining activities, and perhaps the birds themselves, will be required to protect birds living in the surrounding environment. An Avian Management Plan (AMP) has been prepared based on the AMP for the CB which outlines how potential effects on birds will include checking vegetation prior to vegetation clearance and if active nests are detected, vegetation will not be cleared until the nest can be declared empty. Actions to deter birds from initiating nesting in the area to be mined are also proposed. A wildlife act authority under the Wildlife Act (1953) will be required to manage birds using deterrence.

No work is being undertaken within 50 m of the MHWS and no indirect effects (e.g., noise) are anticipated for avifauna likely to be utilising the coastal environment adjacent to the SB.

There is a risk artificial light at night will adversely affect tāiko either leaving or returning to the colony to the north. Mining would only occur during daylight hours, but lighting may be necessary at night for health and safety reasons (e.g., to assess and remedy break downs). The AMP also outlines how adverse effects of artificial light at night will be managed, monitored and reported. Implementing appropriate mitigation measures, including those developed as part of consenting the mining activities at the CB and which comply with the Australian National Light Pollution Guidelines for Wildlife (2023), will result in a **'low' or 'very low'** overall level of effect as set out in Table 31.

9.1.3 Effects on herpetofauna

Vegetation within the SB is comprised mostly of grazed exotic pasture, which does not provide suitable habitat for lizards. There were a few small isolated areas within the mining area of marginally more suitable lizard habitat (e.g., rank pasture grass suitable for Newman's speckled skink and shrubland areas suitable for gecko). There were also areas adjacent to the proposed mining area (e.g., woody debris, rock piles, rank pasture along coastal margin, shrubland and forest) which are suitable habitats for lizards, but will not be affected either directly or indirectly due to being located outside the mining area.

Vegetation clearance resulting in direct injury or mortality of lizards has the potential to result in a 'high' level of effect without effects management. A Lizard Management Plan (LMP) will be developed to ensure work to clear vegetation avoids/minimises lizard injury and mortality via salvage and relocation of any lizards detected with the overall level of effect expected to be **'low'** post effects management.

Post-mining rehabilitation of the SB in accordance with the RMP prepared by Tai Poutini (2025) will re-establish an equivalent or larger area of suitable lizard habitat with the overall level of effect assessed as a **'very low' to a 'net gain'** post rehabilitation as set out in Table 31.

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No work is being undertaken within 50 m of the MHWS and no indirect effects (e.g., noise) are anticipated on herpetofauna species likely to be utilising the coastal environment adjacent to the SB.

9.1.4 Effects on bats

There are recent records of long-tailed bats within 25 km of the SB. There are large, old trees which could be potential roost trees, as well as other features important for commuting and foraging bats (if present), within or immediately adjacent to the SB, but outside of the proposed mining area. Exotic pine trees and shelterbelts within the mining area will be retained. Given the low number and sporadic nature of the nearest records, the likelihood of a large population being present in the area is low. Nonetheless, such a population would be regionally, and perhaps nationally, important and therefore the pre-mitigation effect on bats is considered **'moderate'**.

The vegetation proposed to be cleared is not suitable habitat for roosting bats. As a result, the potential for direct adverse effects on bats through either injuring or killing bats during vegetation clearance is **'negligible'**.

Loss of potential foraging habitat via stream diversion and wetland removal within the SB could adversely affect bats if they are using the site. The small, mobile footprint, combined with prompt rehabilitation as mining proceeds, the retention of the streams at the original location where they enter and leave the mining area, no loss of stream length and the increase in the overall extent and ecological value of wetlands as rehabilitation proceeds and is completed will ensure effects on bats will be **'low'** in the short term and will result in a **'net gain'** in the long term, as set out in Table 31.

If present, bats could also be affected by artificial lighting at night associated with the mobile mining plant, the Mine Water Facility and WCP. Lighting can delay roost emergence (where roosts are nearby), disrupt commuting routes, and illuminate foraging areas forcing bats to alter flight and foraging patterns. Given mining would only occur during daylight hours, and there is no suitable roosting habitat within the mining area, the level of effects pre-mitigation is **'low'**. The need to manage externally visible lighting at night to protect wildlife has formed part of the project development and will ensure that effects on lighting are avoided where they can be and minimised where lighting is required. The lighting management proposed is consistent with the management plan for the CB and is expected to result in a **'very low'** level of effects on bats as set out in Table 31. Given that the vegetation clearance does not include potential roosts, a separate Bat Management Plan is not considered necessary.

9.2 Effects on Wetlands

The wetlands within the proposed mining area will be removed and reconstructed as mining progresses, as guided by the RMP prepared by Tai Poutini Resources Limited (2026).

The location proposed for wetland construction is along the eastern margin of the mining area, as shown in Figure 48, whilst the wetlands to be removed occur throughout the site as shown in Figure 21. The mining sequence is shown in Figure 47.

Natural inland wetlands and other wetlands would generally be removed as mining proceeds, but rehabilitation wetlands would only be constructed following mining along the eastern boundary. Wetland construction will occur in Years 1 and 2 in the north of the SB and in Years 10 and 11 in the centre of the SB. The existing wetland near the WCP would be retained and integrated into the new wetlands as construction proceeds. Wetlands would therefore begin to be constructed and planted in the first year of mining, but would not be completed until after final rehabilitation of the site at the end of mine life. The proposal includes construction of approximately 53.7 ha of wetland as shown in Figures 48 – 50, which substantially exceeds the extent of natural inland wetlands to be removed.

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There are relatively few small wetlands to be removed in the north (see Figure 21) and the overall wetland area created in this area as part of rehabilitation will substantially exceed the area removed. The majority of the wetlands to be removed are within the central block, and wetland creation in the northern block following Years 1 and 7, combined with the overall much larger extent of wetland being created relative to the amount of natural inland wetland being removed, would ensure that wetlands continue to be created and planted ahead of removal as set out in the Rehabilitation Management Plan prepared by Tai Poutini Resources Limited (2026).

These constructed and restored wetlands will take some time to establish and develop and their ecological values will improve as time goes on, although any areas of VDT will retain most of their existing values when they are relocated. Whilst ecological value improves within the constructed wetland, some of the ecological functions that the existing wetlands provide will be provided by water management at the mine.

Given the site is currently a dairy farm and minimal soil disturbance and limited soil stockpiling is proposed, the soils are likely to be highly fertile and growth rates are likely to be good – very good. On that basis good vegetation cover should be achievable within five years in constructed wetlands.

Assuming that wetland cover and a basic level of ecological function will take approximately five years to develop post-construction, wetland values can be expected to return in years 5 and 12 in the northern area and years 15 and 16 in the central block. By year five, Figure 47 shows that mining is still within the northern block, and all the wetlands affected are within that block. By year 11 mining is nearing completion in the central block, allowing construction of wetlands to be completed there.

The natural inland wetlands to be removed in the southern block are mostly located in the west, and would be removed before construction of the new wetlands in the west (at the conclusion of mining). Nonetheless, substantial areas of wetland will have been created in the northern and central blocks, and the ecological values there will be improving as vegetation grows and creates complex habitats. The wetland removal and reconstruction process will be such that hydraulic separation between natural surface water and the dredge pit is maintained at all times.

The wetland types to be removed within the proposed mining area include induced hump and hollow (c. 18.39 ha) and dredge pit (c.10.64 ha) wetlands which are not natural inland wetlands and to which the NPS-FM and NES-F do not apply, although they do have some ecological value. The palustrine wetlands (c. 2.11 ha), and floodplain wetlands (c. 3.05 ha) are natural inland wetlands and the NPS-FM requires that there be no loss of extent or values. The with ecological value of these wetlands is ‘moderate’. Removal of these wetland areas could result in a ‘moderate’ to ‘very high’ level of effect prior to effects management. The proposed mining schedule will ensure that wetlands are constructed in advance of their removal, and overall, there will be no loss of extent or values within the SB. The coastal lagoon will not be affected as it is located outside of the mining disturbance area and areas where material for redistribution will be obtained.

Ecological values and function will improve over time, particularly given the large and connected nature of the proposed constructed wetland relative to the multiple, small, disconnected and isolated wetlands currently present at the site, many of which have been brought about either by previous mining or drainage to support farming. On that basis the overall level of effect is expected to be **‘very low’** in the short term and a **‘net gain’** in the long term allowing for effects management.

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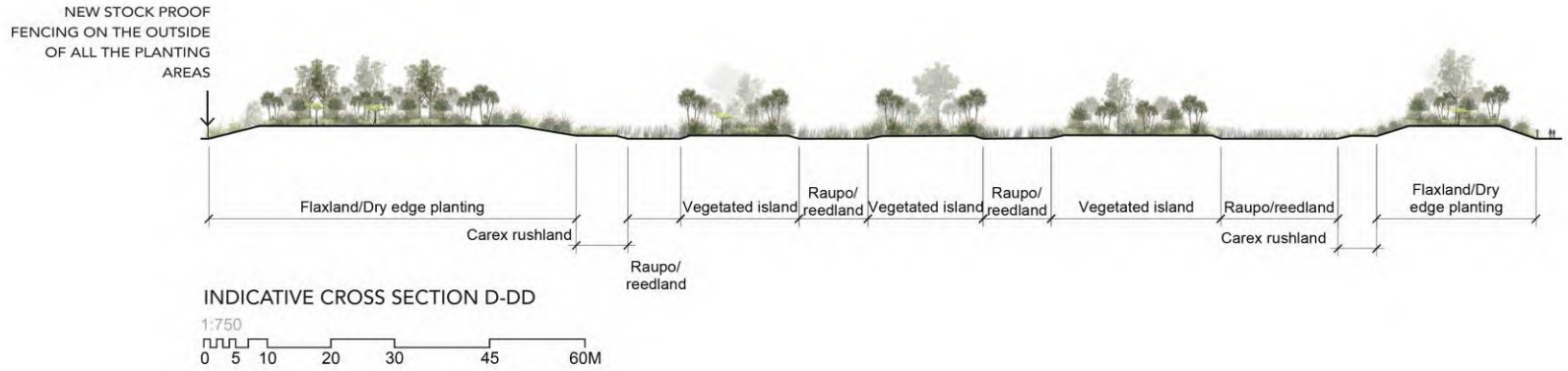
Figure 48: Post mining landscape mitigation plan (Glasson Huxtable 2026).

KEY PLAN - DURING MINING SECTION 1 FROM PAGE 13

Note:
The design and layout of the well functioning large connected wetland has been informed by Landscape Architects, Ecologists and Hydrologists working together.



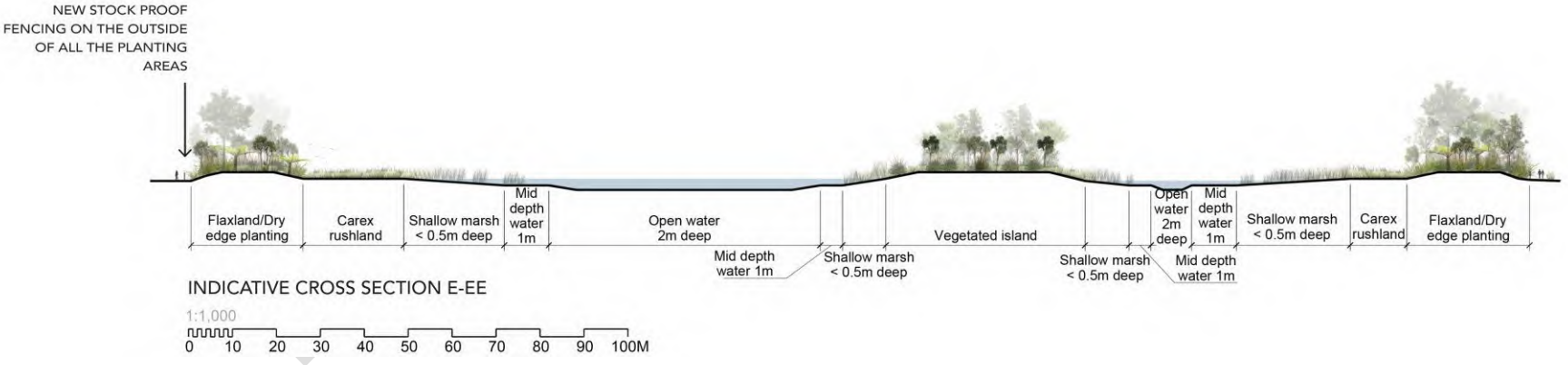
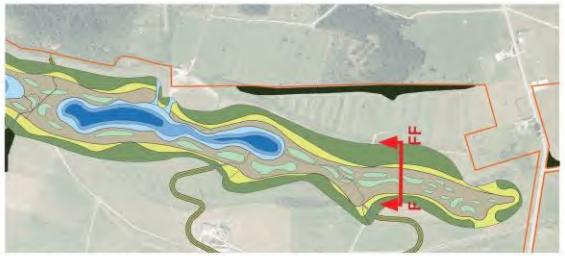


Figure 49: Post mining landscape mitigation plan north of Granite Creek (Glasson Huxtable 2026).



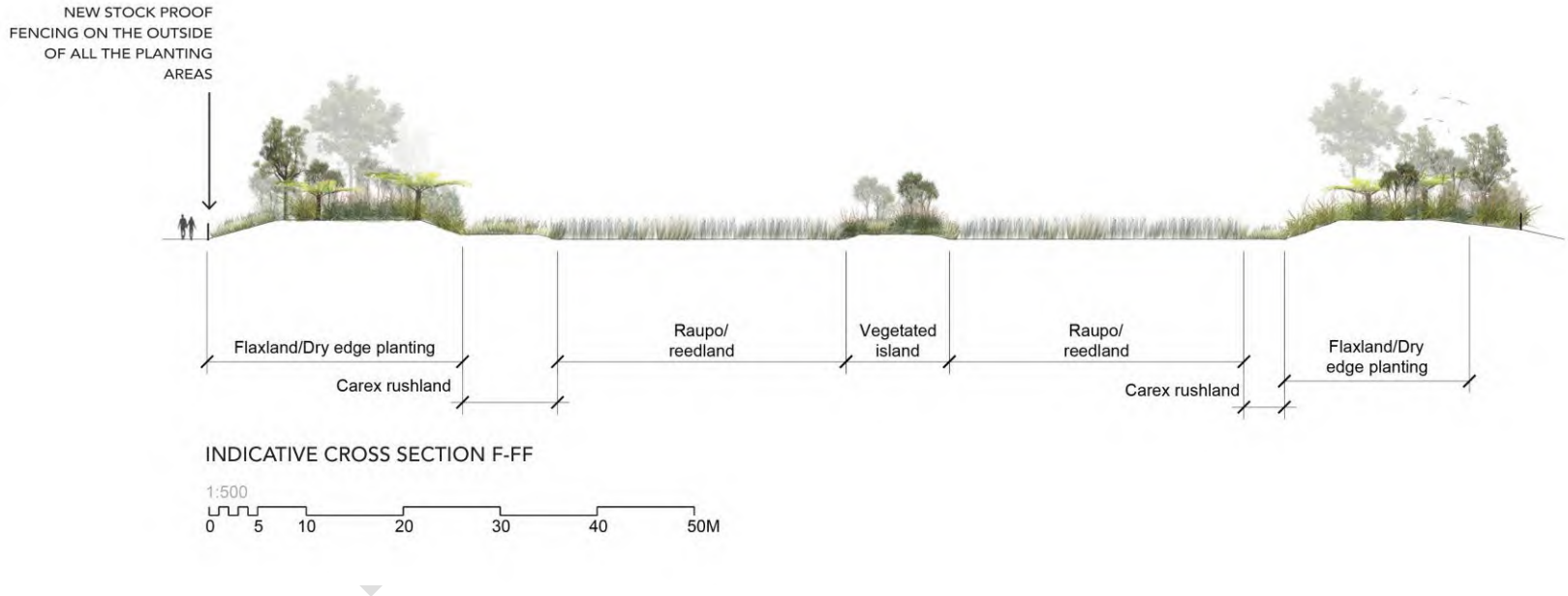


Figure 50: Post mining landscape mitigation plan south of Granite Creek (Glasson Huxtable 2026).

9.3 Effects on Freshwater Ecology

9.3.1 Earthworks and sedimentation effects

Earthworks associated with mining the site has the potential to result in fine sediment mobilisation and runoff into watercourses and wetlands.

To minimise the risk of adverse effects on aquatic habitats and fauna from earthworks and sedimentation it is proposed that erosion and sediment control measures be implemented. An Erosion and Sediment Control Plan (ESCP) has been developed by Ridley Dunphy Environmental Limited which sets out the appropriate timing, location, scale, design and maintenance of erosion and sediment control measures so as to avoid adverse effects of earthworks and sedimentation on aquatic habitats and fauna. In addition, setbacks from key freshwater features that will be retained (e.g., Granite Creek, Fagan Creek) and not directly impacted will be established to minimise the potential for sediment reaching these freshwater environments.

The ESCP has the objective of avoiding and/or minimising the potential adverse effects of earthworks and sedimentation. Based on this plan, the overall level of effect on freshwater ecology values assessed as **'low'**.

9.3.2 Effects on water quality

9.3.2.1 Modelling effects of water quality assumptions and inputs

Site-specific models have been constructed in order to estimate the post-mining water quality at the various ecological monitoring surface water sites identified in this assessment of effects. The two key hydrological assumptions of the surface water models are that the various affected water bodies will be approximately returned with similar hydrological profiles post excavation, and that groundwater flows will be essentially unchanged during the proposed mining operation, being maintained by the porewater of backfilled slimes and tailings.

There is no groundwater hydrology model to inform surface water modelling, however the conceptual approach used here involves the consideration of how surface water quality will emerge in the short to medium term immediately following backfilling with tailings and slimes, hence being affected by modified groundwater quality. It is also assumed that these effects will not persist in the long-term and that groundwater will return to pre-mining quality, which will ultimately see the return of surface waters to baseline quality.

Neither Site 1 nor Site 6 surface water quality was modelled because while the majority of surface water sites identified in this report will see short to medium term modifications in water quality due to direct inputs from the modified groundwater, it has been assumed that surface water quality at Site 1 and Site 6 will be unaffected by modified direct groundwater inputs since the former is at the northern boundary of the proposed mining area while, for the latter, a buffer zone will exist between the Granite Creek bed and peripheral groundwater flows. However, while surface water quality at Site 6 is expected to remain unchanged, Site 5, downstream, will be indirectly affected by modified groundwater feeding in from contributing surface waters to the north and south.

Key elements that inform the inputs of the water quality modelling presented here relate to:

- Relative contributing surface water and groundwater flows;
- Surface water quality;
- Slimes and tailings porewater quality; and

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- The relative slimes to tailings porewater volume.

The water quality modelling undertaken takes a conservative scenario in which surface water flows reflect 1 in 5-year low flow conditions, during which possible significant changes in short to medium term surface water quality due to inputs of groundwater with modified quality are more likely to be realised. Resultant surface water quality under median surface water flow conditions was also considered in order to understand changes in surface water quality that might occur more typically, but this was not modelled, since low flow conditions present the worst-case.

The surface water quality model assumptions under low conditions assumes the North sub block (north of Granite Creek) and South sub block (Cargill Road to Fagan Creek) based entirely on groundwater flows and that surface water quality in the North and South sub blocks reflects groundwater quality in totality.

For the Central sub block, 1 in 5 year flows are the sum of the maximum groundwater flow and the residual upgradient surface water flows gained by estimation versus the Granite Creek 1 in 5 year flow, i.e., 75 L/s (Kōmanawa Solutions 2025a). The estimated surface water flows were based on surface water morphologies and velocities (Table 17).

Surface water and groundwater quality data is summarised in Table 26 and the Barrytown South block slimes and tailings geochemistry, as reported by Kōmanawa Solutions (2025a), and is reproduced here in Table 27 for relevant dissolved parameters as well as total iron. It is noted that tailings and slimes contain elevated concentrations of iron in the total fraction, viz., 28 g/m^3 and 400 g/m^3, respectively, which will remain largely in the form of iron oxyhydroxides on deposition since backfilling is to sub-surface zones that are toxic. The relative proportion of tailings to slimes to tailings was estimated to be 99:1 (i.e., 99% v/v; L. McNeish, pers. comms).

The surface water quality model first uses a mass-balance approach, i.e., chemically unmixed concentrations of key parameters are derived from the addition of apportioned material loads from groundwater and surface water divided by volume.

Notably, where model loads are dependent on upgradient surface water quality consideration is given, where possible, the additive loads reflect the apportioned replacement of groundwater of baseline quality with the quality of tailings and slimes porewater, whereas the 1 in 5 year model for the North and South sub blocks is more straightforward since all surface water is derived from groundwater.

Based on tailings and slimes pore water quality, it is apparent that surface waters receiving modified groundwater could potentially fail to meet surface water quality guidelines for pH and various metals/metalloids, since porewater has lower pH, is less alkaline, has lower hardness, and has greater metal/metalloid concentrations than baseline groundwater. However, lime addition to tailings and slimes prior to deposition will result in porewater amelioration. It should be noted that a limitation of the surface water modelling conducted here is that only one sample of slimes and tailings was analysed for chemical composition.

Therefore, surface water quality modelling was undertaken via material balancing, followed by the determination of chemically mixed concentrations using the ion-association aqueous model, PHREEQC (USGS 2021), with tailings porewater adjusted to pH 8.5 and alkalinity and hardness to 100 g/m^3 (as $CaCO_3$).

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Table 26: Summary of Barrytown South slimes and tailings porewater quality parameters – physico-chemical and nutrients.

Parameter/Site	Slimes	Tailings
pH (pH units)**	5.60	5.60
Electrical conductivity (mSm)	10.4	2.9
Total Dissolved solids (TDS)	158	58
Total Alkalinity (as $CaCO_3$)	10	3.2
Bicarbonate (at 25°C)	12.2	3.9
Total nitrogen (TN)	5.12	1.57
Total ammoniacal nitrogen (Amm-N)	0.39	0.11
Nitrate + nitrite nitrogen (NOx-N)	0.12	0.36
Total Kjeldahl nitrogen (TKN)	5.00	1.21
Total phosphorus (TP)	5.4	0.48
Dissolved reactive phosphorus DRP)	0.006	0.005
Dissolved organic carbon*(DOC)	56	<20

Notes: Units g/m^3 unless stated; *as Total organic carbon (TOC).

Table 27: Summary of slimes and tailings porewater quality parameters – metals/metalloids and major ions.

Parameter/Site	Slimes	Tailings
Aluminium	1.13	0.68
Arsenic	0.0029	0.0020
Boron	0.029	0.014
Cadmium	0.00007	<0.00005
Chromium	0.016	0.0084
Copper	0.034	0.0094
Iron (total)	400	28
Iron	0.95	1.1
Lead	0.0020	0.0032
Manganese	0.38	0.048
Mercury	0.0003	0.0022
Nickel	0.33	0.0041
Silver	0.00068	0.10
Zinc	0.12	0.029
Calcium	11	1.8
Magnesium	1.9	0.50
Potassium	2.0	0.88
Sodium	3.8	1.9
Chloride	4.8	1.6
Sulfate	16	3.7

Notes: Dissolved fraction unless stated.

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9.3.2.2 Predicted surface water quality

The surface water quality model outputs for the 1 in 5 year model are provided in Table 28 and Table 29 and demonstrate that with lime augmentation of tailings and slimes, relevant guidelines can be met under all modelled conditions. Due to the low contribution of modified groundwater to surface water flows under median flow conditions, changes to surface water quality would be **'negligible'**.

Table 28: Modelled surface water quality for North and South sub block sites – 1 in 5 year flows.

Parameter	Sites 2, 3, 9, 10	Guidelines
pH (pH units)	8.3	6-9[A]
Hardness (as $CaCO_3$)	96.8	NA
Aluminium	0.61	2.9[B,C]
Arsenic	0.002	0.013[D,E]
Boron	0.014	0.94[F]
Cadmium	< 0.00005	0.0006[C,D]
Chromium	< 0.0005	0.003[C,D,G]
Copper	< 0.0001	0.0079-0.0138[C,H]
Iron	0.83	1.0[I]
Lead	0.0001	0.015[C,D]
Manganese	0.050	1.9[C]
Mercury	< 0.00008	0.0006[D]
Nickel	< 0.0005	0.030[C,D]
Silver	0.048	0.05[D]
Zinc	0.011	0.022[C,D]
Ammoniacal-N	<0.005	≤ 0.02[J]
Nitrate-N	0.067	≤ 1.0[K]
Phosphorus[L]	0.003	≤ 0.006[N]

Notes: units g/m^3; [A]WCRC (2014); [B]USEPA (2018); [C]hardness and pH as stated, Dissolved Organic Carbon (DOC)=2.5 g/m^3 for aluminium 2.0 g/m^3 for copper; [D]ANZECC (2000) default trigger; [E]As(V); [F]ANZECC (2018);[G]as Cr(VI); [H]USEPA (2007); [I]USEPA (1986); [J]NPS-FM attribute A annual median, pH adjusted; [K]NPS-FM attribute A annual median; [L]modelled as dissolved reactive phosphorus; [M]NPS-FM attribute B median; [N]NPS-FM attribute A 95%-ile.

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Table 29: Modelled surface water quality for Central sub block sites – 1 in 5 year flows.

Parameter	Sites 4, 7	Guidelines	Site 8	Guidelines	Site 5	Guidelines
pH (pH units)	7.1	6-9[A]	7.2	6-9[A]	6.9	6-9[A]
Hardness (as $CaCO_3$)	42	NA	34	NA	34	NA
Aluminium	0.012	0.96-1.8[B,C]	0.015	0.96-1.8[B,C]	0.013	0.96-1.8[B,C]
Arsenic	0.0016	0.013[D,E]	0.0010	0.013[D,E]	0.015	0.013[D,E]
Boron	0.011	0.94[F]	0.008	0.94[F]	0.011	0.94[F]
Cadmium	<0.0005	0.0003[C,D]	<0.0005	0.0002[C,D]	<0.0005	0.0002[C,D]
Chromium	<0.0005	0.0013[C,D,G]	<0.0005	0.0011[C,D,G]	<0.0005	0.0011[C,D,G]
Copper	<0.0005	0.0039-0.0079[C,H]	<0.0005	0.0039-0.0079[C,H]	<0.0005	0.0079-0.0138[C,H]
Iron	0.59	1.0[I]	0.10	1.0[I]	0.51	1.0[I]
Lead	<0.0001	0.0052[C,D]	0.0002	0.0040[C,D]	<0.0001	0.0040[C,D]
Manganese	0.058	1.9[C]	0.006	1.9[C]	0.050	1.9[C]
Mercury	< 0.00008	0.0006[D]	< 0.00008	0.0006[D]	< 0.00008	0.0006[D]
Nickel	<0.0005	0.015[C,D]	<0.0005	0.012[C,D]	<0.0005	0.012[C,D]
Silver	<0.0001	0.05[D]	<0.0001	0.05[D]	<0.0001	0.05[D]
Zinc	0.0059	0.011[C,D]	0.018	0.0089[C,D]	0.0040	0.0089[C,D]
Ammoniacal-N	0.030	≤ 0.07[J]	<0.005	≤ 0.07[J]	0.015	≤ 0.08[J]
Nitrate-N	0.34	≤ 1.0[K]	0.067	≤ 1.0[K]	0.29	≤ 1.0[K]
Phosphorus[L]	<0.004	≤ 0.006[M]	<0.004	≤ 0.006[M]	<0.004	≤ 0.006[M]

Notes: units g/m^3; [A]WCRC (2014); [B]USEPA (2018); [C]hardness and pH as stated, Dissolved Organic Carbon (DOC)=2.5 g/m^3 for aluminium 2.0 g/m^3 for copper; [D]ANZECC (2000) default trigger; [E]As(V); [F]ANZECC (2018);[G]Cr(III); [H]USEPA (2007); [I]USEPA (1986); [J]NPS-FM attribute A annual median, pH adjusted; [K]NPS-FM attribute A annual median; [L]modelled as dissolved reactive phosphorus; [M]NPS-FM attribute B median; [N]NPS-FM attribute A 95%-ile.

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9.3.2.3 Summary of surface water quality and effects

Worst-case, 1 in 5-year low flow, water quality models were constructed that assumed full base flow infiltration of modified groundwater to surface waters in the North and South sub blocks, and combined surface water and base flow contributions to the surface waters in the Central sub block.

As such, the surface water modelling indicates all relevant water quality guidelines will be met, which will in turn prove protective to aquatic biota. There will likely be some appearance of iron oxyhydroxides in surface waters but this should not result in smothering of surface water beds. A caveat to the modelling is that tailings and slimes will require augmentation with lime in order raise porewater pH and hardness and facilitate demobilisation of metals and metalloids.

Surface water quality following the proposed mining is expected to be altered on in the short to medium term as the plume of modified groundwater moves westward through the mined zone toward the coast, after which quality will revert to baseline as groundwater regains its pre-mining geochemical signatures with the overall level of effect assessed as '**very low**'.

9.3.3 Loss or disturbance of aquatic habitat

9.3.3.1 Introduction

Temporary diversions and streamworks will be required to enable the staged extraction of mineralised material across the SB. Given the presence of Northern Creek, Central Creek, Clarke Creek, Wasabi Creek, Southern Creek and farm drains within the mining area, these works will need to be carefully planned and implemented to maintain water conveyance, protect freshwater values and minimise adverse environmental effects. Post-mining reconstruction will focus on achieving no net loss in stream extent and enhancing freshwater values through improved channel alignment, riparian fencing and planting.

9.3.3.2 Design principles

The Rehabilitation Management Plan (RMP) prepared by Tai Poutini Resources Limited (2026) outlines the design principles for diversions and reconstructed watercourses. Diversions and reconstructed watercourses will be designed in accordance with best practice fluvial geomorphology and freshwater management principles, and will:

(a) Maintain hydraulic capacity to convey design flows and prevent flooding.

(b) Minimise erosion and sediment generation.

(c) Promote stable channel forms and banks.

(d) Support the establishment of riparian and aquatic habitat.

(e) Integrate with final landforms and wetland systems.

(f) Reflect, where practicable, natural channel patterns and gradients.

9.3.3.3 Lengths of watercourses proposed to be diverted

Creeks required to be diverted include Northern Creek, Central Creek, Clarke Creek, Wasabi Creek and Southern Creek (total approximate length = 3.83 km; Table 30). There is approximately 11.2 km of artificial drain within the proposed mining area that will be diverted or reclaimed. Little Granite Creek and Granite Creek would not be diverted. Canoe Creek and Fagan Creek to the north and south of the site, respectively, will also not be diverted.

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Table 30: Length and streambed area of continually flowing or intermittent modified rivers (creeks) and artificial drains proposed to be diverted (Tai Poutini Resources Ltd 2026).

Watercourse	Pre-mining length (m)	Mean width (m)	Streambed area (m^2)	Diversion methodology to be applied
Northern Creek	1,178	2.2	2,592	East-west
Central Creek	764	2.1	1,604	East-west
Clarke Creek	681	1.0	681	North-south
Wasabi Creek	733	3.5	2,566	North-south / East-west
Southern Creek	469	1.5	704	East-west
Total	**3,825**		**8,146**	

9.3.3.4 Lengths of watercourses proposed to be created post mining

Approximately 3.83 km of creek is proposed to be diverted and returned to newly constructed channels that will have an approximate total length of 4.35 km. These newly constructed channels will be sized to accommodate the post-mining flows and to ensure that there will be no loss of overall extent of aquatic habitats. Approximately 11.2 km of artificial drain will be diverted during mining. The overall length of artificial drain created may be shorter than the existing extent but will depend on hydrological conditions and need for drainage.

9.3.3.5 Proposed methodology for diverting creeks and drains

To minimise the risk of adverse effects on aquatic habitats and fauna in both temporary diversions and constructed permanent channels, channel designs and construction methodologies, as well as dredge stream methodologies, have been developed and incorporated into the RMP prepared by Tai Poutini Resources Limited (2026).

Two methods are proposed to manage the process of diverting creeks and drains and will depend on the orientation (i.e., north-south or east-west), hydrology, sequence of mining activities and future purpose of the surrounding land. North–south oriented creeks and drains will generally be diverted into previously mined and rehabilitated areas prior to mining reaching the existing channel alignment, except where mining occurs adjacent to the coastal setback boundary (Tai Poutini Resources Limited 2026). East–west oriented drains and creeks will be temporarily diverted behind the active mining void and into adjacent mined areas prior to mining progressing through the existing alignment. These temporary diversions will allow mining to proceed while maintaining downstream flows (Tai Poutini Resources Limited 2026). Following completion of mining through each alignment, permanent reconstructed channels will be constructed and flows reinstated in accordance with the site RMP prepared by Tai Poutini Resources Limited (2026).

Diverted creeks will discharge to the Coastal Marine Area (CMA) at the existing location (i.e., where they currently discharge prior to mining). Artificial drains may be retired or new artificial drains constructed in order to manage drainage within the site where required.

9.3.3.6 Characteristics of reconstructed creeks

The final alignment of reconstructed creeks will maintain their predominant orientation and extent and will be enhanced via riparian planting and fenced so that there will be no overall 'loss of extent' and freshwater ecological values will be enhanced within the site. Creek

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sections that have been diverted are proposed to be reconstructed and rehabilitated along recontoured ground levels once mining through sections that have been completed and will no longer be affected by the mining path. The RMP prepared by Tai Poutini Resources Limited (2026) outlines channel and riparian features to be constructed and the implementation methods to avoid or minimise adverse effects on aquatic habitat and fauna.

The overall extent of creek habitat within the site will increase (refer to Section 9.3.3.4) by introducing meanders on reconstructed channels where they are currently straight aligned and have unnatural flow paths. The reconstructed creek channels will have variable channel widths, variable depths, a range of habitat types (e.g., run, riffle, pool), maintain natural streambed characteristics (i.e., predominantly hard-bottomed) and have floodplains sized to accommodate expected flows. Riparian areas will be planted to 5 m wide (for Granite Creek) or 3 m wide (for all other creeks) on each bank with eco-sourced indigenous species in accordance with the landscape plans prepared by Glasson Huxtable (2026) (shown in Figure 48 to Figure 50 in Section 9.2), with the overall aim of creating habitats with higher ecological value than prior to mining.

Reconstructed creek channels will have a meandering pattern with variable widths and depths that will maintain the overall extent (i.e., length and bed area) and maximise instream habitat diversity and ecological values for aquatic fauna (e.g., pools on bends between shallower run and riffle habitats) (Figure 51). Constructing deeper pools on bends will provide suitable habitat for eel, īnanga and kōkopu species whilst shallow faster flowing riffle habitats will provide suitable habitat for elvers, bully, kōaro and water quality and habitat sensitive mayflies, stoneflies and caddisflies (EPT taxa). Proposed riparian planting along reconstructed creeks with indigenous vegetation will enhance habitat conditions for species with a preference for cover (e.g., banded kōkopu, giant kōkopu, kōaro), provide stream shade, limit algae growth, filter fine sediment and provide a source of woody debris and leaf litter as shelter and food for aquatic fauna. Woody debris will be incorporated into reconstructed channels where possible to stabilise the streambed and banks, trap sediment and organic matter, enhance habitat complexity and provide cover for native fish.

Effective implementation of the RMP prepared by Tai Poutini Resources Limited (2026) and the accompanying Fish Management Plan prepared by Ecological Solutions Limited (2026) will minimise the potential adverse effects of watercourse disturbance with the overall level of effect on native freshwater ecology values assessed as **‘very low’** in the short-term and **‘net gain’** in the long-term once reconstructed watercourses have reached an equilibrium state and fenced indigenous riparian vegetation has established.

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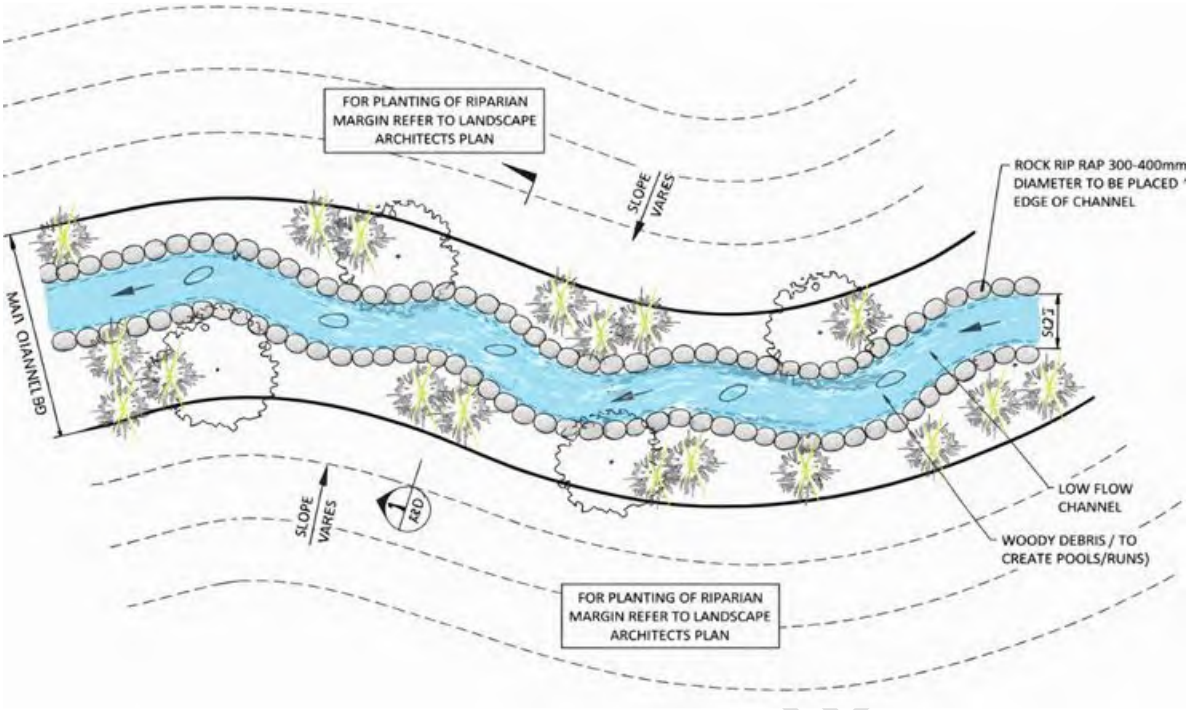

Figure 51: Example of stream alignment plan for reconstructed watercourses.

9.3.4 Effects on fish

Creeks proposed to be diverted include Northern Creek, Central Creek, Clarke Creek, Wasabi Creek, Southern Creek and artificial drains that support native fish communities with 'moderate' to 'high' ecological value due to the presence of native fish with 'Threatened' or 'At Risk' conservation status would also be diverted. The proposed mining and diversion of creeks and drains has potential to cause direct harm and/or mortality of native fish during diversion works.

The diversion of creeks and drains within the mining path will be implemented in accordance with the methodology outlined in Section 9.3.3.5 for north-south and east-west flowing watercourses. Potential harm or mortality of native fish during the diversion or reclamation of creeks, drains and dredge ponds, or any wetlands holding surface water, will be managed by relocating fish prior to and during disturbance in accordance with the Fish Management Plan (FMP) provided in Appendix E.

Implementing the FMP prior to and during the diversion of watercourses or reclamation of waterbodies holding surface water (e.g., ponds, wetlands) will minimise the potential harm or mortality of native fish with the overall level of effect on native freshwater fish values assessed as **'very low'**.

9.3.5 Effects on fish passage

The following aspects of the proposed activity could adversely affect fish passage in watercourses if not designed and constructed appropriately:

- Temporary creek and drain diversions.
- Permanent reconstructed channels during rehabilitation.

The discharge locations of creeks to the Coastal Marine Area (CMA) will be retained at their existing locations and current 'catchment' boundaries will be maintained. All reconstructed creeks and artificial drains will be connected to the constructed wetland system or

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naturalised creek networks to support long-term site hydrology, ecological function and fish passage between the CMA and upstream habitats for diadromous native fish species.

To minimise potential effects on fish passage in temporary diversions or reconstructed creeks and artificial drains, channels will be constructed to 'key in' at the same or similar invert levels to avoid perching or creation of barriers that could affect fish passage. The low gradient of the topography within the SB means that this can be easily achieved.

Careful consideration that ensures the temporary diversions and reconstructed creeks and any artificial drains are constructed to maintain fish passage will avoid adverse effects on native diadromous native fish with the overall level of effect assessed as **'very low'**.

9.3.6 Water supply and effects on Canoe Creek

Processing water will be required to fill ponds at the Mine Water Facility (MWF), storing water for when it is required to be used for processing run of mine material (ROM) at the Wet Concentrator Plant (WCP). The peak water take will occur when the WCP is restarted to process material from the SB or following maintenance or shutdowns (Tai Poutini Resources Limited 2026). Once processing is underway, water demand will significantly decrease. Water will be recycled and reused throughout the plant, reducing the need for a continuous fresh supply. Intermittent top-ups will be required to offset the water that remains in the Heavy Mineral Concentrate (HMC) and therefore lost from the site.

Processing water is proposed to be sourced from shallow ground water in lower Canoe Creek where TCM holds a current consent authorising the abstraction of water for processing CB-mined material at the WCP over a 12-year period (Tai Poutini Resources Limited 2026). The location of the proposed water take is shown on Figure 52. A longer-term consent is being sought via this process to ensure sufficient water is available to support mining of the SB once mining of the CB has been completed.

The proposed take is located adjacent to an existing farm access track near the coast with the pumping rate restricted to 63 L/s instantaneous rate, 5,400 m^3/day or 62.5 L/s on a daily basis. The maximum rate of take is anticipated to be required for infrequent periods of up to seven days and it is anticipated that the long-term rate of abstraction will be <9.5 L/s. The proposed water take from lower Canoe Creek for mining the SB would only commence once mining of the CB has been completed.

The diversion of water away from watercourses has the potential to affect flow and reduce habitat for aquatic fauna. A water take restricted to a maximum rate of 63 L/s but more likely <9.5 L/s in the long-term from lower Canoe Creek near the coast represents <10% of the annual Mean Annual Low Flow (MALF). A water take of this magnitude is expected to maintain instream conditions (i.e., habitat quality, native fish abundance). The overall level of effect of the proposed water take on the amount and quality of habitat in lower Canoe Creek is assessed as **'very low'** with no mitigation required.

Ecological Solutions understands that shallow ground water would be extracted from lower Canoe Creek via a subsurface gallery or a direct surface water take with an appropriate fish screen. This method of take should avoid any risk of fish becoming entrained and 'relocated' from Canoe Creek so will avoid this potential adverse effect, which is assessed as **'very low'**.

9.4 Mitigation

The proposal includes a number of management plans with the objective of mitigating adverse effects, including the:

- Avian Management Plan (AMP) which provides for regular monitoring of birds and implementation of management measures to avoid or minimise effects. This

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includes managing of lighting at the site when required and also prescribes how kororā using the area would be excluded from the active mining area and what would happen in the event of a seabird grounding within or near the site. A Wildlife Act Authority (WAA) is required and is being applied for to implement the AMP.

- Lizard Management Plan (LMP) which provides for the implementation of management measures to avoid or minimise effects in the event that it is required (e.g., if mining would remove potentially suitable lizard habitat). The LMP also sets out the relocation of any herpetofauna salvaged prior to mining. As such there is a need to obtain a Wildlife Act Authority (WAA) to implement the LMP.

- Lime dosing of tailings and slimes to manage water quality prior to discharge.

- Rehabilitation Management Plan (RMP) which sets out details of reconstruction and planting of the creeks, drains and wetlands at the Site. The RMP provides for the construction and planting of c. 53.7ha of wetland, the restoration of approximately 4.35 km of creeks and construction of approximately 11.7 km of drains. The riparian margins of all reconstructed streams would be planted to a width of at least 3 m. Riparian vegetation adjoining Granite Creek would extend at least 5 m from each bank. In addition, the reconstructed watercourses would be designed to include a variety of aquatic habitats (pools, riffles, runs and the like) and riparian planting would improve these aquatic habitats relative to the existing condition. These actions will serve to increase aquatic and terrestrial ecological values compared to pre-activity condition, including the provision of habitat for avifauna, herpetofauna, bat and fish species.

The overall level of effects given the mitigations proposed is set out in Table 31.

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Figure 52: Location of proposed water take and gallery on Canoe Creek (Tai Poutini Resources Limited 2026).

Table 31: Magnitude and level of effects for the proposed development before and after mitigation.

Activity	Effect	Ecological value	Magnitude of effect	Level of effect (no mitigation)	Proposed mitigation measures	Level of effect (with mitigation)
Terrestrial vegetation clearance – pasture (grazed)	Loss of botanical values	Negligible	Low	Very Low	Under the EcIA guidelines Low and Very Low effects should not normally be of concern if design, construction and operational care is exercised to minimise adverse effects.	Very low
Terrestrial vegetation clearance – pasture (ungrazed)	Loss of botanical values	Negligible	Low	Very Low	Under the EcIA guidelines Low and Very Low effects should not normally be of concern if design, construction and operational care is exercised to minimise adverse effects.	Very low
Terrestrial vegetation clearance – indigenous coastal shrubland	Loss of botanical values	Moderate	Very high	High	Planting of bund and other vegetation, including in association with riparian margins and implementation of proposed rehabilitation plan. Collection of seed and potentially salvage and relocation of threatened and at risk species present.	Very low - Net gain
Terrestrial vegetation clearance – Pine shelterbelts and isolated trees	Loss of botanical values	Negligible	N/A	N/A	Pine shelterbelts and isolated trees are to be avoided and retained.	N/A
Terrestrial vegetation clearance - flaxland	Loss of botanical values	Moderate	Very high	High	Planting adjoining the coastal lagoon and open coastline and implementation of proposed rehabilitation plan. VDT of flaxland where practicable.	Very low - Net gain
Terrestrial vegetation clearance – effects on avifauna	Direct mortality of eggs and chicks. Disturbance of little blue penguin crossing the site.	High	Low	Moderate	Avian Management Plan includes actions to identify nests and provides for setback and other management as appropriate. Seasonal bird monitoring to inform mining operations so that risks to conservation status birds can be identified and mitigated. Mining during daylight hours. Compliance with Australian Light Pollution Guidelines for Wildlife (2023) to avoid and/or	Low – Net gain

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Activity	Effect	Ecological value	Magnitude of effect	Level of effect (no mitigation)	Proposed mitigation measures	Level of effect (with mitigation)
					minimise effects on sea birds including tāiko. Rehabilitation Management Plan provides for increased forest/shrubland and wetland habitats.	
Increased activity and human disturbance – effects on avifauna	Loss of foraging and/or reproductive success for birds using the site	High	Low	Moderate	Implementation of Avian Management Plan including commencing mining in the south west, avoiding habitats during the breeding season, fencing to exclude kororā from the mining arrea and monitoring birds for the life of mining to inform management decisions.	Very low
Increased light at night (fixed and mobile lighting) – effects on seabirds, including tāiko	Potential for grounding which can result in bird mortality.	High	Low	Low	Mining during daylight hours only. Implementation of Avian Management Plan, including management of lighting in accordance with Commonwealth of Australia guidelines	Very low
Terrestrial vegetation clearance – effects on herpetofauna	Direct mortality of lizards due to vegetation clearance and loss of suitable lizard habitat	Moderate	Moderate	Moderate	Preparation of a LMP by a suitably qualified ecologist, implementation of lizard management measures. Rehabilitation Management Plan to provide for herpetofauna habitat replacement / enhancement within the SB.	Direct mortality: Low Habitat loss: Very low – Net gain
Terrestrial vegetation clearance – Effects on bats	Short term loss/disruption of a small amount of commuting habitat as diversions are implemented and wetlands removed	Moderate	Moderate	Moderate	Exotic pine and shelterbelt trees to be avoided and retained. Low lying vegetation types to be cleared not suitable for bat roosts. Rehabilitation and enhancement of streams, wetlands and riparian vegetation would provide net positive benefit to bats in the medium to longer term	Low – Net gain
Artificial lighting – effects on bats	Delay emergence from any nearby roots, disruption of commuting pathways, illumination of foraging habitat	Moderate	Moderate	Moderate	Mining only during daylight hours. Compliance with Australian Lighting Pollution Guidelines for Wildlife to avoid and/or minimise effects on bats.	Very low

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Activity	Effect	Ecological value	Magnitude of effect	Level of effect (no mitigation)	Proposed mitigation measures	Level of effect (with mitigation)
Changes to ground and surface water hydrology – effects on fish	Reduction in water quantity reducing habitat quality and availability for fish fauna.	High	Negligible	Very low	None	Very low
Changes to ground and surface water hydrology – effects on watercourses and wetlands	Reduction in water quantity reducing habitat quality and extent.	Moderate	Negligible	Very low	None	Low – Very low
Earthworks and sedimentation	Sedimentation and smothering of stream bed in onsite watercourses and the downstream catchment	Moderate -High	High	Moderate – Very high	Erosion and sediment controls (including associated with stream diversions and borrow pits) implemented in accordance with Erosion and Sediment Control Plan (Ridley Dunphy Limited 2023) and GD05 will reduce magnitude of effect to 'low'	Low
Discharge of treated mine water via groundwater	Effects on water quality in downstream receiving environment.	High	Low	Low	With lime augmentation of tailings and slimes, relevant guidelines can be met under all modelled conditions.	Very low
Removal of watercourse habitat	Complete removal of habitat beneath mining path. *Magnitude and level of effect based on highest instream value (fish fauna).*	High	Very high	Very high	Implementation of fish management provisions within the Rehabilitation Management Plan to guide de-fishing of affected habitat. Reconstruction of habitat prior to removal or in association with rehabilitation immediately post mining (i.e., within rehabilitation period).	Very low
Removal of wetlands	Complete removal of habitat beneath mining path.	Moderate	Very High	High	Construction of large amounts of wetland habitat prior to removal as mining moves across the site	Very low – net gain
Watercourse diversions and replacement– effects on fish passage	During the time watercourses are diverted around the active mine area fish passage could be restricted.	High	Low	Low	Temporary stream diversions will be constructed such that fish passage is provided for. Fish management provisions in the Rehabilitation Management Plan will include detail as to how this can be achieved.	Very low

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10.0 NPS-IB Assessment

10.1 Introduction

The Government introduced new policy direction around the protection and maintenance of biodiversity across Aotearoa New Zealand in the National Policy Statement for Indigenous Biodiversity (NPS-IB) in 2023. The NPS-IB directs local authorities to update their policies, plans and strategies to reflect the NPS-IB's direction. As part of this process, applications for resource consent made after August 2023 are required to have regard to the NPS-IB. With respect to TiGa's Fast Track application for the SB, the most relevant sections of the NPS-IB include Policies 3, 4, 6-8 and 13-15.

10.2 Assessment of proposed SB application against relevant NPS-IB direction

Table 32: Assessment of proposed mining activities against relevant NPS-IB policies

NPS-IB Part 2 Objectives/Policies	Measures to give regard to NPS-IB
Policy 3: *A precautionary approach is adopted when considering adverse effects on indigenous biodiversity*	The assessment of effects is conservative when considering adverse effects on indigenous biodiversity by: i) Avoidance of effects where that is practically achievable (e.g. not diverting Granite and Little Granite Creeks, not removing over mature pine trees that could be bat roosts). ii) If any doubt, species are assumed to be present (e.g. although no lizards have been detected to date, this assessment assumes lizards are present). iii) The worst-case scenario is assumed with respect to the effects (e.g., that tall trees are providing bat roosts, although evidence whether they are not is unavailable). iv) Proactive recommendations have been made with respect to addressing effects, even if the risk of that effect materialising is low (e.g., management of kororā is provided for, even though if kororā are commuting across the site, the number of individuals would be very small and the level of effects at the population level similarly low). v) Focus on net positive for the project with respect to biodiversity (e.g., the construction of the wetland was not proposed to address any residual effects, rather it will restore more natural habitats representative of the pre-human habitats within the Barrytown Flats, which have generally been either substantially modified or removed).
Policy 4: *Indigenous biodiversity is managed to promote resilience to the effects of climate change*	The proposal includes substantial native species revegetation within wetland areas and for buffering of waterways. An increase in the extent and integrity of indigenous wetland and riparian communities is expected to improve ecological resilience, including to climate change.
Policy 6: *Significant indigenous vegetation and*	The TTPP does not identify any significant indigenous vegetation or habitats of indigenous fauna within the proposed mining area.

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significant habitats of indigenous fauna are identified as SNAs using a consistent approach	The SB is a highly modified and actively managed agricultural landscape dominated by exotic pasture.
Policy 7: *SNAs are protected by avoiding and managing adverse effects from new subdivision, use and development.*	The nearest SNA identified in the proposed Te Tai o Poutini Plan (TTPP) is PUN-049. The proposed mining of the SB will not result in any direct or indirect adverse effects on SNA PUN-049. This example of lowland kahikatea forest with some wetland character and scrub on the fringes is located c. 145 m east of the proposed mining disturbance area.
Policy 8: *The importance of maintaining indigenous biodiversity outside SNAs is recognised and provided for.*	Vegetation within the site comprises predominantly exotic pasture and small fragmented areas of shelterbelt and exotic trees. A maximum of 16 ha will be disturbed at any one time with mined strips being progressively rehabilitated as mining proceeds. The Rehabilitation Management Plan includes indigenous planting and the creation of new wetland areas to provide habitat for indigenous flora and fauna. Consequently, indigenous biodiversity values will increase at the site following rehabilitation.
Policy 13: *Restoration of indigenous biodiversity is promoted and provided for.* **Policy 14:** *Increased indigenous vegetation cover is promoted in both urban and non-urban environments.*	Restoration of indigenous biodiversity is proposed for the site by way of a Rehabilitation Management Plan, effective implementation of which will expand and protect ecological values and habitats. The Rehabilitation Management Plan details the restoration of indigenous vegetation within the proposed mining area during and at the completion of mining. The plan provides for the replacement and enhancement of existing botanical and ecological values, including extent. In addition, the plan provides for enhancements to flora and faunal ecological values where this is considered achievable (e.g., the use of appropriate vegetation to enhance avifauna, herpetofauna and bat habitats and the increased riparian vegetation contributing to improved aquatic habitats). Implementation of the Rehabilitation Management Plan is expected to result in the restoration and maintenance of indigenous biodiversity and a net gain in indigenous vegetation cover within the SB.
Policy 15: *Areas outside SNAs that support specified highly mobile fauna are identified and managed to maintain their populations across their natural range, and information and awareness of highly mobile fauna is improved.*	Nine avian species which are likely to use the site (at least occasoinally) are listed as 'specified highly mobile fauna' in Appendix 2 of the NPS-IB. This includes banded dotterel (At Risk – Declining), black shag (At Risk – Relict), New Zealand pipit (At Risk – Declining), black-billed gull (At Risk – Declining), Caspian tern (Threatened –Nationally vulnerable), red-billed gull (At Risk – Declining), South Island pied oystercatcher (At Risk – Declining), New Zealand 'southern' falcon (Threatened – Nationally Endangered), variable oystercatcher (At Risk – Recovering), and white fronted tern (At Risk – Declining). The 'specified highly mobile fauna' species likely to use the site are unlikely to rely on pasture habitats for breeding, but may use them infrequently for foraging. Their presence and the potential to be adversely affected by noise and other disturbance within the site, has informed the proposed effects management (e.g., the Avian Management Plan) in regard to mining activities within the SB.

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APPENDIX A

Vascular Plant Species List

Scientific name	Common name	Wetland indicator rating	Biostatus origin	Conservation status (de Lange et al. 2023)
TREES AND SHRUBS				
Alnus glutinosa	common alder	FACW	Exotic	Not Threatened
Aristotelia serrata	wineberry; makomako	FACU	Indigenous Endemic	Not Threatened
Bidens frondosa	beggars' ticks	FACW	Exotic	Not Threatened
Buddleja davidii	buddleia; butterfly bush	FACU	Exotic	Not Threatened
Carmichaelia australis	native broom; mākaka	FACU	Indigenous Endemic	At Risk - Declining
Coprosma grandifolia	kanono; large-leaved coprosma	FACU	Indigenous Endemic	Not Threatened
Coprosma propinqua	mingimingi	FAC	Indigenous Endemic	Not Threatened
Coprosma repens	taupata	#N/A	Indigenous Non-Endemic	Not Threatened
Coprosma rhamnoides		UPL	Indigenous Endemic	Not Threatened
Cordyline australis	cabbage tree; Giant dracena; ti kōuka	FACW	Indigenous Endemic	Not Threatened
Coriaria arborea	tutu	UPL	Indigenous Endemic	Not Threatened
Dacrycarpus dacrydioides	kahikatea	FACW	Indigenous Endemic	Not Threatened
Eucalyptus species	gum; stringybark	#N/A	Exotic	Not Threatened
Fuchsia excorticata	tree fuchsia; kōtukutuku	FACU	Indigenous Endemic	Not Threatened
Griselinia lucida	puka	#N/A	Indigenous Endemic	Not Threatened
Haloragis erecta	shrubby haloragis; toatoa	FACU	Indigenous Endemic	Not Threatened
Hedycarya arborea	pigeonwood; porokaiwhiri	UPL	Indigenous Endemic	Not Threatened
Hypolepis ambigua	pig fern	UPL	Indigenous Endemic	Not Threatened
Melicytus ramiflorus	māhoe; whiteywood	FACU	Indigenous Non-Endemic	Not Threatened
Metrosideros excelsa	pōhutukawa	UPL	Indigenous Endemic	Not Threatened
Metrosideros robusta	Northern rātā	FACU	Indigenous Endemic	At Risk - Declining
Metrosideros umbellata	Southern rātā	UPL	Indigenous Endemic	Not Threatened
Pinus radiata	Monterey pine; radiata pine	FACU	Exotic	Not Threatened
Piper excelsum	kawakawa	UPL	Indigenous Endemic	Not Threatened
Pittosporum eugenioides	lemonwood; tarata	-	Indigenous Endemic	Not Threatened
Pterophylla racemosa	kāmahi	FACU	Indigenous Endemic	Not Threatened
Rhopalostylis sapida	nīkau	FACU	Indigenous Endemic	Not Threatened
Salix fragilis	crack willow	FACW	Exotic	Not Threatened
Solanum aviculare var. aviculare	poroporo	-	Indigenous Non-Endemic	Threatened - Nationally Endangered
Solanum laciniatum	poroporo; bullibulli	-	Indigenous Non-Endemic	Not Threatened
Sophora species	kōwhai		Indigenous Endemic	Not Threatened
Ulex europaeus	gorse	FACU	Exotic	Not Threatened
Veronica species		-	-	-
Veronica stricta	hebe; koromiko	FACU	Indigenous Endemic	Not Threatened
VINES AND LIANAS				
Calystegia sepium	pink bindweed	FAC	Indigenous Non-Endemic	Not Threatened
Freycinetia banksii	kiekie	FACU	Indigenous Endemic	Not Threatened
Metrosideros perforata	akatea; small white rātā	FACU	Indigenous Endemic	Not Threatened
Muehlenbeckia australis	large-leaved muehlenbeckia	FACU	Indigenous Non-Endemic	Not Threatened
Muehlenbeckia complexa	small-leaved pohuehue; wire vine;	FACU	Indigenous Non-Endemic	Not Threatened
Ripogonum scandens	supplejack; kareao; pirita	FACU	Indigenous Endemic	Not Threatened
Rubus fruticosus	blackberry	FAC	Exotic	Not Threatened
Tetragonia species	native spinach	-	Indigenous Non-Endemic	-
FERNS AND ALLIED PLANTS				
Asplenium flaccidum	drooping spleenwort; hanging spleenwort	UPL	Indigenous Non-Endemic	Not Threatened
Asplenium polyodon	sickle spleenwort	UPL	Indigenous Non-Endemic	Not Threatened
Azolla rubra	Pacific azolla; red azolla	OBL	Indigenous Non-Endemic	Not Threatened
Blechnum novae-zelandiae	kiokio	FAC	Indigenous Endemic	Not Threatened
Blechnum penna-marina	little hard fern	FAC	Indigenous Non-Endemic	Not Threatened
Cyathea dealbata	silver fern; ponga	UPL	Indigenous Endemic	Not Threatened
Cyathea medullaris	black tree fern; mamaku	FACU	Indigenous Non-Endemic	Not Threatened
Cyathea smithii	kātote; Smith's tree fern; soft tree fern	FACU	Indigenous Endemic	Not Threatened

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Dicksonia fibrosa	golden tree fern; whekī-ponga	UPL	Indigenous Endemic	Not Threatened
Dicksonia squarrosa	rough tree fern; whekī	FACU	Indigenous Endemic	Not Threatened
Histiopteris incisa	water fern; mātātā	FAC	Indigenous Non-Endemic	Not Threatened
Microsorum pustulatum	hound's tongue; kōwaowao	UPL	Indigenous Non-Endemic	Not Threatened
Microsorum scandens	fragrant fern; mokimoki	UPL	Indigenous Non-Endemic	Not Threatened
Nephrolepis cordifolia	tuber ladder fern; tuber sword fern	FAC	Exotic	Not Threatened
Paesia scaberula	hard fern; ring fern; scented fern	FACU	Indigenous Endemic	Not Threatened
Pakau pennigera	gully fern; pākau	FACU	Indigenous Non-Endemic	Not Threatened
Pellaea rotundifolia	button fern; New Zealand cliff brake; round-leaved fern	-	Indigenous Non-Endemic	Not Threatened
Pteridium esculentum	bracken; rarauhe	FACU	Indigenous Non-Endemic	Not Threatened
Pyrrosia elaeagnifolia	leather-leaf fern	UPL	Indigenous Endemic	Not Threatened
DICOTYLEDON HERBS				
Anisotome species		-	-	-
Apium species		-	-	-
Callitriche stagnalis	starwort	OBL	Exotic	Not Threatened
Cerastium species		-	Exotic	Not Threatened
Digitalis purpurea	foxglove	UPL	Exotic	Not Threatened
Erythranthe guttata	monkey musk	OBL	Exotic	Not Threatened
Erythranthe moschata	musk	OBL	Exotic	Not Threatened
Geranium molle	dove's-foot cranesbill	UPL	Exotic	Not Threatened
Goodenia radicans		FACW	Indigenous Non-Endemic	Not Threatened
Gunnera tinctoria	Chilean rhubarb	FAC	Exotic	Not Threatened
Hydrocotyle moschata	hairy pennywort	FAC	Indigenous Endemic	Not Threatened
Lobelia angulata		FAC	Indigenous Endemic	Not Threatened
Lotus pedunculatus	lotus; birdsfoot treefoil	FAC	Exotic	Not Threatened
Lysimachia arvensis subsp. arvensis var. arvensis	Scarlet pimpernel	-	Exotic	Not Threatened
Myosotis species	forget-me-not	-	Exotic	Not Threatened
Nasturtium microphyllum	watercress; kōwhitiwhiti	OBL	Exotic	Not Threatened
Nasturtium officinale	watercress; kōwhitiwhiti	OBL	Exotic	Not Threatened
Nertera depressa	bead plant; fruiting duckweed	FACU	Indigenous Non-Endemic	Not Threatened
Persicaria hydropiper	water pepper	FACW	Exotic	Not Threatened
Persicaria maculosa	willow weed	FACW	Exotic	Not Threatened
Plantago lanceolata	narrow-leaved plantain	FACU	Exotic	Not Threatened
Plantago major	broad-leaved plantain	FACU	Exotic	Not Threatened
Prunella vulgaris	self-heal	FACU	Exotic	Not Threatened
Rumex acetosella	sheep's sorrel	FAC	Exotic	Not Threatened
Rumex obtusifolius	broad-leaved dock	FAC	Exotic	Not Threatened
Trifolium repens	white clover	FACU	Exotic	Not Threatened
Veronica anagallis-aquatica	blue water speedwell	OBL	Exotic	Not Threatened
DICOTYLEDON COMPOSITES				
Anthemis cotula	stinking mayweed	-	Exotic	Not Threatened
Cirsium species	thistle	-	Exotic	Not Threatened
Cirsium vulgare	Scotch thistle	FACU	Exotic	Not Threatened
Cotula coronopifolia	bachelor's buttons	FACW	Indigenous Non-Endemic	Not Threatened
Erigeron sumatrensis	broad-leaved fleabane	FACU	Exotic	Not Threatened
Hypochaeris radicata	catsear	FACU	Exotic	Not Threatened
Jacobaea vulgaris	ragwort	FACU	Exotic	Not Threatened
Leontodon saxatilis	hawkbit	FAC	Exotic	Not Threatened
Rumex conglomeratus	clustered dock	FAC	Exotic	Not Threatened
GRASSES, SEDGES AND RUSHES				
Agrostis capillaris	browntop bent	FACU	Exotic	Not Threatened
Agrostis stolonifera	creeping bent	FACW	Exotic	Not Threatened
Alopecurus geniculatus	kneed foxtail	FACW	Exotic	Not Threatened
Carex comans	longwood tussock; maurea	FAC	Indigenous Endemic	Not Threatened

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Carex dissita	forest sedge	FAC	Indigenous Endemic	Not Threatened
Carex gaudichaudiana	Gaudichaud's sedge	FACW	Indigenous Non-Endemic	Not Threatened
Carex geminata	cutty grass; Rautahi; Toetoe rautahi;	FACW	Indigenous Endemic	Not Threatened
Carex leporina	oval sedge	FACW	Exotic	Not Threatened
Carex maorica	Māori sedge	OBL	Indigenous Endemic	Not Threatened
Carex secta	pūkio; pūrei	OBL	Indigenous Endemic	Not Threatened
Carex virgata	swamp sedge	OBL	Indigenous Endemic	Not Threatened
Cyperus ustulatus	giant umbrella sedge	FACW	Indigenous Endemic	Not Threatened
Dactylis glomerata	cocksfoot	FACU	Exotic	Not Threatened
Eleocharis acuta	sharp spike sedge	OBL	Indigenous Non-Endemic	Not Threatened
Eleocharis gracilis	slender spike sedge	OBL	Indigenous Non-Endemic	Not Threatened
Holcus lanatus	Yorkshire fog	FAC	Exotic	Not Threatened
Isolepis aucklandica		OBL	Indigenous Non-Endemic	Not Threatened
Isolepis cernua	slender clubrush	OBL	Indigenous Non-Endemic	Not Threatened
Isolepis prolifera		OBL	Indigenous Non-Endemic	Not Threatened
Isolepis reticularis		FACW	Indigenous Endemic	Not Threatened
Juncus articulatus	jointed rush	FACW	Exotic	Not Threatened
Juncus australis	leafless rush	FACW	Indigenous Non-Endemic	Not Threatened
Juncus bulbosus	bulbous rush	OBL	Exotic	Not Threatened
Juncus canadensis	tailed-seed rush	OBL	Exotic	Not Threatened
Juncus edgariae	wiwi	FACW	Indigenous Endemic	Not Threatened
Juncus effusus	soft rush	FACW	Exotic	Not Threatened
Juncus pallidus	giant rush	FACW	Indigenous Non-Endemic	Not Threatened
Juncus planifolius	flat-leaved rush; grass-leaved rush	FACW	Indigenous Non-Endemic	Not Threatened
Juncus sarophorus	broom rush	FACW	Indigenous Non-Endemic	Not Threatened
Juncus tenuis	track rush	FACU	Exotic	Not Threatened
Juncus usitatus		FACW	Indigenous Non-Endemic	Not Threatened
Lolium perenne	perennial ryegrass	FACU	Exotic	Not Threatened
Poa annua	annual poa; Winter grass	FACU	Exotic	Not Threatened
Ranunculus repens	creeping buttercup	FAC	Exotic	Not Threatened
MONOCOTYLEDON HERBS				
Astelia grandis	swamp astelia	OBL	Indigenous Endemic	Not Threatened
Astelia hastata	tank lily	UPL	Indigenous Endemic	Not Threatened
Crocosmia xcrocosmiiflora	crocosmia; montbretia	UPL	Exotic	Not Threatened
Elodea canadensis	oxygen weed; Canadian pondweed	OBL	Exotic	Not Threatened
Lemna disperma	common duckweed	OBL	Indigenous Non-Endemic	Not Threatened
Phormium tenax	flax; harakeke	FACW	Indigenous Endemic	Not Threatened
Potamogeton suboblongus	mānihi; mud pondweed; rērēwai	OBL	Indigenous Endemic	Not Threatened
Typha orientalis	raupō; bulrush	OBL	Indigenous Non-Endemic	Not Threatened
Zantedeschia aethiopica	arum lily; lily of the Nile; white arum lily	FAC	Exotic	Not Threatened

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APPENDIX B

Bird Species List

Common name	Scientific name	Conservation status (Robertson et al. 2021)
Double-banded plover	*Anarhynchus bicinctus*	At Risk - Declining
Buller's shearwater	*Ardenna bulleri*	At Risk - Declining
Sooty shearwater	*Ardenna grisea*	At Risk - Declining
Red knot	*Calidris canutus*	At Risk - Declining
Black-billed gull	*Chroicocephalus bulleri*	At Risk - Declining
Silver gull	*Chroicocephalus novaehollandiae*	At Risk - Declining
Yellow-crowned parakeet	*Cyanoramphus auriceps*	At Risk - Declining
Little blue penguin	*Eudyptula minor*	At Risk - Declining
South Island oystercatcher	*Haematopus finschi*	At Risk - Declining
Bar-tailed godwit	*Limosa lapponica*	At Risk - Declining
South Island robin	*Petroica australis*	At Risk - Declining
New Zealand fernbird	*Poodytes punctatus*	At Risk - Declining
White-fronted tern	*Sterna striata*	At Risk - Declining
Buller's albatross	*Thalassarche bulleri*	At Risk - Declining
White-capped albatross	*Thalassarche cauta*	At Risk - Declining
Baillon's crake	*Zapornia pusilla*	At Risk - Declining
New Zealand pipit	*Anthus novaeseelandiae*	At Risk - Naturally Uncommon
Eurasian coot	*Fulica atra*	At Risk - Naturally Uncommon
Little Black cormorant	*Phalacrocorax sulcirostris*	At Risk - Naturally Uncommon
Royal spoonbill	*Platalea regia*	At Risk - Naturally Uncommon
Westland petrel	*Procellaria westlandica*	At Risk - Naturally Uncommon
New Zealand falcon	*Falco novaeseelandiae*	At Risk - Recovering
Variable oystercatcher	*Haematopus unicolor*	At Risk - Recovering
Northern giant-petrel	*Macronectes halli*	At Risk - Recovering
New Zealand kākā	*Nestor meridionalis*	At Risk - Recovering
Pied cormorant	*Phalacrocorax varius*	At Risk - Recovering
Little pied cormorant	*Microcarbo melanoleucos*	At Risk - Relict
Fairy prion	*Pachyptila turtur*	At Risk - Relict
Common diving-petrel	*Pelecanoides urinatrix*	At Risk - Relict
Great cormorant	*Phalacrocorax carbo*	At Risk - Relict
Fluttering shearwater	*Puffinus gavia*	At Risk - Relict
Australasian grebe	*Tachybaptus novaehollandiae*	Coloniser
Redpoll	*Acanthis flammea*	Introduced and Naturalised
Eurasian skylark	*Alauda arvensis*	Introduced and Naturalised
Mallard	*Anas platyrhynchos*	Introduced and Naturalised
Graylag goose	*Anser anser*	Introduced and Naturalised
Canada goose	*Branta canadensis*	Introduced and Naturalised
California quail	*Callipepla californica*	Introduced and Naturalised
European goldfinch	*Carduelis carduelis*	Introduced and Naturalised
European greenfinch	*Chloris chloris*	Introduced and Naturalised
Rock pigeon	*Columba livia*	Introduced and Naturalised
Yellowhammer	*Emberiza citrinella*	Introduced and Naturalised
Common chaffinch	*Fringilla coelebs*	Introduced and Naturalised
Australian magpie	*Gymnorhina tibicen*	Introduced and Naturalised
House sparrow	*Passer domesticus*	Introduced and Naturalised

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Dunnock	*Prunella modularis*	Introduced and Naturalised
European starling	*Sturnus vulgaris*	Introduced and Naturalised
Eurasian blackbird	*Turdus merula*	Introduced and Naturalised
Song thrush	*Turdus philomelos*	Introduced and Naturalised
Eastern cattle-egret	*Ardea coromanda/Bubulcus ibis coromandus*	Migrant
Short-tailed shearwater	*Ardenna tenuirostris*	Migrant
Ruddy turnstone	*Arenaria interpres*	Migrant
Arctic skua	*Stercorarius parasiticus*	Migrant
Pomarine skua	*Stercorarius pomarinus*	Migrant
Mallard x Pacific black duck (hybrid)	*Anas platyrhynchos x superciliosa*	NA
Pied x Black Stilt (hybrid)	*Himantopus leucocephalus x novaezelandiae*	NA
Domestic hen	*Gallus gallus*	NA
Rifleman	*Acanthisitta chloris*	Not Threatened
Gray teal	*Anas gracilis*	Not Threatened
New Zealand bellbird	*Anthornis melanura*	Not Threatened
New Zealand scaup	*Aythya novaeseelandiae*	Not Threatened
Shining-cuckoo	*Chrysococcyx lucidus*	Not Threatened
Australasian harrier	*Circus approximans*	Not Threatened
Black swan	*Cygnus atratus*	Not Threatened
White-faced heron	*Egretta novaehollandiae*	Not Threatened
Weka	*Gallirallus australis*	Not Threatened
Gray warbler	*Gerygone igata*	Not Threatened
New Zealand pigeon	*Hemiphaga novaeseelandiae*	Not Threatened
Pied stilt	*Himantopus leucocephalus/Himantopus himantopus*	Not Threatened
Welcome swallow	*Hirundo neoxena*	Not Threatened
Kelp gull	*Larus dominicanus*	Not Threatened
Pipipi	*Mohoua novaeseelandiae*	Not Threatened
Australasian gannet	*Morus serrator*	Not Threatened
Morepork	*Ninox novaeseelandiae*	Not Threatened
Tomtit	*Petroica macrocephala*	Not Threatened
Australasian swamphen	*Porphyrio melanotus*	Not Threatened
Tūī	*Prosthemadera novaeseelandiae*	Not Threatened
New Zealand fantail	*Rhipidura fuliginosa*	Not Threatened
Australasian shoveler	*Spatula rhynchotis*	Not Threatened
Paradise shelduck	*Tadorna variegata*	Not Threatened
Sacred kingfisher	*Todiramphus sanctus*	Not Threatened
Spur-winged plover	*Vanellus miles*	Not Threatened
Silvereye	*Zosterops lateralis*	Not Threatened
Great egret	*Ardea alba*	Threatened - Nationally Critical
Australasian bittern	*Botaurus poiciloptilus*	Threatened - Nationally Critical
Antipodean albatross	*Diomedea antipodensis*	Threatened - Nationally Critical
Black-fronted tern	*Chlidonias albostriatus*	Threatened - Nationally Endangered
Pacific reef-heron	*Egretta sacra*	Threatened - Nationally Endangered
Kea	*Nestor notabilis*	Threatened - Nationally Endangered
Wrybill	*Anarhynchus frontalis*	Threatened - Nationally Increasing
Pacific black duck	*Anas superciliosa*	Threatened - Nationally Vulnerable

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Great spotted kiwi	*Apteryx maxima*	Threatened - Nationally Vulnerable
Caspian tern	*Hydroprogne caspia*	Threatened - Nationally Vulnerable
Blue duck	*Hymenolaimus malacorhynchos*	Threatened - Nationally Vulnerable
Spotted shag	*Phalacrocorax punctatus*	Threatened - Nationally Vulnerable
Hutton's shearwater	*Puffinus huttoni*	Threatened - Nationally Vulnerable
Long-tailed koel	*Urodynamis taitensis/Eudynamys taitensis*	Threatened - Nationally Vulnerable
King penguin	*Aptenodytes patagonicus*	Vagrant
White-throated needletail	*Hirundapus caudacutus*	Vagrant
Tree martin	*Petrochelidon nigricans*	Vagrant
Cyanoramphus sp.	*Cyanoramphus sp.*	NA
Small albatross sp.	*Thalassarche sp.*	NA
Procellaria sp.	*Procellaria sp.*	NA
Cormorant sp.	*Phalacrocoracidae sp.*	NA

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APPENDIX C

Laboratory Water Quality Data

Hill Labs

R J Hill Laboratories Limited
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Private Bag 3205
Hamilton 3240 New Zealand

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Certificate of Analysis

Client:	Komanawa Solutions Limited	**Lab No:**	3538815	SPv1
Contact:	Zeb Etheridge	**Date Received:**	11-Apr-2024	
	C/- Komanawa Solutions Limited	**Date Reported:**	29-Apr-2024	
	4 Ash Street	**Quote No:**	130257	
	Christchurch Central City	**Order No:**		
	Christchurch 8011	**Client Reference:**	Testing suite A (Surface water)	
		Submitted By:	Zeb Etheridge	

Sample Type: Aqueous

Sample Name:		Site 1 08-Apr-2024 10:00 am	Site 2 08-Apr-2024 10:30 am	Site 3 08-Apr-2024 10:15 am	Site 4 08-Apr-2024 11:00 am	Site 5 08-Apr-2024 11:35 am
Lab Number:		3538815.1	3538815.2	3538815.3	3538815.4	3538815.5
Individual Tests						
Sum of Anions	meq/L	1.47	0.96	0.95	1.38	1.78
Sum of Cations	meq/L	1.54	0.98	0.96	1.49	1.88
Turbidity	NTU	22	1.35	0.20	3.5	132
pH	pH Units	7.4	7.5	7.5	7.5	6.6
Total Alkalinity	g/m³ as $CaCO_3$	43	31	30	34	23
Bicarbonate	g/m³ at 25°C	52	37	37	41	28
Total Hardness	g/m³ as $CaCO_3$	49	32	32	42	53
Electrical Conductivity (EC)	mS/m	15.3	10.2	10.1	15.5	21.1
Total Suspended Solids	g/m³	12	< 4	< 3	10	77
Total Dissolved Solids (TDS)	g/m³	91	61	60	97	145
Dissolved Calcium	g/m³	13.7	8.2	7.9	12.0	12.5
Total Iron	g/m³	4.7	0.46	0.110	1.82	42
Dissolved Magnesium	g/m³	3.7	2.8	2.9	2.9	5.2
Dissolved Mercury	g/m³	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008
Total Mercury	g/m³	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008
Dissolved Molybdenum	g/m³	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.0002
Dissolved Potassium	g/m³	1.93	0.87	0.89	2.7	5.5
Dissolved Silver	g/m³	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Dissolved Sodium	g/m³	9.4	7.0	7.0	12.6	15.1
Chloride	g/m³	20	9.4	9.3	24	27
Total Ammoniacal-N	g/m³	0.153	0.013	< 0.010	< 0.010	< 0.010
Nitrite-N	g/m³	< 0.002	< 0.002	< 0.002	< 0.002	0.020
Nitrate-N	g/m³	0.007	0.31	0.31	< 0.002	4.2
Nitrate-N + Nitrite-N	g/m³	0.007	0.31	0.31	< 0.002	4.2
Total Kjeldahl Nitrogen (TKN)	g/m³	0.37	< 0.10	< 0.10	0.51	1.27
Dissolved Reactive Phosphorus	g/m³	< 0.004	< 0.004	< 0.004	< 0.004	0.004
Total Phosphorus	g/m³	0.063	0.006	< 0.002	0.047	0.60
Sulphate	g/m³	1.7	2.9	2.9	1.6	13.1
Total Organic Carbon (TOC)	g/m³	3.5	0.7	< 0.5	6.3	13.7
Leachate metals suite, dissolved, trace						
Dissolved Aluminium	g/m³	0.007	< 0.003	0.003	< 0.003	0.129
Dissolved Arsenic	g/m³	< 0.0010	< 0.0010	< 0.0010	0.0011	0.0026
Dissolved Boron	g/m³	0.009	0.008	0.008	0.010	0.011
Dissolved Cadmium	g/m³	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Dissolved Chromium	g/m³	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.0074
Dissolved Cobalt	g/m³	0.0009	< 0.0002	< 0.0002	< 0.0002	0.0006
Dissolved Copper	g/m³	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.0058

This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised.
The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked * or any comments and interpretations, which are not accredited.

Sample Type: Aqueous						
Sample Name:		Site 1 08-Apr-2024 10:00 am	Site 2 08-Apr-2024 10:30 am	Site 3 08-Apr-2024 10:15 am	Site 4 08-Apr-2024 11:00 am	Site 5 08-Apr-2024 11:35 am
Lab Number:		3538815.1	3538815.2	3538815.3	3538815.4	3538815.5
Leachate metals suite, dissolved, trace						
Dissolved Iron	g/m^3	2.1	0.19	0.03	0.86	0.44
Dissolved Lead	g/m^3	< 0.00010	< 0.00010	< 0.00010	< 0.00010	0.00058
Dissolved Manganese	g/m^3	0.167	0.0087	0.0032	0.026	0.035
Dissolved Nickel	g/m^3	0.0007	< 0.0005	0.0007	0.0006	0.0029
Dissolved Zinc	g/m^3	0.0012	0.0013	0.0018	0.0013	0.0080

Sample Name:		Site 6 08-Apr-2024 12:20 pm	Site 7 08-Apr-2024 12:45 pm	Site 8 08-Apr-2024 2:10 pm	Site 9 08-Apr-2024 2:25 pm	Site 10 08-Apr-2024 2:40 pm
Lab Number:		3538815.6	3538815.7	3538815.8	3538815.9	3538815.10
Individual Tests						
Sum of Anions	meq/L	0.95	1.08	0.88	0.91	0.94
Sum of Cations	meq/L	1.12	1.13	0.91	0.92	0.99
Turbidity	NTU	1,110	3.7	0.89	1.48	1.19
pH	pH Units	6.2	6.8	7.4	7.4	6.9
Total Alkalinity	g/m^3 as $CaCO_3$	11.3	31	31	30	29
Bicarbonate	g/m^3 at 25°C	13.8	38	37	36	36
Total Hardness	g/m^3 as $CaCO_3$	28	33	29	31	33
Electrical Conductivity (EC)	mS/m	11.7	12.0	9.1	9.3	10.4
Total Suspended Solids	g/m^3	3,000	5	3	5	< 3
Total Dissolved Solids (TDS)	g/m^3	90	67	58	57	65
Dissolved Calcium	g/m^3	8.7	9.2	7.6	8.3	9.4
Total Iron	g/m^3	96	1.25	0.28	0.145	0.107
Dissolved Magnesium	g/m^3	1.56	2.5	2.6	2.5	2.3
Dissolved Mercury	g/m^3	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008
Total Mercury	g/m^3	< 0.0021	< 0.00008	< 0.00008	< 0.00008	< 0.00008
Dissolved Molybdenum	g/m^3	0.0008	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Dissolved Potassium	g/m^3	2.0	1.05	1.22	0.92	1.18
Dissolved Silver	g/m^3	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Dissolved Sodium	g/m^3	8.0	9.4	6.6	6.3	6.8
Chloride	g/m^3	12.9	12.9	7.8	8.5	9.5
Total Ammoniacal-N	g/m^3	0.035	0.091	< 0.010	< 0.010	0.016
Nitrite-N	g/m^3	< 0.002	0.004	< 0.002	0.002	< 0.002
Nitrate-N	g/m^3	< 0.002	0.29	0.031	0.22	0.23
Nitrate-N + Nitrite-N	g/m^3	< 0.002	0.29	0.032	0.22	0.23
Total Kjeldahl Nitrogen (TKN)	g/m^3	1.44	0.17	0.14	0.10	< 0.10
Dissolved Reactive Phosphorus	g/m^3	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
Total Phosphorus	g/m^3	1.20	0.007	0.026	0.008	0.007
Sulphate	g/m^3	17.6	3.1	2.3	2.8	3.2
Total Organic Carbon (TOC)	g/m^3	6.8	1.0	0.9	0.5	0.7
Leachate metals suite, dissolved, trace						
Dissolved Aluminium	g/m^3	0.24	0.004	0.004	0.009	0.005
Dissolved Arsenic	g/m^3	0.0199	0.0014	< 0.0010	< 0.0010	< 0.0010
Dissolved Boron	g/m^3	0.009	0.011	0.008	0.011	0.010
Dissolved Cadmium	g/m^3	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Dissolved Chromium	g/m^3	0.0118	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Dissolved Cobalt	g/m^3	0.0005	0.0003	< 0.0002	0.0002	< 0.0002
Dissolved Copper	g/m^3	0.0026	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Dissolved Iron	g/m^3	3.3	0.51	0.05	0.08	0.06
Dissolved Lead	g/m^3	0.00181	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Dissolved Manganese	g/m^3	0.110	0.065	0.0034	0.0067	0.0056
Dissolved Nickel	g/m^3	0.0021	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Dissolved Zinc	g/m^3	0.0038	< 0.0010	0.0176	0.0021	0.0040

Sample Type: Aqueous						
Sample Name:		Site 11 08-Apr-2024 3:00 pm	Site 12 09-Apr-2024 8:45 am	Site 13 09-Apr-2024 8:55 am	Site 14 09-Apr-2024 9:15 am	Site 14 A 09-Apr-2024 9:45 am
Lab Number:		3538815.11	3538815.12	3538815.13	3538815.14	3538815.15
Individual Tests						
Sum of Anions	meq/L	1.52	1.11	0.96	0.97	1.23
Sum of Cations	meq/L	1.66	1.12	0.96	0.99	1.61
Turbidity	NTU	17.7	5.9	2.2	290	1,080
pH	pH Units	7.0	6.7	6.7	6.4	6.1
Total Alkalinity	g/m³ as $CaCO_3$	25	32	25	22	31
Bicarbonate	g/m³ at 25°C	31	39	30	26	37
Total Hardness	g/m³ as $CaCO_3$	36	34	25	24	34
Electrical Conductivity (EC)	mS/m	17.9	11.9	10.4	10.8	14.0
Total Suspended Solids	g/m³	23	3	< 3	820	1,270
Total Dissolved Solids (TDS)	g/m³	118	78	66	70	98
Dissolved Calcium	g/m³	9.2	9.1	6.9	6.6	10.2
Total Iron	g/m³	3.5	1.24	0.63	37	118
Dissolved Magnesium	g/m³	3.1	2.6	1.95	1.84	2.1
Dissolved Mercury	g/m³	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.00008
Total Mercury	g/m³	< 0.00008	< 0.00008	< 0.00008	< 0.00008	< 0.0021
Dissolved Molybdenum	g/m³	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.0002
Dissolved Potassium	g/m³	3.8	1.05	0.86	0.91	2.7
Dissolved Silver	g/m³	< 0.00010	< 0.00010	< 0.00010	< 0.00010	< 0.00010
Dissolved Sodium	g/m³	18.3	9.1	9.3	11.0	12.1
Chloride	g/m³	30	13.3	12.9	15.6	19.5
Total Ammoniacal-N	g/m³	< 0.010	0.094	0.018	< 0.010	0.36
Nitrite-N	g/m³	0.003 #1	0.005	< 0.002	< 0.002	< 0.002
Nitrate-N	g/m³	< 0.002	0.30	0.21	0.34	< 0.002
Nitrate-N + Nitrite-N	g/m³	< 0.002 #1	0.31	0.21	0.34	< 0.002
Total Kjeldahl Nitrogen (TKN)	g/m³	0.97	0.19	< 0.10	0.77	3.6
Dissolved Reactive Phosphorus	g/m³	0.005	< 0.004	< 0.004	0.007	< 0.004
Total Phosphorus	g/m³	0.127	0.012	0.004	0.45	2.2
Sulphate	g/m³	7.5	3.0	3.8	3.5	3.4
Total Organic Carbon (TOC)	g/m³	10.3	2.3	0.8	6.1	12.2
Leachate metals suite, dissolved, trace						
Dissolved Aluminium	g/m³	0.013	0.005	0.015	0.024	0.169
Dissolved Arsenic	g/m³	< 0.0010	0.0017	0.0014	< 0.0010	0.0042
Dissolved Boron	g/m³	0.016	0.011	0.011	0.012	0.010
Dissolved Cadmium	g/m³	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Dissolved Chromium	g/m³	0.0013	< 0.0005	0.0006	< 0.0005	0.0055
Dissolved Cobalt	g/m³	0.0006	0.0002	0.0004	< 0.0002	0.0009
Dissolved Copper	g/m³	0.0009	< 0.0005	< 0.0005	0.0008	0.0021
Dissolved Iron	g/m³	1.16	0.62	0.48	0.06	7.7
Dissolved Lead	g/m³	0.00039	< 0.00010	< 0.00010	0.00014	0.00055
Dissolved Manganese	g/m³	0.083	0.065	0.044	0.0065	0.26
Dissolved Nickel	g/m³	0.0012	< 0.0005	< 0.0005	< 0.0005	0.0024
Dissolved Zinc	g/m³	0.0018	0.0016	0.0020	0.0015	0.0023

Sample Name:		Site 15 09-Apr-2024 10:30 am
Lab Number:		3538815.16
Individual Tests		
Sum of Anions	meq/L	1.28
Sum of Cations	meq/L	1.29
Turbidity	NTU	1,500
pH	pH Units	6.2
Total Alkalinity	g/m³ as $CaCO_3$	34
Bicarbonate	g/m³ at 25°C	41
Total Hardness	g/m³ as $CaCO_3$	40
Electrical Conductivity (EC)	mS/m	13.9
Total Suspended Solids	g/m³	3,400

Sample Type: Aqueous		
Sample Name:		Site 15 09-Apr-2024 10:30 am
Lab Number:		3538815.16
Individual Tests		
Total Dissolved Solids (TDS)	g/m³	100
Dissolved Calcium	g/m³	9.6
Total Iron	g/m³	106
Dissolved Magnesium	g/m³	3.8
Dissolved Mercury	g/m³	< 0.00008
Total Mercury	g/m³	< 0.0021
Dissolved Molybdenum	g/m³	< 0.0002
Dissolved Potassium	g/m³	1.65
Dissolved Silver	g/m³	< 0.00010
Dissolved Sodium	g/m³	10.4
Chloride	g/m³	11.6
Total Ammoniacal-N	g/m³	< 0.010
Nitrite-N	g/m³	< 0.002
Nitrate-N	g/m³	1.79
Nitrate-N + Nitrite-N	g/m³	1.79
Total Kjeldahl Nitrogen (TKN)	g/m³	4.4
Dissolved Reactive Phosphorus	g/m³	0.013
Total Phosphorus	g/m³	8.6
Sulphate	g/m³	7.2
Total Organic Carbon (TOC)	g/m³	10.2
Leachate metals suite, dissolved, trace		
Dissolved Aluminium	g/m³	0.029
Dissolved Arsenic	g/m³	< 0.0010
Dissolved Boron	g/m³	0.016
Dissolved Cadmium	g/m³	< 0.00005
Dissolved Chromium	g/m³	< 0.0005
Dissolved Cobalt	g/m³	< 0.0002
Dissolved Copper	g/m³	0.0010
Dissolved Iron	g/m³	0.05
Dissolved Lead	g/m³	0.00015
Dissolved Manganese	g/m³	0.0024
Dissolved Nickel	g/m³	< 0.0005
Dissolved Zinc	g/m³	0.0025

Analyst's Comments

#1 It has been noted that the result for Nitrite-N was greater than that for Nitrate-N + Nitrite-N, but within the analytical variation of these methods.

Samples 2, 9-10 Comment:
Please note that the level of Uncertainty of Measurement (UOM) for the TOC result is significantly greater than that usually reported for this analyte (up to 200-300% at the 95% confidence level).

Samples 7-8, 13 Comment:
Please note that the level of Uncertainty of Measurement (UOM) for the TOC result is significantly greater than that usually reported for this analyte (up to 100-200% at the 95% confidence level).

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Aqueous			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Leachate metals suite, dissolved, trace	0.45µm Filtration, ICP-MS, trace level. APHA 3125 B : Online Edition.	0.00005 - 0.02 g/m³	1-16
Filtration, Unpreserved	Sample filtration through 0.45 µm membrane filter. Analysed at Hill Laboratories - Chemistry; Unit 1, 17 Print Place, Middleton, Christchurch.	-	1-16
Total Digestion	Nitric acid digestion. APHA 3030 E (modified) : Online Edition.	-	1-16

Sample Type: Aqueous			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Total Digestion with HCl	Nitric/hydrochloric acid digestion. APHA 3030 E (modified) : Online Edition.	-	6, 15-16
Total acid digest for Silver analysis	Boiling nitric / hydrochloric acid digestion (5:1 ratio). APHA 3030 F (modified) : Online Edition.	-	1-16
Total anions for anion/cation balance check	Calculation: sum of anions as mEquiv/L calculated from Alkalinity (bicarbonate), Chloride and Sulphate. Nitrate-N, Nitrite-N. Fluoride, Dissolved Reactive Phosphorus and Cyanide also included in calculation if available. APHA 1030 E : Online Edition.	0.07 meq/L	1-16
Total cations for anion/cation balance check	Sum of cations as mEquiv/L calculated from Sodium, Potassium, Calcium and Magnesium. Iron, Manganese, Aluminium, Zinc, Copper, Lithium, Total Ammoniacal-N and pH (H^+) also included in calculation if available. APHA 1030 E : Online Edition.	0.05 meq/L	1-16
Turbidity	Analysis by Turbidity meter. Analysed at Hill Laboratories - Chemistry; Unit 1, 17 Print Place, Middleton, Christchurch. APHA 2130 B (modified) : Online Edition.	0.05 NTU	1-16
pH	pH meter. Analysed at Hill Laboratories - Chemistry; Unit 1, 17 Print Place, Middleton, Christchurch. APHA 4500-H^+ B (modified) : Online Edition. Note: It is not possible to achieve the APHA Maximum Storage Recommendation for this test (15 min) when samples are analysed upon receipt at the laboratory, and not in the field. Samples and Standards are analysed at an equivalent laboratory temperature (typically 18 to 22 °C). Temperature compensation is used.	0.1 pH Units	1-16
Total Alkalinity	Titration to pH 4.5 (M-alkalinity), autotitrator. Analysed at Hill Laboratories - Chemistry; Unit 1, 17 Print Place, Middleton, Christchurch. APHA 2320 B (modified for Alkalinity <20) : Online Edition.	1.0 g/m^3 as $CaCO_3$	1-16
Bicarbonate	Calculation: from alkalinity and pH, valid where TDS is not >500 mg/L and alkalinity is almost entirely due to hydroxides, carbonates or bicarbonates. APHA 4500-CO_2 D : Online Edition.	1.0 g/m^3 at 25°C	1-16
Total Hardness	Calculation from Calcium and Magnesium. APHA 2340 B : Online Edition.	1.0 g/m^3 as $CaCO_3$	1-16
Electrical Conductivity (EC)	Conductivity meter, 25°C. Analysed at Hill Laboratories - Chemistry; Unit 1, 17 Print Place, Middleton, Christchurch. APHA 2510 B : Online Edition.	0.1 mS/m	1-16
Total Suspended Solids	Filtration using Whatman 934 AH, Advantec GC-50 or equivalent filters (nominal pore size 1.2 - 1.5 µm), gravimetric determination. Analysed at Hill Laboratories - Chemistry; Unit 1, 17 Print Place, Middleton, Christchurch. APHA 2540 D (modified) : Online Edition.	3 g/m^3	1-16
Total Dissolved Solids (TDS)	Filtration through GF/C (1.2 µm), gravimetric. Analysed at Hill Laboratories - Chemistry; Unit 1, 17 Print Place, Middleton, Christchurch. APHA 2540 C (modified; drying temperature of 103 - 105°C used rather than 180 ± 2°C) : Online Edition.	10 g/m^3	1-16
Filtration for dissolved metals analysis	Sample filtration through 0.45µm membrane filter and preservation with nitric acid. APHA 3030 B : Online Edition.	-	6-7
Filtration for dissolved metals analysis - Misc	Sample filtration through 0.45µm membrane filter and preservation with nitric acid. APHA 3030 B : Online Edition.	-	6-7
Dissolved Calcium	Filtered sample, ICP-MS, trace level. APHA 3125 B : Online Edition.	0.05 g/m^3	1-16
Total Iron	Nitric acid digestion, ICP-MS, trace level. APHA 3125 B : Online Edition.	0.021 g/m^3	1-16
Dissolved Magnesium	Filtered sample, ICP-MS, trace level. APHA 3125 B : Online Edition.	0.02 g/m^3	1-16
Dissolved Mercury	0.45µm filtration, bromine oxidation followed by atomic fluorescence. US EPA Method 245.7, Feb 2005.	0.00008 g/m^3	1-16
Total Mercury	Acid digestion, ICP-MS, screen level. APHA 3125 B : Online Edition.	0.0021 g/m^3	6, 15-16
Total Mercury	Bromine Oxidation followed by Atomic Fluorescence. US EPA Method 245.7, Feb 2005.	0.00008 g/m^3	1-5, 7-14
Dissolved Molybdenum	Filtered sample, ICP-MS, trace level. APHA 3125 B : Online Edition.	0.0002 g/m^3	1-16
Dissolved Potassium	Filtered sample, ICP-MS, trace level. APHA 3125 B : Online Edition.	0.05 g/m^3	1-16
Dissolved Silver	Filtered sample, ICP-MS, trace level. APHA 3125 B : Online Edition.	0.00010 g/m^3	1-16
Dissolved Sodium	Filtered sample, ICP-MS, trace level. APHA 3125 B : Online Edition.	0.02 g/m^3	1-16

Sample Type: Aqueous			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Chloride	Filtered sample from Christchurch. Ion Chromatography. APHA 4110 B (modified) : Online Edition.	0.5 g/m³	1-16
Total Ammoniacal-N	Filtered Sample from Christchurch. Phenol/hypochlorite colourimetry. Flow injection analyser. (NH_4-N = NH_4^+-N + NH_3-N). APHA 4500-NH_3 H (modified) : Online Edition.	0.010 g/m³	1-16
Nitrite-N	Filtered sample from Christchurch. Automated Azo dye colorimetry, Flow injection analyser. APHA 4500-NO_3^- I (modified) : Online Edition.	0.002 g/m³	1-16
Nitrate-N	Calculation: (Nitrate-N + Nitrite-N) - Nitrite-N. In-House.	0.0010 g/m³	1-16
Nitrate-N + Nitrite-N	Filtered sample from Christchurch. Total oxidised nitrogen. Automated cadmium reduction, flow injection analyser. APHA 4500-NO_3^- I (modified) : Online Edition.	0.002 g/m³	1-16
Total Kjeldahl Nitrogen (TKN)	Total Kjeldahl digestion, phenol/hypochlorite colorimetry. Discrete Analyser. APHA 4500-N_{org} D (modified) 4500 NH_3 F (modified) : Online Edition.	0.10 g/m³	1-16
Dissolved Reactive Phosphorus	Filtered sample from Christchurch. Molybdenum blue colourimetry. Flow injection analyser. APHA 4500-P G (modified) : Online Edition.	0.004 g/m³	1-16
Total Phosphorus	Total phosphorus digestion, automated ascorbic acid colorimetry. Flow Injection Analyser. APHA 4500-P H (modified) : Online Edition.	0.002 g/m³	1-16
Sulphate	Filtered sample from Christchurch. Ion Chromatography. APHA 4110 B (modified) : Online Edition.	0.5 g/m³	1-16
Total Organic Carbon (TOC)	Supercritical persulphate oxidation, IR detection, for Total C. Acidification, purging for Total Inorganic C. TOC = TC -TIC.The uncertainty of the calculated result is a combination of the uncertainties of the two analytical determinands in the subtraction calculation. Where both determinands are similar in magnitude, the calculated result has a significantly higher uncertainty than would normally be achieved if one of the results was significantly less than the other. In such cases, the elevated uncertainty should be kept in mind when interpreting the data. APHA 5310 C (modified) : Online Edition.	0.5 g/m³	1-16

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed between 12-Apr-2024 and 29-Apr-2024. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

This certificate of analysis must not be reproduced, except in full, without the written consent of the signatory.

Ara Heron BSc (Tech)
Client Services Manager - Environmental

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APPENDIX D

Raw Macroinvertebrate Data

		Artificial drains						Rivers			
								Northern	Clark	Granite	Granite
	MCI	1	3	7	8	9	10	2	4	6	5
Ephemeroptera											
Deleatidium	8	-	-	-	-	1	-	-	-	1	-
Nesameletus	9	-	-	-	-	1	-	-	-	-	-
Plecoptera											
Austroperla	9	-	-	-	-	-	-	-	-	1	-
Stenoperla	10	-	-	-	-	-	-	-	-	1	-
Zelandobius	5	11	-	-	-	-	-	-	-	1	-
Trichoptera											
Costachorema	7	-	-	-	-	3	-	-	-	-	-
Helicopsyche	10	1	-	-	-	-	-	-	-	-	-
Hudsonema	6	17	-	-	6	2	-	-	-	-	-
Hydrobiosis	5	3	1	2	2	26	22	5	2	7	-
Oeconesidae	9	2	-	-	1	-	-	-	-	-	-
Oxyethira	2	3	86	87	50	-	132	41	-	3	3
Polyplectropus	8	-	-	4	-	-	-	-	-	-	-
Psilochorema	8	3	-	2	1	1	3	1	-	-	-
Pycnocentria	7	21	-	-	-	81	-	1	-	-	-
Pycnocentrodes	5	4	-	-	3	326	-	1	-	-	-
Triplectides	5	62	1	21	-	1	5	-	-	1	2
Odonata											
Xanthocnemis	5	-	-	2	-	-	-	-	1	-	-
Hemiptera											
Microvelia	5	-	44	-	1	-	-	-	1	-	3
Sigara	5	-	-	-	-	-	-	-	-	-	1
Megaloptera											
Archichauliodes	7	-	-	-	-	-	-	-	-	6	-
Coleoptera											
Elmidae	6	-	-	-	-	-	-	-	-	6	-
Enochrus	5	1	13	-	3	-	-	1	-	-	1
Hydrophilidae	5	-	1	-	-	-	-	-	-	-	-
Scirtidae	8	-	-	1	-	-	1	-	-	12	1
Staphylinidae	5	-	-	-	-	-	-	-	-	-	1
Diptera											
Austrosimulium	3	1	11	7	38	18	141	4	47	19	1
Chironomus	1	-	-	-	-	-	-	1	8	-	-
Corynoneura	2	2	161	-	7	-	-	5	-	-	2
Empididae	3	-	2	2	-	-	6	3	1	14	-
Eriopterini	9	-	-	-	-	1	-	-	-	3	-
Maoridiamesa	3	2	-	-	48	21	28	122	-	-	-
Molophilus	5	-	-	-	-	-	-	1	-	-	-
Muscidae	3	1	-	-	-	1	12	-	1	-	-
Orthocladiinae	2	267	69	83	800	185	1208	226	14	96	23
Paradixa	4	1	7	4	6	-	-	-	-	-	-
Paralimnophila	6	-	-	-	1	-	1	-	-	-	-
Polypedilum	3	2	-	5	-	3	36	1	1	3	-
Psychodidae	1	-	-	-	-	-	-	-	-	-	2
Stictocladius	9	-	-	-	-	-	-	-	-	6	-
Tanypodinae	5	-	-	4	-	-	-	-	-	1	-
Tanytarsini	3	3	-	6	-	-	-	-	-	2	-
Zelandotipula	6	-	1	-	2	-	-	-	-	-	-
Lepidoptera											
Hygraula	4	-	1	-	-	-	-	-	-	-	-
Collembola											
Collembola	6	1	14	1	3	-	-	-	2	2	58
Crustacea											
Copepoda	5	-	-	1	-	-	-	-	-	-	-
Ostracoda	3	5	-	2	10	-	2	-	11	-	-
Paracalliope	5	17	712	808	544	-	-	1	184	1	11
Paraleptamphopus	5	-	-	5	-	2	-	-	-	-	-
Paratya	5	-	-	-	-	-	-	-	-	-	5
Talitridae	5	-	-	-	-	-	-	-	-	1	-
Tanaidacea	4	-	-	-	-	-	-	-	-	-	-
Acarina											
Acarina	5	3	-	6	3	2	2	-	-	1	8
Mollusca											
Gyraulus	3	-	-	-	-	-	1	-	-	-	-
Physella (Physa)	3	-	3	-	-	-	-	-	1	-	-
Potamopyrgus	4	213	532	844	131	18	182	98	169	1	4
Sphaeriidae	3	1	-	-	-	-	-	-	1	-	-
Other											
Oligochaeta	1	7	-	84	61	122	203	124	163	57	1
Hirudinea	3	-	-	1	-	-	-	-	-	-	-
Platyhelminthes	3	-	-	-	3	-	-	-	4	-	-
Rhabdocoela	3	-	1	-	-	-	-	-	-	-	-
Nematoda	3	-	-	2	1	4	3	-	1	-	-
Nemertea	3	-	-	3	-	-	1	-	-	-	-
Nematomorpha	3	-	-	-	-	-	-	-	-	1	-
Coelenterata											
Hydra	3	-	-	1	2	-	2	-	-	-	-

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APPENDIX E

Fish Management Plan

Appendix D: Draft Avian Management Plan

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ecoLogical Solutions
Environmental Consultants

March 2026

Barrytown Mineral Sand Mine
Avian Management Plan

Submitted to:
Tāiko Critical Minerals Limited

water fauna flora land

Quality Assurance

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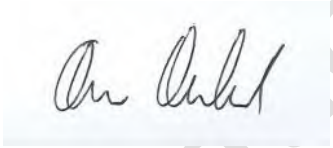

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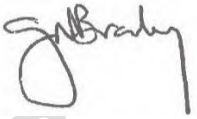

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1.0 Introduction

1.1 Background

Tāiko Critical Minerals Limited ('Tāiko') holds resource consents for mineral sand mining on farmland near Barrytown, known as 'the Central Block' (CB) and located approximately 36 km north of Greymouth within Mining Permit MP 60785. The CB adjoins several wetlands and other habitats which are used by 'Threatened' and 'At Risk' birds. The CB is also located approximately 3.5 km south of the only known breeding colony of tāiko (Westland petrel, *Procellaria westlandica*). As such, the conditions of consent for the Central Block include a requirement for an Avian Management Plan to minimise effects on avifauna.

Tāiko are proposing to extend the existing sand mine to an area of farmland located between Canoe Creek and Fagan Creek approximately 0.5 km south of the Central Block at its northernmost point known as 'the Southern Block' (SB). A Wet Concentrator Plant (WCP), ancillary infrastructure and access road has been consented at this location. The location of the proposed mining area and the Southern Block is shown in **Error! Reference source not found..**

The mining area would be set back from State Highway 6. Setback distances of at least of 20 m from Granite Creek and Fagan Creek and the property boundaries will be maintained. There will be a 50 m setback from Mean High Water Springs.

Vegetation throughout the area to be mined comprises mostly grazed and rough exotic pasture growing on land which has previously been 'humped and hollowed' to improve drainage for farming, as well as small fragments of indigenous coastal shrubland and flaxland. The artificially constructed and small natural wetlands and vegetation fragments could provide habitat for birds. The Southern Block does not adjoin wetland and other habitats regularly used by birds, nonetheless 'Threatened' and 'At Risk' birds may use the small areas of habitat present and immediate surrounds within the mining area. This management plan has been prepared to minimise potential effects on those birds occupying the SB and provides for detection and monitoring of breeding birds within the mining area, deterrents and physical barriers to deter use by at risk species such as tūturiwhatu (dotterels *Charadrius bicinctus*) and kororā (little blue penguin, *Eudyptula minor*), restrictions on lighting and traffic movements to avoid effects on tāiko, management of any grounded tāiko and monitoring of birds using the site to inform operational decisions and species management.

Mining would take place using a floating dredge in progressive strips along the site moving from west to east and north to south. The dredge would float in a 1 ha dredge pond with topsoil and overburden removed in advance and tailings returned to the rear of the pond to be used as part of the progressive rehabilitation. There would be no more than 16 ha disturbed area at any one time (excluding the 4 ha occupied by the WCP and ancillary infrastructure). The mining approach is shown in **Error! Reference source not found.**.

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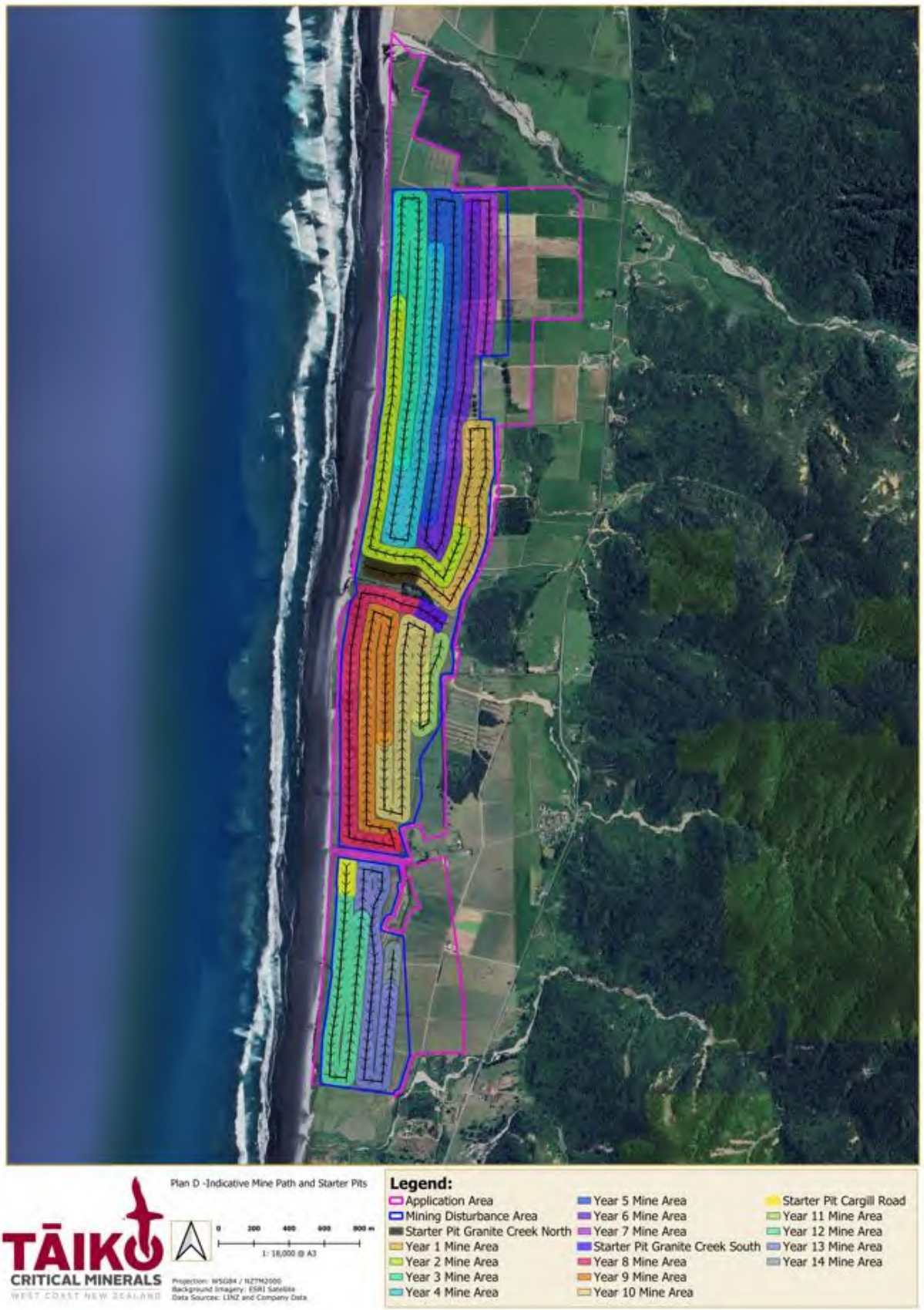

Figure 1: Location and mine path of the proposed mineral sand mine at Barrytown.

The data collected as part of implementing this plan will be compiled and presented in an annual report, to be used to inform adaptive management of risks to birds within and surrounding the site. These reports will be provided to Greymouth District Council, Te Rūnanga o Ngāti Waewae and the Department of Conservation Māwhera / Greymouth (lizards) and Kawatiri / Buller (birds) offices and the West Coast Penguin Trust.

1.2 Relevant Consent Conditions

Tāiko has been granted resource consents (NUMBER) under the Fast-track Approvals Act 2024 to construct and operate the mine subject to conditions. The relevant conditions are detailed below as well as information on where the matters identified are addressed in this Avian Management Plan.

13.0 Avian Management		
13.1	a. Prior to and during each breeding season, the Consent Holder shall undertake regular surveys of all areas scheduled for mining to identify any bird breeding or nesting activity. Where surveys indicate that nesting is likely to occur, the Consent Holder shall implement appropriate deterrence measures, including walkovers, visual cues, audio bird scarers, and strategic placement of machinery, to discourage birds from establishing nests. Advice Note: • *Conditions relating to the Avian Management Plan are Conditions 13.7 – 13.9.*	Surveys: Sections 3.0, 4.0, 5.0, 6.0 Deterrents: Section 3.2
13.2	Staff, contractors and visitors associated with the mining activity must not be permitted to bring dogs to the site at any time, except for conservation purposes.	
13.3	a. The Consent Holder must deploy wildlife cameras at suitable locations to detect target wildlife (particularly kororā and tāiko) including low spots and creek mouths along the coastal edge of the mine disturbance area and other locations likely to detect activity as determined by a suitably qualified ecologist and set to record for at least 10 nights every month. b. The cameras must be equipped with passive infrared receptors (or other mechanisms to enable night vision capability and motion detection) and be installed by a suitably qualified ecologist. c. Imagery must be reviewed for wildlife interactions at least weekly by a suitably qualified ecologist, retained for a minimum of 6 months, and be made available to the Consent Authority or the Department of Conservation on request.	Sections 4.2, 6.3
13.4	a. Any interactions with wildlife recorded as a result of the monitoring requirements in the Avian Management Plan including the wildlife cameras required by Condition 13.3, must be reported to the Consent Authority and the Department of Conservation on a weekly basis from 1 November to 31 January each year, and on a monthly basis from 1 February to 31 October.	Section 7.1

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	b. Footage must be made available to the Department of Conservation and the consenting authority as set out in Condition 13.3.	
13.5	a. The Consent Holder must engage a suitably qualified expert to carry out annual penguin surveys of Pakiroa beach and the mine area within 500m of the mining disturbance area to detect the presence of Kororā. If available, the Consent Holder must use a certified conservation dog . If a certified conservation dog is unavailable or unable to complete the survey, human surveys and increased camera monitoring will be undertaken in accordance with the advice of a suitably qualified ecologist. b. The first survey must be conducted within the first 12 months of the commencement date of the resource consent, and at least two annual surveys must be completed before mining commences. c. If penguins or burrows are detected the GPS location must be recorded and the Consent Holder must undertake the following management actions: i. If penguins are detected using the mining area to access other habitats, any existing access ways must be maintained and/or works affecting that accessway must be completed in the period April – June (outside the breeding and moult period). ii. Any potential penguin burrows identified must be investigated, including use of a burrowscope, to determine whether Kororā are using them. iii. Where any penguin burrows are compromised by mining (i.e. there are direct effects), replacement artificial burrows or nest boxes must be installed at a rate of 2:1. Any additional nest boxes provided must be located within the vegetated coastal foreshore habitat associated with any identified accessways. iv. If penguins are found within the application site, a specific Penguin Management Plan must be developed by a suitably qualified and experienced ecologist on behalf of the applicant in consultation with the West Coast Penguin Trust. The West Coast Penguin Trust must be reimbursed for reasonable time and expenses associated with consultation on the Penguin Management Plan. v. Any deceased penguins found on or near the mine site must be provided to the Department of Conservation for necropsy.	Section 4.2 Section 6.4 Section 4.2
13.6	a. The Consent Holder must erect and maintain a penguin fence for each mining stage identified in the current Annual Work Plan to deter Kororā from entering hazardous areas. b. The penguin fence must be comprised of geosynthetic mesh to a height of at least 900mm above ground and buried at least 300mm below the ground and with posts no greater than 4m apart.	Section 4.4

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	c. The fence installation must be certified by a suitably qualified ecologist as preventing the ingress of Korora to the active mine disturbance area. d. The certification must be supplied to the Consent Authority prior to mining commencing. e. Upon completion of all mining activities and associated site rehabilitation, all penguin fencing must be removed. Advice Note: • *The requirement to erect a penguin fence only applies if Kororā are detected within 500m proximity of the active mining disturbance area during pre-mining surveys. If no Kororā are detected within 500m of the active mine disturbance area a penguin fence is deemed unnecessary.*	
13.7	The Consent Holder must conduct activities on site in general accordance with an Avian Management Plan (AMP) prepared by a suitably qualified ecologist or ornithologist. The objectives of the AMP are: a. To ensure adverse effects on the threatened and at risk birds present in the vicinity of the site and any other threatened and at risk species detected by subsequent monitoring are avoided. b. To ensure safe ongoing use of the site and its environs by the birds which currently occur in the area. Advice Note: • *All Management Plans are required to adhere to the requirements of Condition 6.0.* • *Threatened or at-risk bird species refers to the Conservation Status according to the Department of Conservation's Threatened Classification System.*	Section 1.4
13.8	The AMP must detail: a. A description of the site b. A description of the threatened and at risk indigenous birds likely to be present in these habitats and which species require specific mitigation measures c. A description of the measures that are required to be implemented to avoid effects on threatened and at risk indigenous birds . d. A procedure for managing and responding to Westland Petrel or other wildlife being found on the mine site; e. Details of the penguin fence described in condition 13.6. f. Lighting management at the site to comply with the guidelines	 Section 2.0 Section 2.0 Sections 3.0, 4.0, 5.0 Sections 3.0, 4.0, 5.0 Section 4.0

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	g. A description of the monitoring requirements to assess the effectiveness of the AMP.	Sections 4.0, 5.0 Section 6.0
13.9	The AMP must be reviewed annually by the Consent Holder. Any proposed amendments to the AMP must be submitted to Council for certification and must: a. Achieve the AMP's objectives including avoiding effects on any threatened or at-risk indigenous bird species; b. Comply with the conditions of this resource consent; c. Have been reviewed by an appropriately qualified and experienced ecologist or ornithologist; d. Have been provided in advance to Te Rūnanga o Ngāti Waewae and the Buller/Kawatiri (for Tāiko) and the Greymouth (for other wildlife) office of the Department of Conservation for comment (and feedback received collated and submitted with the amendments to be provided to Council); and e. Follow the certification process set out in Condition 6.1. Advice Note: • *Any disturbance or relocation of avifauna may require a permit from the Department of Conservation under the Wildlife Act (1953).*	Section 7.0
13.10	a. The Consent Holder must engage a suitably qualified expert(s) to undertake all monitoring of avian species from the commencement of consent until at least one year following the cessation of mining activities on this site. b. The monitoring must be carried out in accordance with the monitoring requirements in the AMP.	Section 6.0
13.11	An annual bird management report must be provided to the Consent Authority, Te Rūnanga o Ngāti Waewae, the Buller/Kawatiri and Greymouth offices of the Department of Conservation in Westport, the West Coast Penguin Trust, Paparoa Wildlife Trust, the Community Liaison Group and Waka Kotahi NZ Transport Agency Environment and Sustainability Team (via: environment@nzta.govt.nz), no later than 30 June each year. The report must include the following matters: a. The timing and duration of any mining within 100m of the proposed SNA Site PUN-049; b. Results of seasonal bird surveys at the site; c. Timing of nest detection surveys and observations relating to nesting or other behaviours observed within the area to be mined;	Section 7.0

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	d. Efforts to deter any attempts at nesting within the area to be mined and the outcome of those efforts; e. Species attempting to nest within the area to be mined (including threatened and at risk species); f. Date of first nesting attempts (if any) for threatened and at risk species within the area to be mined; g. Number and location of nesting attempts by threatened and at risk species within the area to be mined; h. Outcome of individual nesting attempts by threatened and at risk species within the area to be mined; i. Results of annual Kororā surveys on Pakiroa Beach, the implications for mine operations and any management actions undertaken; j. Number, dates and location of any mining operation vehicle strikes or near misses involving the Westland Petrel or Kororā; k. Autopsy outcomes for any dead Westland Petrel or Kororā collected; l. The findings of any lighting audits undertaken during the year and steps taken to resolve any issues identified; m. A summary of any revisions made to the AMP and the reasons for the changes; n. The date and duration of any operational shut-downs; and	

1.3 Purpose

The purpose of this Avian Management Plan is to ensure:

a) Adverse effects on the 'Threatened' and 'At Risk' birds present in the vicinity of the site and any other 'Threatened' and 'At Risk' species detected by subsequent monitoring are avoided.

b) Safe ongoing use of the site and its environs by the birds which currently occur in the area as mining proceeds.

1.4 Scope

This AMP includes:

- Identification of species which may be adversely affected by mining activities;
- A copy of the relevant consent conditions intended to reduce effects of the mining activity on birds;
- Details of the monitoring required to identify 'At Risk' species present and inform management;
- Where available, best practice methods to be used to protect such species

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- Specific management actions for those species considered likely to be present or that may breed within mining areas; and
- Monitoring and reporting requirements.

1.5 Updates

This plan will be updated annually by a suitably qualified and experienced ecologist/ ornithologist taking into account the mining proposed for the coming year, as well as the results of the previous year's avian monitoring and the outcome of any management actions undertaken to protect birds in the preceding year.

2.0 Ecological Context

2.1 Avifauna That May Use the Site

The birds identified via desktop analysis and avian surveys as using the site or surrounds are generally common exotic and native species typical of urban and rural environments. This species mix likely reflects the highly modified state of the habitats within the SB. Bird species of conservation interest that have been detected within or near the site are primarily associated with coastal, wetland or forest habitats located off site, though some may temporarily use the habitats within the SB. The species of conservation interest recorded during surveys either in the SB or in the CB are shown in Table 1. None of these species are likely to rely solely on the pasture habitat present in the mining area, but may visit such areas for feeding (especially in disturbed soil), loafing, or in the case of kororā / little blue penguin, may cross the site to access habitats inland. While tāiko (Westland petrel) have not been detected on site, the only known breeding colony is located approximately 4.5 km to the north and tāiko are likely to be passing the site when leaving or returning to the colony.

For the SB there have been three bird surveys undertaken to date (July, October 2024 and February 2025) recording a total of 37 species. This information was combined with database records in eBird, and monitoring undertaken at the CB, to identify the species likely to be present at the site, which are shown in Table 1.

Table 1: Threatened and At-Risk birds which may use the Southern Block.

Common name	Scientific name	Conservation status (Robertson et al. 2021)
Banded dotterel	*Charadrius b. bicinctus*	Threatened – Nationally Vulnerable
Black billed gull	*Chroicocephalus bulleri*	At Risk – Declining
Black shag	*Phalacrocorax carbo novaehollandiae*	At Risk – Relict
Caspian tern	*Hydroprogne caspia*	Threatened – Nationally Vulnerable
Great spotted kiwi	*Apteryx maxima*	Threatened – Nationally Vulnerable
Little shag	*Microcarbo melanoleucos brevirostris*	At Risk – Relict
Little blue penguin	*Eudyptula minor*	At Risk - Declining
Long-tailed cuckoo	*Eudynamys taitensis*	Threatened – Nationally Vulnerable
Red-billed gull	*Chroicocephalus novaehollandiae*	At Risk – Declining
Royal spoonbill	*Platalea regia*	At Risk – Naturally Uncommon
South Island fernbird	*Poodytes p. punctatus*	At Risk – Declining

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South Island pied oystercatcher	*Haematopus finschi*	At Risk – Declining
New Zealand falcon ('south')	*Falco novaeseelandiae*	Threatened (Nationally Endangered)
Variable oystercatcher	*Haematopus unicolor*	At Risk – Recovering
Pacific black duck	*Anas superciliosa*	Threatened - Nationally Vulnerable
White-fronted tern	*Sterna s. striata*	At Risk – Declining

2.2 Important Avian Habitat

The bird species confirmed present within and surrounding the site are mainly species which would use the habitats therein for foraging, roosting or occasional visitation (e.g., oystercatchers, dotterels, gulls) with primary foraging and nesting habitat located elsewhere. Only common native and exotic birds are likely to be nesting within the mining area, although kororā / little blue penguin may cross the site to reach burrows inland. Tāiko, and perhaps other seabirds, could be affected by lighting at night, although mining is only proposed during daylight hours, which substantially reduces the risk to seabirds. The important habitats for birds are therefore areas of indigenous shrubland and flaxland or riparian vegetation surrounding creeks, which species such as kororā may use as cover when navigating through the landscape. A small number of species may use the pasture habitat for foraging, roosting and breeding.

The site is privately owned and predominantly actively farmed. The site is adjacent to an area identified by Boffa Miskell (2006) on behalf of the Grey District Council as a potential Significant Natural Area ('SNA', Site PUN-049) and south of another SNA (Site PUN W034). There are other potential SNAs identified on the wider Barrytown Flats as well as the Canoe Creek Scenic Reserve to the north of the project area. These areas are shown in Figure 2.

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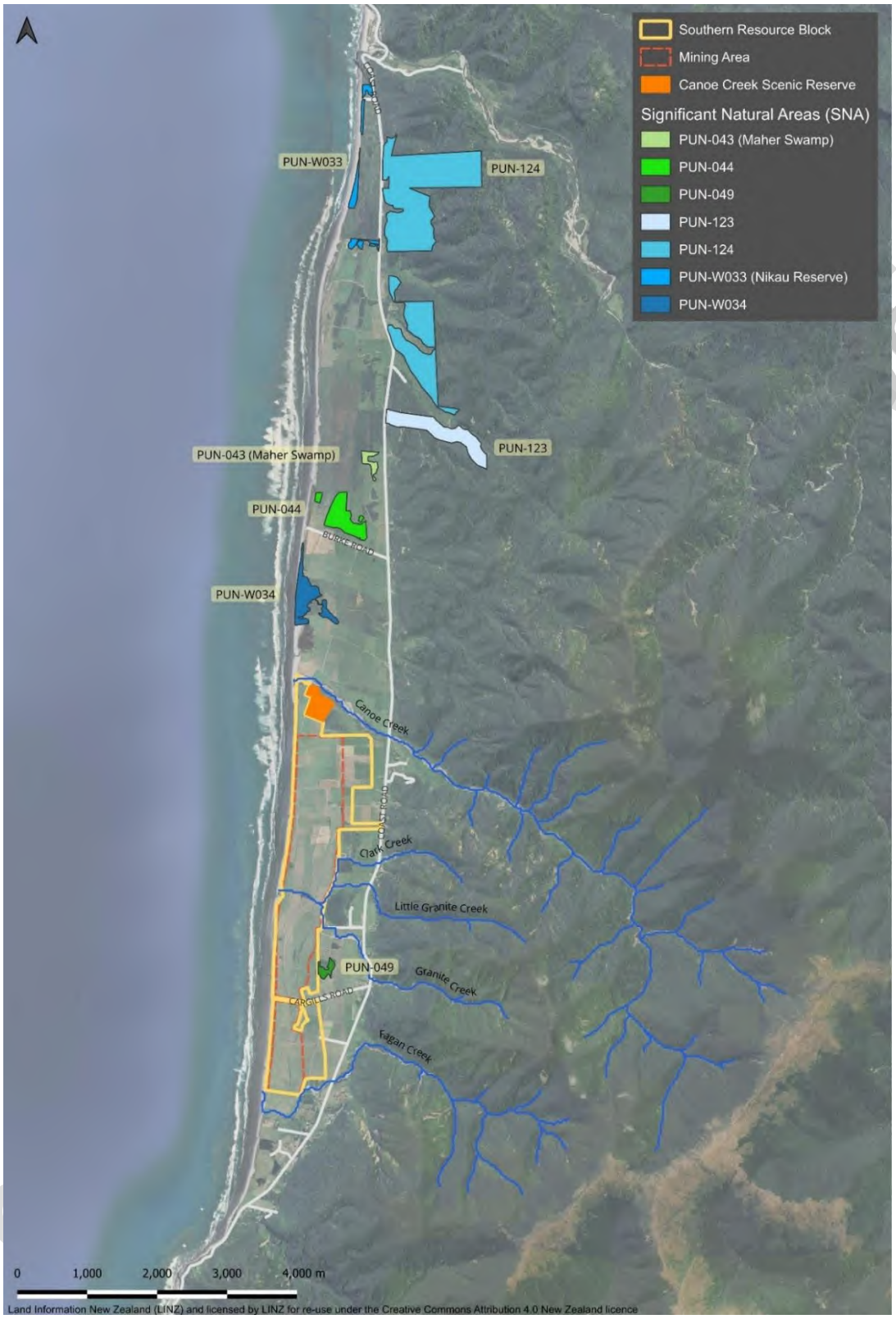

Figure 2: Significant Natural Areas near the site identified in the proposed Te Tai o Poutini Plan

2.3 General Management Approach

The species of 'Threatened' or 'At Risk' birds which have either been confirmed using the site and surrounds or may use the site occasionally are shown in Table 1. Of these birds, different species are expected to be affected by different activities. The majority are not likely to use habitats within the site, rather using the adjoining beach or nearby lagoon or SNA habitats and would therefore be predominantly affected by noise, human activities and vehicle movements near their habitats, particularly during the breeding season. The general setbacks (20 m from the creeks crossing the site, property boundaries and 50 m from Mean High Water Springs) are expected to assist in that regard. Given the lack of forested habitat within the site, including limited foraging habitat and no potential daytime roosts, it is unlikely that rōroa (great spotted kiwi, *Apteryx maxima*) or other forest birds use the habitats within the SB and therefore there are no specific management activities proposed for rōroa or forest birds.

In order to avoid adverse effects on 'Threatened' and 'At Risk' species, as well as manage effects on common natives and exotics, the following general avian management actions are proposed:

- Seasonal surveys and frequent trail camera monitoring of birds to inform mining operations so that risks to birds of conservation concern can be identified in advance and mitigated as required.
- Commencement of mining in the south west of Section 1 (Granite Creek North), avoiding mining near important avian habitats such as the indigenous coastal shrubland and flaxland during the breeding season, and allowing for rehabilitated wetland habitat to be created in advance of clearance of these habitats.
- Maintenance of a 50 m mining setback buffer from the mining disturbance area to Mean High Water Springs and a 20 m buffer from the consent boundary, private property boundaries, Significant Natural Areas, Granite Creek and Fagan Creek. This boundary is to be permanently marked so as to avoid crossing it inadvertently.
- Progressive rehabilitation to replace and create additional wetland vegetation, revegetate riparian margins and buffer forest/shrubland habitat (required by Condition 9.1).
- Management of lighting in accordance with Commonwealth of Australia guidelines (May 2023 or subsequent amendments).

Specific management actions are outlined for 'Threatened' or 'At Risk' species that are considered likely to be present within the site during mining operations, or may use the site for breeding or access to breeding sites. Management for these species is described in Sections 3.0 – 5.0.

2.4 Birds to be Managed

2.4.1 Introduction

Of the birds identified in Table 1, site surveys of the SB indicate a small subset is considered likely to visit the mining area frequently and/or may nest within, or in close proximity to, the mining disturbance area. For these species, specific management activities are proposed. The six species for which specific management actions will be provided are shown in

Table 2. Kororā have not been observed within the site during surveys, however evidence of birds has been seen near the mining disturbance area and penguins are most likely to be

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observed at night when transiting the site to forage and approach burrows, and have therefore been included here. While tāiko have not been observed within site boundaries either, due to the proximity of the site to their only documented breeding colony, they will also be managed if required.

Table 2: Threatened and at-risk birds to be managed at the Barrytown Site.

Common name	Scientific name	Threat classification
Tūturiwhatu / banded dotterel	*Charadrius b. bicinctus*	Threatened – Nationally Vulnerable
Tarāpunga / red-billed gull	*Chroicocephalus novaehollandiae*	At Risk – Declining
Kororā / little blue penguin	*Eudyptula minor*	At Risk – Declining
Tōrea / South Island pied oystercatcher	*Haematopus finschi*	At Risk – Declining
Tōrea tai / variable Oystercatcher	*Haematopus unicolor*	At Risk - Recovering
Tāiko/Westland petrel	*Procellaria westlandica*	At Risk – Naturally Uncommon

Specific management actions are set out in Section 3.0 for tūturiwhatu / red-billed gull, tōrea tai / variable oystercatcher and tōrea / South Island pied oystercatcher if they are detected at the site during ongoing monitoring. Sections 4.0 and 5.0 set out the management proposed for kororā and tāiko respectively.

2.4.2 Tūturiwhatu / New Zealand banded dotterel

Tūturiwhatu (banded dotterel) are the most common small plover of New Zealand seashores, estuaries and riverbeds. They are readily identified by their brown upperparts and complete or partial chestnut breast band, which is quite obvious when in breeding plumage. Their movements are characteristic of dotterels in general, with their body held erect and a run-stop-peck-run foraging behaviour as they feed on shoreline invertebrates.

Banded dotterels will breed on vegetated riverbeds, herb fields, beaches and sometimes farmland, and they are sometimes attracted to open earth worked areas for breeding. On that basis, recently excavated areas for mining may attract dotterels.

Banded dotterel pairs are solitary and territorial, but will sometimes congregate in higher densities in quality habitats. Birds will arrive and initiate territories in winter (July) with eggs laid August-November. Nesting areas are usually shallow scrapes in gravel, sand or soil and are sometimes lined with tiny stones or shells. Clutch size is usually three eggs, which are grey to pale-green or olive with small dark spots. Incubation is performed by both adults for c. 4 weeks and chicks fledge after another 5–6 weeks.

Management of tūturiwhatu is discussed in more detail in Section 3.0 below.

2.4.3 Tarāpunga/ red-billed gull

Tarāpunga (red-billed gull) is the most common gull in coastal locations in New Zealand, but it is only rarely found inland. It is often seen in coastal towns, wharves, and areas where they can scavenge human rubbish and offal. On mainland New Zealand, breeding occurs in dense colonies, mainly restricted to the eastern coasts of the North and South Islands on

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stacks, cliffs, river mouths and sandy and rocky shores. Red-billed gulls tend to nest at the same locality from one season to the next, and offspring mostly return to their natal colony to breed. They have an extremely long egg-laying period that can extend from mid-September to January. They are monogamous, sharing parental duties equally. Nests consist of grass, seaweed or twigs and they produce between one and three eggs. Eggs are mainly brownish or greenish-grey with dark brown spots or blotches. Incubation lasts 21-25 days and chicks begin to fly at 35 days and continue to be fed for another c. 30 days. Management of red-billed gulls is discussed in Section 3.0 below.

2.4.4 Tōrea / oystercatchers

Tōrea (South Island pied oystercatchers) and tōrea tai (variable oystercatchers) have both been recorded using the coastal area adjoining the site. Tōrea have conspicuous black and white plumage whilst mature tōrea tai's plumage is black. Both species have a long red bill. Tōrea are found on most estuaries and many coastal locations, with numbers greatest during the period December to July. Fewer tōrea remain in coastal areas during the rest of the year, with most of the population moving to inland South Island riverbeds and farmland to breed. Tōrea tai are site attached in coastal areas throughout the year.

Tōrea and tōrea tai breed in spring and summer. Nests are unlined scrapes on a mound or raised area of sand, gravel or soil with good visibility all around. Both members of the pair incubate the 1-3 eggs and care for the young. Incubation takes 24-28 days, and the young fledge 28-42 days after hatching. Both species have a conservation status of At Risk (Declining).

There is a possibility that oystercatchers of either species may choose to nest within the mining area on newly excavated soils or stockpiles. Management of oystercatchers will focus on monitoring and then deterrence from nesting in areas to be mined within the breeding season.

Management of tōrea and tōrea tai is discussed in more detail in Section 3.0 below.

2.4.5 Kororā / little blue penguin

Kororā (little blue penguin) occur throughout New Zealand and are thought to have a large, but declining population.

Kororā typically breed in small colonies numbering from a few up to 20-30 pairs, sometimes semi-colonially, or sometimes as isolated pairs. Birds can be found nesting some distance inland, and in a variety of habitats (Marchant and Higgins 1990). Birds nest in a burrow, sometimes digging their own, sometimes adopting burrows of other birds, and sometimes making use of small crevices or gaps in the substrate. They also make use of small spaces under buildings, in dense vegetation and in nest boxes where these are provided. Penguin burrows are used throughout the year and the same site is often used for nesting over many years.

During moult, the bird will stay in or close to the burrow and is not able to enter the water to feed because they are not waterproof. Activities after moulting are uncertain, some birds continue to use burrows, but many disappear for weeks or months until the next breeding season.

Only low numbers of kororā have been detected at Barrytown, but suitable nesting habitat is common. Management of kororā is discussed in more detail in Section 4.0 below.

2.4.6 Tāiko / Westland petrel

Tāiko (Westland petrel) are the largest species of burrowing petrel still breeding on the New Zealand mainland. Tāiko breed in coastal broadleaf forest in the coastal ranges near Punakaiki (north of the Southern Block), before migrating to western South America in the

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non-breeding season during the austral summer. During the breeding season, they are found in a single large colony. They form long-term monogamous pair bonds, sharing both incubation and chick care. Tāiko lay a single, large egg in May or June which is nested within a 1-2 m deep burrow. Chicks usually hatch in late July and fledge between early November and mid-January. They may live as long as 37 years (but typically approximately 10 years), initiating breeding from 5 years old. Their diet consists mainly of fish, including a strong component of fisheries waste. Although their population size is considered relatively stable, they are at significant risk of mortality from fisheries activities, having been killed by both tuna longline and trawl fisheries, due to their predisposition to follow and forage around fisheries vessels. Management of tāiko is discussed in more detail in Section 5.0 below.

3.0 General Species Management

3.1 Seasonal Surveys

Seasonal surveys, initiated in July 2024, will be continued for the duration of the project and involve five-minute bird counts (5MBCs) and acoustic monitoring at points designed to provide adequate coverage of the site and its varying habitats as shown in Figure 3.

3.2 Discouraging Nesting

To reduce the likelihood of birds establishing nests in areas about to be mined, birds prospecting for nest sites will be discouraged from settling (beginning 10 July each year) in the area to be mined during the upcoming breeding season (as defined in the Annual Work Plan) using one or more of the following methods:

(i) Use of regular / frequent livestock grazing over the winter – spring period in order to prevent birds settling.

(ii) Completing a disruptive site walkover regularly between the 1st August and the onset of breeding.

(iii) Installing streamers/tapes that flutter in breeding habitats to deter birds from nesting. Note that this method is effective over the short term (up to 3 weeks) but decreases over time as birds become accustomed to it.

(iv) Parking earthworks machinery in future stage locations, starting the engine from time to time, but not moving equipment.

(v) Use of acoustic deterrents including bird scarers and the use of playback alarm or predator calls.

Birds habituate to these devices and approaches relatively quickly and they may need to be regularly alternated and / or combined with another of the above methods so as to maintain their effectiveness.

3.3 Pre-breeding detection surveys

The breeding season for most seasonally breeding birds in New Zealand starts between June and September with most breeding being undertaken between September and January. Some birds will attempt second clutches and breeding can extend through until February or March. Site works and other activity is likely to deter most birds from establishing nests near that activity, forcing them to nest elsewhere in less disturbed habitat. However, several species are known to nest in disturbed areas e.g., dotterel, oystercatchers.

In advance of each breeding season, a pre-season detection survey will follow a general detection route across both the area to be mined during the upcoming breeding season (as

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prescribed in the Annual Work Plan) and adjoining areas (within 50 m) which will be used to detect birds using the site.

Fortnightly detection surveys will be undertaken between 1 August and the onset of breeding (or the 14th September, whichever is earliest) and weekly detection surveys between the commencement of breeding and 31 January.

During these detection surveys, observers will walk over the predetermined route which will cover areas intended to be mined during the forthcoming breeding season plus adjoining areas within 50 m, in order to detect breeding behaviour or nesting that indicates species management should begin (see below).

Fortnightly detection surveys were chosen so that:

(i) There is a high probability that birds will be detected soon after their arrival at the site, ensuring early intervention and management.

(ii) The behaviour of birds can be observed regularly, and if necessary, they can be discouraged from nesting where the presence of nests or dependent young would either put them at risk or obstruct mining activity.

(iii) The probability of detecting nest attempts is increased.

(iv) Nests which are abandoned or vacated (and isolated from other nests) will be detected quickly so as to minimise disruption to mining.

(v) The fate of nesting attempts and nestlings can be monitored so as to determine whether this management plan is effective at protecting the target species.

During detection surveys all birds seen or heard will be recorded, and their location will be marked using a GPS. The number of birds observed and their behaviour will be recorded, and if behaviours are consistent with breeding (e.g., territorial defense (e.g. calling, displaying), nest building, feeding young), then individuals will be observed from a distance for a period of at least five minutes to see if a nest can be located. All nest attempts, including locations, date and time of nest observations, stage of breeding and the outcome (where known) will be recorded.

3.4 Management of Nest Sites

Where achievable, any nests of ‘Threatened’ or ‘At Risk’ species located which are detected early enough and can be practicably left in situ and managed will be subject to management and protection until such time as the chicks have successfully fledged.

If a nest of any threatened or at-risk species (including those listed in Table 1) is discovered within the area to be mined, but the nest is far enough in advance of mining that the nest could realistically fledge chicks, the following plan would be implemented:

(i) Establish a “no go” zone approximately 20 m around the nest using tape and markers so as to minimise the risk of nest abandonment.

(ii) Minimise time spent near the nest to avoid attracting ground predators such as rats and stoats and aerial predators such as gulls.

(iii) Monitor the area at least twice weekly from outside the “no go” area in order to assist in estimating the time of fledging. Maintain the “no go” zone until the chicks have fledged. This monitoring is described in more detail in Section 6.0 below.

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Figure 3: Location of seasonal bird monitoring sites at Barrytown.

4.0 Kororā, Little Blue Penguin

4.1 Potential effects on kororā

Kororā (little blue penguin) are found in small colonies across the West Coast, with many colonies comprising fewer than five breeding pairs, and the largest supporting between 20 and 40 pairs. Nesting sites are varied and can include coastal dunes, forested areas, rocky shorelines, and farmland – sometimes located up to 200 m inland. Kororā may be present on West Coast beaches throughout much of the year, either during the breeding season or while moulting.

Whilst there is limited data on kororā activity specifically within this part of the Barrytown Flats, at least one known pair has been observed nesting under a house situated between the proposed mining disturbance area and State Highway 6. Further south, the beach scarp rises in height, which may act as a physical barrier to penguin access. However, nearby creek mouths may serve as alternative access routes inland.

Kororā are particularly sensitive to disturbance, habitat modification, and disorientation caused by artificial lighting and human activity. These risks are heightened in industrial environments, such as mining areas. As such, a precautionary approach to kororā management has been adopted. The following section outlines mitigation measures aimed at minimising adverse effects on this species within the project area.

4.2 Kororā Detection and Monitoring

Due to the limited information currently available on the presence of kororā at this site, pre-mining monitoring will be conducted for a minimum of two years prior to the commencement of mining activity.

If penguins are found within the application site, a specific Penguin Management Plan must be developed by a suitably qualified and experienced ecologist on behalf of the application and in consultation with the West Coast Penguin Trust who will be reimbursed for any reasonable time and associated expenses for consultation on the plan.

Pre-mining and ongoing monitoring will include:

- Engagement of a certified conservation dog trained in detecting kororā presence and nesting sites. There are a limited number of trained penguin detection dogs and their time can be at a premium, so efforts will be made to secure these services early and monitoring must include other methods in case a dog is unavailable for any reason.
- Annual conservation dog surveys will be carried out during the period of 1 August – 30 November, aligning with the breeding season, with the first survey being conducted within the first 12 months of the commencement date of the resource consent. At least two annual surveys must be completed before mining commences.
- Fortnightly beach walk surveys will be conducted during the period 1 August – 30 November by a trained observer to look for evidence (footprints, guano, sightings) to assist in determining where kororā are crossing the beach.
- Use of wildlife cameras at low spots and creek mouths along the coastal edge of the mine disturbance area to inform where penguins are coming ashore. These cameras must be equipped with infrared motion sensors and be installed by a suitably qualified ecologist and set to record at least 10 nights each month. Footage will be reviewed for wildlife interactions at least weekly by a suitably qualified ecologist, retained for a minimum of six months and made available to the Consent Authority

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or Department of Conservation on request.

- Identification of active burrows and breeding pairs to inform the development of site-specific management plans for each confirmed nesting pair. If penguins are detected using the mining area to access other habitats, any existing access ways must be maintained and/or works affecting that accessway must be completed in the period April – June (outside the breeding/moult period).
- Investigation of all potential burrows, including use of a burrow scope, to confirm whether kororā are using them by a suitably qualified ecologist.
- Where any penguin burrows are compromised by mining, replacement artificial burrows or nest boxes must be installed at a rate of 2:1 (i.e., two nest boxes for every natural burrow). Any additional nest boxes provided must be located within the vegetated coastal foreshore habitat associated with accessways identified using the methods set out above.

4.3 Lighting Management

4.3.1 Fixed Lighting

In order to reduce the effects of lighting at the mine, only daylight mining operations are proposed. The WCP will operate 24 hours, so the possibility of equipment failure means that use of lighting may be required during occasional night time operations to repair equipment or deal with other unexpected events.

The WCP and loadout area is already consented, however condition 17 (particularly 17.2) of the proposed consent conditions for mining within the SB requires minimisation of the amount of light at the site, which includes the WCP. This condition is to be achieved via adherence to the Australian Government's National Light Pollution Guidelines for Wildlife May 2023 (or subsequent revision), including but not limited to pointing all fixed lighting downward, shielding to avoid light spill, screening bunds, and use of the yellow-orange spectrum. In addition, lights should only illuminate the object or area intended and be mounted as close to the ground as possible[1]. Loading of trucks will be undertaken on the eastern side of the building via roller doors which can be closed when not loading. These actions are expected to reduce visible light from the processing plant.

4.3.2 Dredge Pond Lighting

Since operations are limited to daylight hours (30 mins before sunrise to 30 mins after sunset), lighting at the dredge pond is only likely to be required either close to sunrise and sunset or in the event of equipment failure at night, meaning that lighting will be of limited duration. Nonetheless, the possibility remains that kororā may become disoriented by lighting at the dredge pond, although this risk is considered to be very low.

The following actions will be deployed as appropriate at the site:

- Consideration will be given to using motion detectors, timing switches or similar methods to limit lighting to when it is required;
- Lighting will be used to light only the object or area intended;
- Lights will be deployed close to the ground, directed and shielded near coastal and bush interface zones to prevent disorientation of kororā;

[1] These are based on best practice lighting design, Appendix A of the Australian Government Light Pollution Guidelines available at http://www.environment.gov.au/system/files/resources/2eb379de-931b-4547-8bcc-f96c73065f54/files/national-light-pollution-guidelines-wildlife.pdf

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- The lowest intensity lighting appropriate for the task will be used; and
- Non-reflective, dark-coloured surfaces will be used in preference to light or reflective surfaces.

4.3.3 Vehicles Within and Surrounding the Site

Given that mining and trucking movements (to the south) from the site would not occur during the hours of darkness (i.e., 30 mins after sunset to 30 mins prior to sunrise), any vehicle movements between the processing plant and pit would be extremely limited. Noenetheless, vehicle movements are possible while staff are in attendance at night, for any repair or maintenance work being carried out outside of normal operating hours, or near to sunset or sunrise. In these cases, there remains a risk of vehicle strike and lighting disorientation within the site for kororā. Actions intended to protect kororā from accidental death due to collision with vehicles within the site include:

- Limiting the speed of vehicles to 15 km per hour while on site
- Requiring headlights to be dipped at all times within the site.
- Monitoring and reporting of all encounters with kororā by all site vehicles throughout the year. In the event that a vehicle collides with a kororā within the site this management plan will be reviewed (including consideration of further reducing speed limits) with a view to avoiding any further mortality.

Similar methods have been implemented elsewhere, such as at Westland Mineral Sands Limited's Okari Road site (where kororā also occur) and no mortalities have occurred since activities commenced there in late 2022

4.4 Fencing

Fencing will be constructed along the coastline and extending inland around each active mining section so as to deter kororā from entering the active mining area and to encourage their movement toward safer, suitable nesting habitats.

The fencing will be designed to:

- Prevent penguins from entering hazardous or high-traffic operational areas.
- Guide penguins safely inland to designated nesting areas outside the mine footprint.
- Extend along site perimeters and natural creek corridors to:
    - Create safe inland migration routes to bush and vegetated nesting areas.
    - Deter movement through the mine site, reducing the risk of disorientation, injury, or mortality.

The penguin fence must surround the mining areas identified in the current Annual Work Plan and will have the following specifications:

- Comprised of geosynthetic mesh
- Be at least 900mm above ground and buried at least 300mm below ground
- No posts greater than 4 m apart
- Installation must be certified by a suitably qualified ecologist to ensure it will prevent the ingress of kororā to the active mine disturbance area
- Certification must be provided to the Consent Authority prior to mining commencing
- At the completion of mining activity, all penguin fencing must be removed.

Mining across the SB will be carried out in three distinct sections, and fencing will be staged accordingly. The following measures will apply across all areas:

- A penguin-proof exclusion fence will be installed as appropriate at a location inland

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from the Mean High Water Springs (MHWS) along the coastline adjacent to the site.
- Within this buffer zone, nesting boxes and other habitat enhancement measures (such as planting) will be implemented as required.
- Where existing penguin burrows, or access across the mine site, may be affected by mining activity, replacement artificial burrows or nest boxes must be installed at a ratio of 2:1 (i.e., two boxes for every known burrow and access track).
- Additional nest boxes will be located within vegetated coastal foreshore habitats, particularly near identified penguin accessways, such as creek mouths and natural corridors.

Section 1: Canoe Creek to Granite Creek
- Fencing will extend along the coastline between Canoe Creek and Granite Creek.
- From each creek mouth, fencing will be installed inland along the natural creek corridors toward established bush areas to facilitate penguin access to safe nesting habitat and across the eastern (inland) edge of the mining area so as to prevent penguins travelling to sea from getting stuck behind the fence.

Section 2: South of Granite Creek to Cargill Road
- The penguin-proof fence will run along the coastal edge and up Granite Creek to the adjacent bush area.
- Along Cargill Road, the fence will extend along the roadside to incorporate the bunded and planted buffer zone.
- The fence will extend along the eastern inland edge of the mining area so as to prevent penguins travelling to sea from getting stuck behind the fence.

Section 3: South of Cargill Road to Southern Boundary
- Fencing will run up the southern side of Cargill Road, enclosing the bunded and planted area through to the driveway of 114 Cargill Road.
- At the southern boundary of the active mining area, the fence will extend inland to the established bush area surrounding Fagan Creek, providing a natural retreat zone for penguins.
- The fence will extend along the eastern inland edge of the mining area so as to prevent penguins travelling to sea from getting stuck behind the fence.

Upon completion of mining activities and associated rehabilitation works, coastal and site fencing will be removed.

4.5 Accidental Discovery Management

4.5.1 Detecting Kororā

It is the responsibility of the Consent Holder to provide training so as to ensure staff are appropriately informed and able to implement the accidental discovery protocol set out below. It is the responsibility of all employees based at the site to be alert to the possibility that they might encounter a kororā and to know how to respond appropriately. In addition, the specific location, date and time any birds are detected is to be recorded by the personnel who discover the bird(s), and this information is to be provided to the Mine Manager.

Staff must be made aware that kororā may seek shelter under parked vehicles, machinery, sheds, or other structures, especially during the day.

- A mandatory visual inspection of vehicles and equipment must be carried out before use each day, particularly in areas near known kororā habitat.

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- Temporary shelters or covers in safe zones may be provided to discourage kororā from seeking refuge in operational spaces. The consent holder should avoid storing piles of materials (timber, rocks, building materials and the like) that could be accessed by kororā and used as a nest/burrow.

4.5.2 Accidental Discovery Protocol for Kororā

In the event an uninjured kororā is found on site, individuals may attempt to shepherd lone birds from their at-risk location by encouraging them toward safe areas. Shepherding must not involve any physical contact with birds directly and involves making gentle noises and directing the bird with directional movements. If kororā are not able to be safely shepherded without physical contact, only DOC-permitted kororā handlers (named in the Wildlife Act Authority Application), will catch the bird with minimum disturbance and relocate it to an unoccupied burrow along the fenced coastal edge. If injured or displaying signs of illness, the kororā will be placed in a suitable enclosure in a warm dark place and transferred as quickly as possible to the Māwhera / Greymouth Department of Conservation office. The DOC emergency hotline should be called immediately for advice on care and the appropriate location to take injured birds (**0800 DOC HOT (0800 362 468)**). The Department of Conservation will determine if it is fit for release and will undertake the release and inform the Mine Manager of the outcome.

The incident must be logged, the rationale behind the identification of the likely cause and steps taken to reduce/eliminate the risk must be documented and authorised by the Mine Manager. These steps and the outcomes should be included in the annual monitoring report.

4.5.3 Discovery of Dead Kororā

In the event of any dead birds (including kororā) being located at the site the Māwhera / Greymouth Department of Conservation office in Greymouth and Te Rūnanga o Ngāti Waewae will be informed and collection by or delivery to the Department of Conservation will be arranged.

In the event that a dead kororā is discovered within 50 m of the pit or WCP and load out area the following steps will be taken:

- If recently dead, the animal should be frozen immediately and an autopsy arranged.
- An attempt to identify the potential cause of mortality should be undertaken immediately. If the likely cause can be identified and the reason can be modified or eliminated immediately, this will be done.
- The incident must be logged, the rationale behind the identification of the likely cause and steps taken to reduce/eliminate the risk must be documented and authorised by the Mine Manager. These steps and the outcomes should be included in the annual monitoring report.

5.0 Tāiko/Westland Petrel

5.1 Potential Effects on Tāiko

While tāiko have not been recorded within the site during desktop analyses or site surveys, the area to be mined is located approximately 4.5 km south (at the most northern point of the consent area) of the only known colony of tāiko/Westland petrel and therefore potential risks to tāiko must be considered. The WCP and access road to the processing area are located approximately 5.8 km south of the colony's indicative boundary. Tāiko breeding occurs between March and November. Adult birds entering and departing the colony, and at

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sea close to shore, are known to be disoriented and attracted by artificial lighting and can become grounded. Young tāiko are also known to be disoriented by lights when leaving the breeding colony and this can result in juvenile birds being grounded. Groundings are most likely to occur between November and January, with a peak in early December as shown in Figure 4.

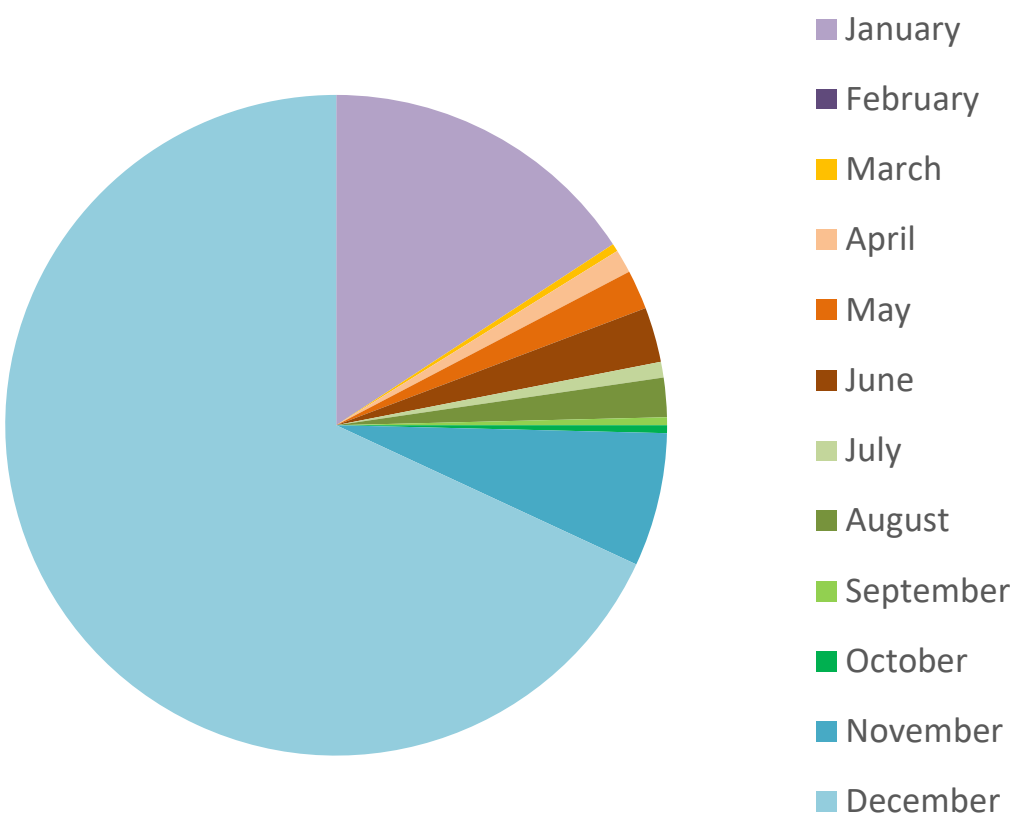

Figure 4: Records of grounded tāiko recorded between 2007 and 2022 categorised by month of occurrence (Data from Department of Conservation).

5.2 Lighting Management

5.2.1 Fixed Lighting

In order to reduce the effects of lighting at the mine, mining operations will only occur during daylight hours.

Consents have been granted for the WCP and loadout area, however Condition 17 (particularly 17.2) of the proposed consent conditions for mining at the SB requires minimisation of the amount of light at the site, which includes the WCP. This condition will be achieved via adherence to the Australian Government's National Light Pollution Guidelines for Wildlife May 2023 (or subsequent revision) [2], including but not limited to pointing all fixed lighting downward, shielding to avoid light spill, screening bunds, and use of the yellow-orange spectrum. In addition, lights should only illuminate the object or area intended and be mounted as close to the ground as possible. Loading of trucks will be

[2] These are based on best practice lighting design, Appendix A of the Australian Government Light Pollution Guidelines available at http://www.environment.gov.au/system/files/resources/2eb379de-931b-4547-8bcc-f96c73065f54/files/national-light-pollution-guidelines-wildlife.pdf

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undertaken on the eastern side of the building via roller doors which can be closed when not loading. These actions are expected to reduce visible light from the processing plant.

5.2.2 Dredge Pond Lighting

Mining will only take place during daylight hours (i.e., 30 mins after sunrise to 30 mins prior to sunrise). Lighting may be required at the dredge pond at certain times of the year close to sunrise or sunset for health and safety reasons or outside daylight hours if emergency repairs are required. Due to the time of year, long daylight hours means that there will be no need for lighting at the dredge pond during December and January (1 November daylight hours of 0620 – 2018 hours; 31 January daylight hours of 0636 – 2100 hours[3]). This coincides with the peak months for tāiko groundings. In addition, the following actions will be deployed:

- Lighting to be used only when and where it is required;
- Lighting will be used to light only the object or area intended;
- Lights will be deployed close to the ground, directed and shielded to avoid light spill as required;
- The lowest intensity lighting appropriate for the task will be used;
- Non-reflective, dark-coloured surfaces will be used in preference to light or reflective surfaces; and
- Light in the yellow-orange spectrum only to be used.

While the possibility remains that tāiko might be grounded by lighting at the pit this risk is considered low.

5.2.3 Vehicles Within and Surrounding the Site

Vehicles using State Highway 6

While mining operations are limited to the hours of daylight, the headlights of trucks and other vehicles arriving or leaving the site via State Highway 6 close to sunset or sunrise could affect tāiko, although it is noted that the vehicle entrance point to the SB is c. 5.8 km south of the colony and most vehicles would be travelling south, rather than north, past the colony.

The mean number of nightly vehicle movements on State Highway near the site is lowest in the November to January period (approximately 61 vehicle movements per night) and highest in the May – July period (approximately 159 movements per night). This difference is likely due, at least in part, to the longer night length in winter. The total number of vehicle movements during darkness (defined as half an hour after sunset to half an hour before sunrise, conservatively rounded to the nearest hour) during approximately fortnightly periods is shown in Figure 5.

[3] Sunrise and sunset times Greymouth, November 2026 and January 2027

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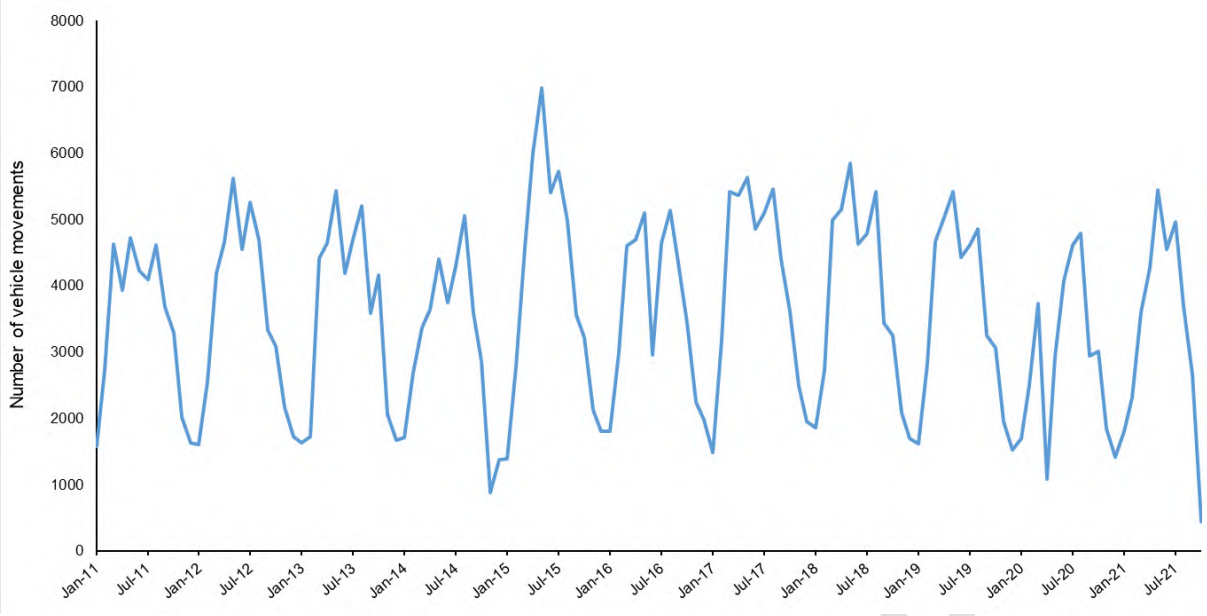

Figure 5: Vehicle movements recorded during the hours of darkness from just north of Canoe Creek, Barrytown 2011 – 2021 (Data from Waka Kotahi, New Zealand Transport Agency).

The November to January period coincides with the time when most tāiko deaths are recorded. Most vehicle related deaths of tāiko between 2007 and 2020 occurred in the same period as shown in Figure 6.

This data should be interpreted with care because they are only birds that were reported and/or found, and the cause of death was estimated, but nonetheless, they strongly indicate that most (approximately 75%) groundings resulting in death occur in November, December and January, with more than 50% of deaths (including vehicle related deaths) occurring in December.

Actions intended to protect tāiko from accidental death due to collision with vehicles on the State Highway include:

- Truck movements are limited to daylight hours only. At the time of the year when most tāiko groundings occur, these movements would take place in daylight.
- No truck movements will occur to the north (past the colony).
- Monitoring and reporting of all encounters with tāiko by all mine related vehicles throughout the year. In the event that a taiko collides with a mine related vehicle this management plan will be reviewed (including consideration of amending the period of truck movements) with a view to avoiding any further mortality.

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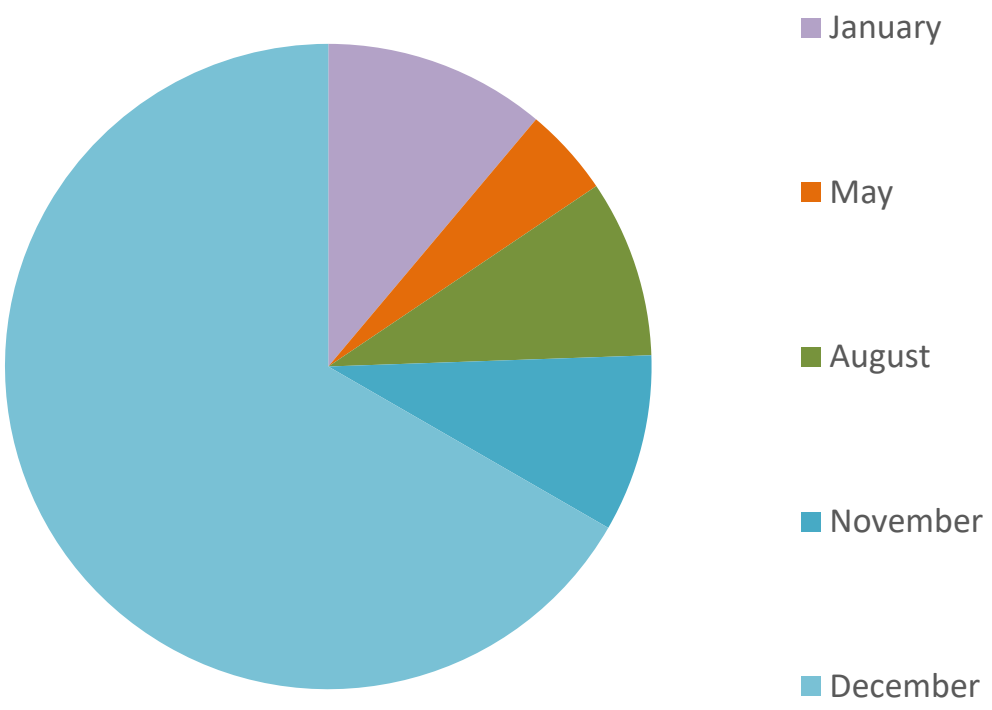

Figure 6: Deaths of tāiko (found dead or euthanised) thought to be due to vehicles recorded between 2007 and 2022 categorised by month of occurrence (Data from Department of Conservation).

Moving vehicles within the site

Given that mining will not occur during the night and trucking movements from the site would also only occur during daylight hours (to the south), transport movements between the processing plant and pit would be extremely limited. Actions intended to protect tāiko from accidental death due to collision with vehicles within the site include:

- Limiting the speed of vehicles to 15 km per hour while on site.
- Requiring headlights to be dipped at all times within the site. The effectiveness of this action in avoiding tāiko remains unknown, but it may assist. This practice will be trialled for at least three months. In the event that it proves unhelpful (e.g., if it becomes difficult to see tāiko) this practice will be discontinued.
- Monitoring and reporting of all encounters with tāiko by all site vehicles throughout the year. In the event that a taiko collides with a vehicle within the site this management plan will be reviewed immediately (including consideration of banning night time vehicle movements) with a view to avoiding any further mortality.

5.3 Accidental Discovery Management

5.3.1 Detecting Grounded Tāiko

Mining will only take place during daylight hours, year-round within the SB and so lighting activity presents a low risk of grounding for tāiko. The most likely location for tāiko to be

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grounded is near any area where lights are being used (the dredge pond during winter, the processing plant and load out area, the internal road within the site and along State Highway 6).

It is the Consent Holder's responsibility to provide training so as to ensure staff are appropriately informed and able to implement the accidental discovery protocol set out below. It is the responsibility of all employees based at the site to be alert to the possibility that they might encounter a grounded tāiko and to know how to respond appropriately.

NOTE an authority under the Wildlife Act 1953 is required to handle absolutely protected wildlife (including, but not limited to tāiko) if any are recovered. This authority will be obtained as part of the Fast Track Approval Act application and a copy of the permit will be attached to this plan as Appendix A.

In the event that grounded tāiko are discovered, the specific location, date and time any grounded birds are detected is to be recorded by the personnel who discover the bird(s), and this information is to be provided to the Mine Manager.

All trucking and other contractors and staff leaving the site at night (including those travelling to and from work past the colony) are required to report any vehicle strike of birds, as well as near misses, to the Mine Manager as soon as practicable after they occur.

Reports are to include the date, time, approximate location and number of birds (if known). The Mine Manager will be responsible for maintaining an incident log and upon receiving a report of a bird strike will notify the Department of Conservation as soon as practicable.

Data relating to near misses will be reviewed annually in order to determine whether any changes to operations are required for the coming season.

Live birds seen on the road at any time of day/night, should be reported to 0800 DOC HOT as soon as possible.

5.3.2 Accidental Discovery Protocol for Grounded Tāiko

A sturdy net suitable for catching grounded birds, leather gloves for handling birds and a suitable enclosure (lined box, crate or cage) will be held on site and all staff will be informed of their location and trained in their safe use to ensure bird welfare. Best practice guidelines for species translocations indicate a white flute-board or cardboard pet (cat) box with a dark interior lining is suitable for a single bird to be contained until a qualified handler can be accessed (Gummer *et al*. 2014). Boxes must have ventilation and a secured entry/exit point to ensure accidental release does not occur and to avoid injury.

In the event that a live grounded tāiko is discovered within the site, a person with the appropriate qualifications and permits will catch the bird, place it in a suitable enclosure in a warm dark place, and call the Department of Conservation line (0800 DOC HOT) as soon as possible for advice on care and relocation. If the bird is to be transferred to a care facility, it should be moved as quickly as practicable to the local (Māwhera / Greymouth Department of Conservation office (or as advised by the DOC hot line). The Department of Conservation will determine if it is fit for release and will undertake the release and inform the Mine Manager of the outcome. If injured the local Department of Conservation office will take responsibility for the bird and keep the Mine Manager up to date with progress.

In the event that a live tāiko is recovered from within 50 m of the dredge pond or the processing plant and loadout area, the following steps will be instigated:

- An attempt to identify the potential reason for grounding should be undertaken immediately. If the likely cause can be identified and the reason can be modified or eliminated immediately, this will be done.
- The incident must be logged, the rationale behind the identification of the likely

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cause and steps taken to reduce/eliminate the risk must be documented and authorised by the Mine Manager. These steps and the outcomes should be included in the annual monitoring report.

- If the cause of grounding is identified as a light source which cannot be modified or eliminated, Tāiko will seek advice from a suitably qualified and experienced ecologist and the Māwhera / Greymouth Department of Conservation office.
- A lighting audit will be undertaken at the commencement of mining to ensure lighting at the site complies with the requirements set out in this Avian Management Plan and the latest version of the Australian Government National Light Pollution Guidelines for Wildlife including marine turtles, seabirds and migratory shore birds. Another audit will be undertaken if any grounded seabirds are recorded.
- This management plan will be reviewed annually by a suitably qualified and experienced ecologist in consultation with the Department of Conservation and any other changes to management protocols including, but not limited to: changes to light colour, intensity or timing; additional bunding or planting; the use of black out curtains; tinted windows or other methods to reduce light spill, and the risk of grounding will be considered with a view to implementing them as required.
- Any potential management protocol changes to reduce the risk of grounding during the review of this management plan will be implemented as soon as practicable.

5.3.3 Discovery of a Dead Tāiko

In the event of any dead birds (including tāiko) being discovered at the site, the Māwhera / Greymouth Department of Conservation office and Te Rūnanga o Ngāti Waewae will be informed and collection by or delivery to the Department of Conservation will be arranged.

In the event that a dead tāiko is discovered within 50 m of the pit or processing plant and load out area the following steps will be taken:

- An attempt to identify the potential reason for grounding should be undertaken immediately. If the likely cause can be identified and the reason can be modified or eliminated immediately, this will be done.
- If recently dead, the bird should be frozen immediately for collection and autopsy.
- The incident must be logged, the rationale behind the identification of the likely cause and steps taken to reduce/eliminate the risk must be documented and authorised by the Mine Manager. These steps and the outcomes should be included in the annual monitoring report.
- If the cause of grounding is identified as a light source which cannot be modified or eliminated, TiGa will seek advice from a suitably qualified and experienced ecologist and the Māwhera / Greymouth Department of Conservation office.
- A lighting audit will be undertaken to ensure lighting at the site complies with the requirements set out in this Avian Management Plan and the latest version of the Australian Government National Light Pollution Guidelines for Wildlife including marine turtles, seabirds and migratory shore birds.
- This management plan will be reviewed by a suitably qualified and experienced ecologist in consultation with the Māwhera / Greymouth Department of Conservation office and any other changes to management including, but not limited to, changes to light colour, intensity or timing, additional bunding or planting, the use of black out curtains, tinted windows or other methods to reduce light spill and the risk of grounding will be considered with a view to implementing them as required.

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- Any potential management changes identified as likely to contribute to reducing the risk of grounding during the review of this management plan will be implemented as soon as practicable.

If, after any necessary amendments to site management and this management plan are implemented, a second bird (alive or dead) is found within 50m of the dredge pond or WCP and load out area within four weeks of the first finding, operations and use of external lights at the pond and processing plant will cease between thirty minutes after sunset and prior to dawn. Interior lighting and operations can continue during the hours of darkness, provided any lights are not visible from the exterior.

Operations between thirty minutes after sunset and prior to dawn will remain suspended until such time as a plan to prevent any additional mortality is prepared, agreed with the Department of Conservation and implemented, or until the 15 January following the discovery, whichever is sooner.

6.0 Monitoring

6.1 Seasonal Bird Surveys

Seasonal bird surveys at the site commenced in July 2024 and will be undertaken four times each year, once each in spring, summer, autumn and winter using five-minute bird counts and acoustic recorders. These surveys will continue until 12 months after completion of mining at the site. These surveys are intended to detect species using locations closest to the mining area and other adjoining habitats where effects beyond the site are most likely, and may need to be managed with monitoring at the locations shown in Figure 3.

6.2 Detection Surveys for Species of Conservation Concern

Detection of 'Threatened' and 'At Risk' species using the site, particularly birds using the current mining area, will rely on fortnightly and/or weekly detection surveys and twice-weekly monitoring of any identified nesting attempts during the breeding season, as outlined in Section 3.0. The number, location and outcome of all nesting attempts will be recorded, along with the number, dates and times of monitoring visits. This information will be compiled into an annual bird monitoring report at the conclusion of the breeding season as discussed in Section 7.0

For kororā, monitoring will consist of regular walk-through surveys conducted throughout the breeding season, as well as an annual conservation dog survey. Both surveys will be undertaken by a trained kororā observer (see Section 4.0 for detail).

For tāiko, the location, date and time of any groundings will be recorded, along with any vehicle strikes and near misses (see Section 5.0 for detail). This information will be included in the annual bird monitoring report.

6.3 Wildlife Camera Detection

Wildlife cameras will be deployed at low spots and creek mouths or other sites along the coastal edge of the mine disturbance area deemed appropriate by the project ornithologist as required to monitor for kororā, and around the processing plant area and the access road to monitor for tāiko and any other birds which might be affected by lighting there. These cameras will be equipped with motion sensors and be installed by a suitably qualified ecologist. To detect tāiko, ten cameras will be installed around the processing plant and the length of the access road, operating during the hours of darkness each night, with the location to be determined by the ecologist. Imagery from these cameras will be reviewed for

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wildlife interactions at least weekly by a suitably qualified ecologist and retained for at least six months.

6.4 Annual Work Plan

To ensure that avian mitigation actions are timed appropriately in relation to mining activity, the Annual Work Plan will include a section for avian management as per the approach outlined above. The annual work plan will identify areas to be mined within the next 12 months, and particularly during the upcoming bird breeding season, so as to ensure appropriate deterrents are in place at the appropriate time and that all management activities specifically address effects on avifauna identified as being at risk of mining activity during seasonal surveys.

The relevant phases for work planning include:

Action	Timeframe
WAA	Obtained as part of the fast-track application
Wildlife Surveys – penguin conservation dog survey	24 and 12 months prior to mining
Annual and seasonal surveys	Ongoing
Establishment of deterrents	During the breeding season (specific timing informed by breeding season surveys). Deterrents must be established prior to mining commencing in a particular area identified in the Annual Work Plan and >1 method may be used in a season.
Breeding season surveys	Fortnightly from 1 August until breeding commencement
Nest surveys	Weekly from commencement of breeding to completion
Nest progress surveys	Twice-weekly from breeding initiation to fledging
Annual Reporting	Provided by 30 June annually

7.0 Reporting

7.1 Ongoing Reporting

Any interactions with wildlife recorded as a result of the monitoring requirements in this Avian Management Plan (including wildlife cameras) must be reported to the Consent Authority and the Department of Conservation on a weekly basis from 1 November to 31 January each year and on a monthly basis from 1 February to 31 October. Footage from wildlife cameras must be made available on request.

This includes:

- Observations of ‘Threatened’ or ‘At Risk’ species entering the active mining site observed during surveys or using wildlife cameras
- Any instances of accidental discovery of injured or dead avifauna
- Any grounded tāiko
- Any near-misses or vehicle strikes of ‘threatened’ or ‘at risk’ species

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7.2 Annual Bird Management Report

An annual bird management report will be prepared which details the following matters:

- The timing and duration of any mining within 100 m of the proposed SNA Site PUN-049
- Timing of nest detection surveys and observations;
- A summary of data resulting from seasonal, or breeding season surveys
- The findings of any wildlife camera monitoring;
- Number and location of any kororā detected by the conservation dog survey and/or the walk-through beach surveys;
- Efforts to deter nesting within the area to be mined and the outcome of those efforts (including fence locations, the use of visual or acoustic deterrents, frequency of grazing);
- Date of first nesting attempts (if any) within the area to be mined;
- Number and location of nesting attempts within the area to be mined;
- Species attempting to nest within the area to be mined;
- Outcome of individual nesting attempts within the area to be mined;
- Number and location of any grounded tāiko;
- Management undertaken and the outcome for any grounded tāiko collected;
- Autopsy outcomes for any dead tāiko collected;
- The number, dates and location of any near misses or vehicle strikes of tāiko with vehicles;
- The findings of any lighting audits undertaken during the year and steps taken to resolve any issues identified.
- A summary of any revisions made to this management plan and the reasons for the changes;
- The date and duration of any operational shut-downs;

The annual bird management report will summarise the above information, identify any trends or patterns and compile any relevant maps. This report will be reviewed by a suitably qualified and experienced independent ecologist/ornithologist who will evaluate the findings and provide any recommendations considered necessary to improve bird management at the site.

The annual bird management report and any updates to this management plan will be provided to the Consent Authority, Te Rūnunga o Ngāti Waewae, the Buller/Kawatiri and Greymouth offices of the Department of Conservation in Westport, the West Coast Penguin Trust, Paproa Wildlife Trust, the Community Liaison Group and Waka Kotahi NZ Transport Agency Environment Sustainability Team (environment@nzta.govt.nz) no later than **30 June** each year.

This Avian Management Plan may be amended to take into account:

- Any positive measure/s to ensure the stated objectives of the management plan are achieved
- Any changes to further reduce the potential for adverse effects as result of actions identified in the Annual Work Programme

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- Any required actions identified as a result of monitoring to address the above

Amendments must be undertaken by a suitably qualified person (ie., a qualified ornithologist or ecologist) and must be provided to the Consent Authorities within 20 working days of its review for recertification.

8.0 Summary

Tāiko proposes to undertake mineral sand mining on farmland between Canoe Creek and Fagan Creek in an area known as the Southern Block. The Southern Block includes a mix of artificially constructed and natural wetlands, and small amounts of low-quality indigenous vegetation which can provide habitat for a range of indigenous bird species, some of which are considered to be 'Threatened' or 'At Risk'. The proposed mine is also located 4.5 km south of the only known breeding colony of tāiko (Westland petrel, *Procellaria westlandica*).

A number of threatened and at-risk bird species have been identified in habitats within and adjoining the SB site. The majority of these species would not consistently use habitats within the SB and are unlikely to use the site for breeding, but could be affected by noise, human activities and vehicle movements near their habitats, particularly during the breeding season. A number of management activities (e.g., monitoring surveys, maintaining buffers from key areas of habitat, planting, and lighting management will be undertaken to minimise impacts on these species.

Specific management actions for at-risk and threatened species considered likely to use the site, or who may attempt to breed within the site once mining commences (e.g., tūturiwhatu, tarāpunga, tōrea, kororā, and tāiko) are provided and would be implemented when these species are detected at the site during ongoing monitoring. These management actions include: discouraging birds from establishing nests in the work site via the use of deterrents and fencing; detection surveys prior to, and during, breeding; managing nest sites (via buffers and intensive monitoring); accidental discovery protocols; annual reporting; and ongoing assessment and amendment of the Avian Management Plan in response to avian observations and encounters within the site.

Lighting management is set out within this plan to reduce the effects of mine lighting on both adult and young seabirds including tāiko and kōrora. A number of actions will also be taken to avoid accidental death of tāiko and kororā by vehicles entering or leaving the site at night, including limits on speed and headlight settings, the establishment of accidental discovery protocols and ongoing assessment and amendment of the Avian Management Plan in response to documented encounters with these species.

Annual reporting will include summary and interpretation of monitoring data collected during the preceding year, any management actions undertaken to protect birds within and surrounding the site, any observed nesting attempts and outcomes, accidental discovery of any injured or dead species of conservation concern, the findings of any lighting audits conducted, and any proposed changes to the Avian Management Plan. The data collected will be compiled and presented in an annual bird management report and used in adaptively managing the operations to protect the birds at the site and provided to Greymouth District Council, Te Rūnanga o Ngāti Waewae and the Māwhera Department of Conservation office in Greymouth.

9.0 References

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APPENDIX A

Wildlife Act (1953) Authority to Handle Absolutely Protected Wildlife

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Appendix E: Draft Native Freshwater Fish Capture and Relocation Plan

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ecoLogical Solutions
Environmental Consultants

March 2026

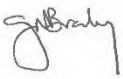
Barrytown South Mineral Sand Project

Native Freshwater Fish Capture and Relocation Plan

Submitted to:
Tāiko Critical Minerals Limited

Quality Assurance

This report has been prepared and reviewed by the following:

Prepared by:	Phil Taylor Freshwater Ecologist	
Reviewed by:	Dr. Gary Bramley Ecologist / Director	

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1.0 Introduction

1.1 Background

Taiko Critical Minerals Ltd (Tāiko) holds resource consents from the Grey District and West Coast Regional Councils for mineral sand mining at the 'Central Block' (CB) within Mining Permit MP 60785 as shown in **Error! Reference source not found.**. The 'Southern Block' (SB) is approximately
408 ha in extent and located south of the already consented area, between Canoe Creek and Fagan Creek. Mining activity would occur on 280 ha within the SB, which is known as the 'mining disturbance area' as shown in **Error! Reference source not found.**. Earthworks may be undertaken within up to 72 ha of the SB outside the mining disturbance area to assist with recontouring and rehabilitation within the mining disturbance area. The affected land is owned by Moir Farms Maimai Limited, Barrytown Farms Ltd, Nikau Deer Farm and Cargill Road Barrytown Limited. Grey District Council also owns a small piece of road reserve which would be affected.

Resource consents are being sought under Schedule 5 of the Fast Track Approvals Act 2024 to undertake mineral sand mining using a floating dredge to obtain ilmenite, garnet and other minerals. Wildlife approvals are also being sought under Schedule 7 for management of lizards and avifauna. It has been assessed that no complex fisheries approvals are required under Schedule 9. TCM's application to seek resource consents to mine within the SB was scheduled in the Fast Track legislation as a Schedule 2 project.

This Native Freshwater Fish Capture and Relocation Plan (NFFCRP) has been prepared for the the SB and outlines the methodology for how native fish will be captured and relocated from the creeks and drains within the SB prior to and during works including responsibilities, relocation sites and reporting.

The objective of the NFFCRP is to avoid or minimise adverse effects on native fish present within the project area.

1.2 Fish Fauna at the Site

There are no records in the New Zealand Freshwater Fish Database (NZFFD) for watercourses within the site as shown in Figure 1. There are NZFFD records of longfin eel (*Anguilla dieffenbachii*), banded kōkopu (*Galaxias fasciatus*), kōaro (*Galaxias brevipinnis*) and shortjaw kōkopu (*Galaxias postvectis*) in the mid-upper reaches of Granite Creek to the east of SH6 during surveys by the Department of Conservation in 1998 and 2022. These three native species are diadromous and migrate between the sea and freshwater to complete their life cycles so would have migrated up the highly modified lower reaches of Granite Creek to reach this habitat. These records also indicate there are no substantial barriers within the site for these species with 'good to excellent' climbing ability.

Additional fish species listed in the NZFFD from Canoe Creek to the immediate north of the SB and Fagan Creek to the immediate south of the SB include shortfin eel (*Anguilla australis*), torrentfish (*Cheimarrichthys fosteri*), common bully (*Gobiomorphus cotidianus*), bluegill bully (*Gobiomorphus hubbsi*), redfin bully (*Gobiomorphus huttoni*) and the introduced brown trout (*Salmo trutta*). Mining will be set back at least 20 m from both of these creeks.

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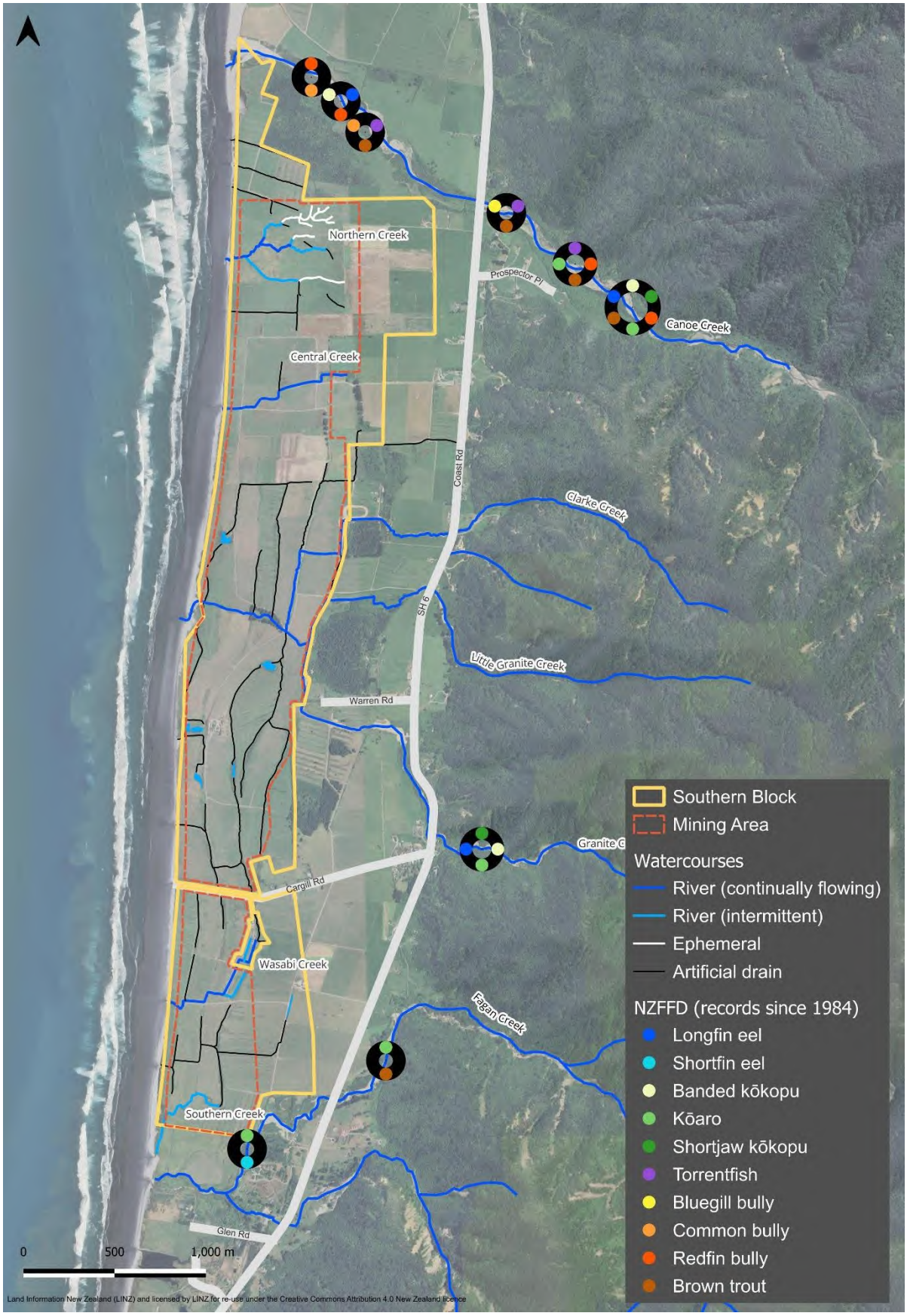

Figure 1: New Zealand Freshwater Fish Database records since 1985.

1.3 Relevant Consent Conditions

Tāiko has been granted resource consents (NUMBER) under the Fast-track Approvals Act 2024 to construct and operate the mine subject to conditions. The relevant conditions are detailed below.

15.0 Native Freshwater Fish Management	
15.1	The Consent Holder must conduct activities on site in general accordance with a Native Freshwater Fish Capture and Relocation Plan (NFFCRP) prepared by a suitably qualified freshwater ecologist. The objective of the NFFCRP is to avoid or minimise adverse effects on native fish present within the project area.
15.2	This NFFCRP must detail how native fish will be salvaged and relocated prior to streamworks commencing and must include but not be limited to: a. Methodologies to capture fish within the impact streams and wetland habitats, or justification there is no habitat for native fish present at the time of earthworks; b. Fishing effort; c. Details of the relocation site(s); d. Storage and transport measures including prevention of predation and death during capture; e. Euthanasia methods for diseased individuals or pest species,
15.3	Streamworks must not commence until the Consent Authority has certified the NFFCRP.

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2.0 Native Fish Management

2.1 Responsibilities

The responsibilities related to this NFFCRP are outlined below:

- Fish relocations are to be carried out by experienced freshwater ecologists whom are responsible for implementing all aspects of the NFFCRP including the installation and maintenance of temporary exclusion nets along the drain.
- The Consent Holder is responsible for ensuring the NFFCRP is implemented and that all results are reported to the appropriate entities (e.g., West Coast Regional Council).
- The Construction Site Manager is responsible for earthworks, construction, diversion, dewatering and reclamation/infilling. These responsibilities also include the management of environmental impacts and their own personal health and safety.

2.2 Permits

Fish relocations are to be carried out under the relevant permits including:

- A special permit from the Ministry of Primary Industries to capture fish using methods outside of amateur fishing regulations.
- An approval to transfer aquatic life under either section 26ZM(2) or 26ZM(3) of the Conservation Act 1987. Section 26ZM(2) is administered by the Ministry of Primary Industries in situations where a species is being translocated to locations where it

already occurs while Section 26ZM(3) is administered by the Department of Conservation is situations where a species is being translocated to locations where that species is absent.

Ecological Solutions Limited already hold the relevant permits required to implement this plan.

2.3 Staging and Timing of Mining Activities

The following is a summary of the timing and staging of mining activities on the Site:

Mining will occur over a 14-year period commencing in the northern part of the site and progress south and from west to east (**Error! Reference source not found.**).

Over the period of the project five creeks within the site will require diversions (**Error! Reference source not found.**). These are:

- Northern Creek;
- Central Creek;
- Clarke Creek;
- Wasabi Creek; and
- Southern Creek.

2.4 Diversion Methodology

2.4.1 Approach

The diversion methodology will differ for each creek and drain depending on their orientation, future purpose for the adjoining land and sequence of mining activity.

2.4.2 North South Methodology

North–south oriented creeks and drains will be diverted into a previously mined area before mining reaches them (except where mining is adjacent to the coastal setback boundary) (**Error! Reference source not found.**). This may require adjustments (widening or narrowing) of the mine path to facilitate this diversion. Following mining, a permanent reconstructed channel will be built in advance of diversion to this new channel as part of the rehabilitation of the mined land. The flow will be redirected into the final channel in a single 'livening' event.

2.4.3 East West Methodology

East–west oriented creeks and drains will be diverted into previously mined areas (behind the mining void) and into the adjacent mine path (to the east as mining moves inland), prior to mining progressing through the existing alignment. This requires a temporary diversion of the creek or drain around the active mining area (**Error! Reference source not found.**). Once mining has advanced beyond the temporary alignment, a permanent reconstructed channel can be constructed and the creek or drain reinstated. These waterbodies will likely be disturbed several times, with temporary diversions occurring each time the active mining area intersects the watercourse, potentially once per year for up to three months at a time per waterbody. Diverting the watercourse around two sections of mine path at a time as proposed reduces the number of diversions required.

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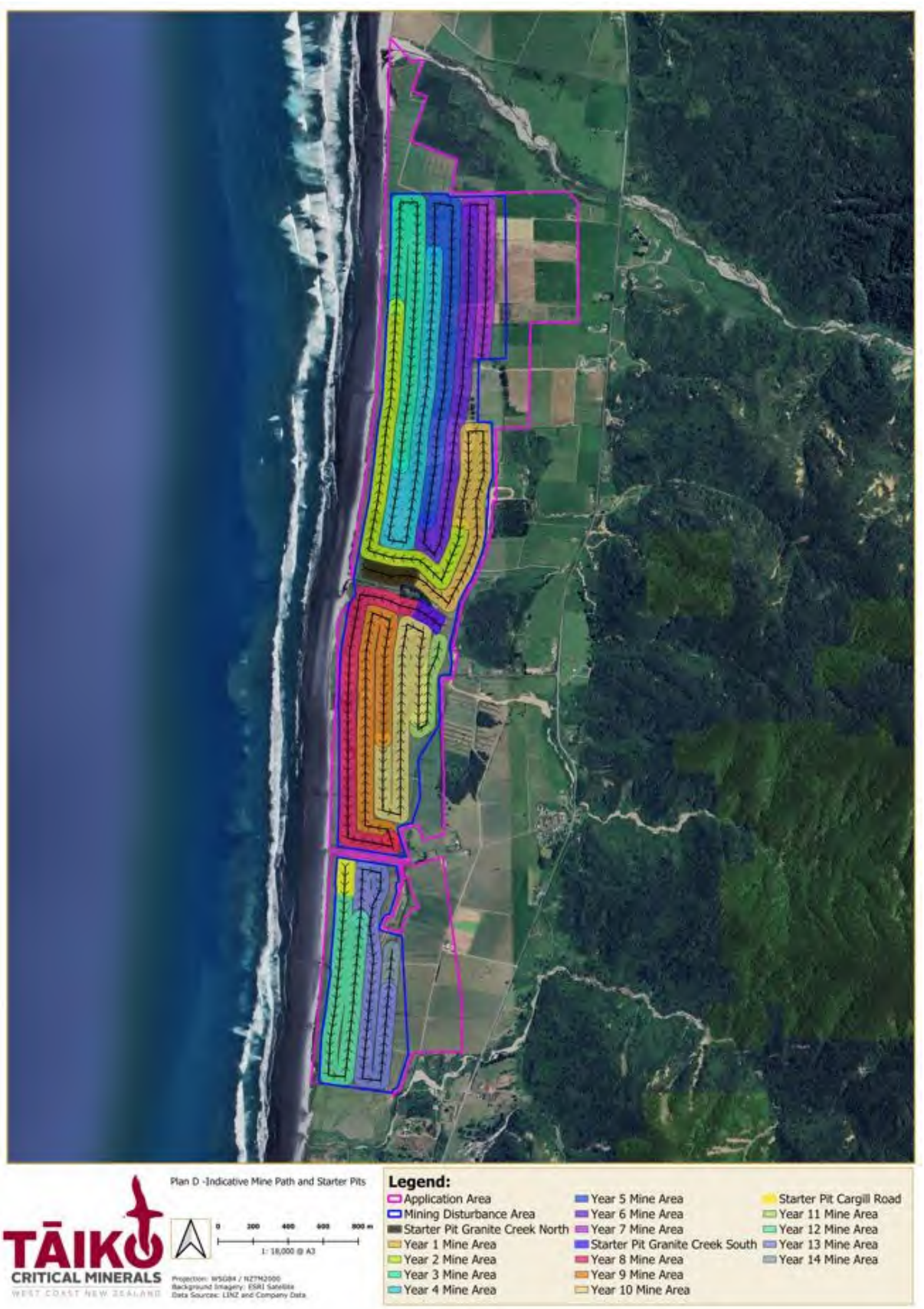


Figure 2: Staging Plan.

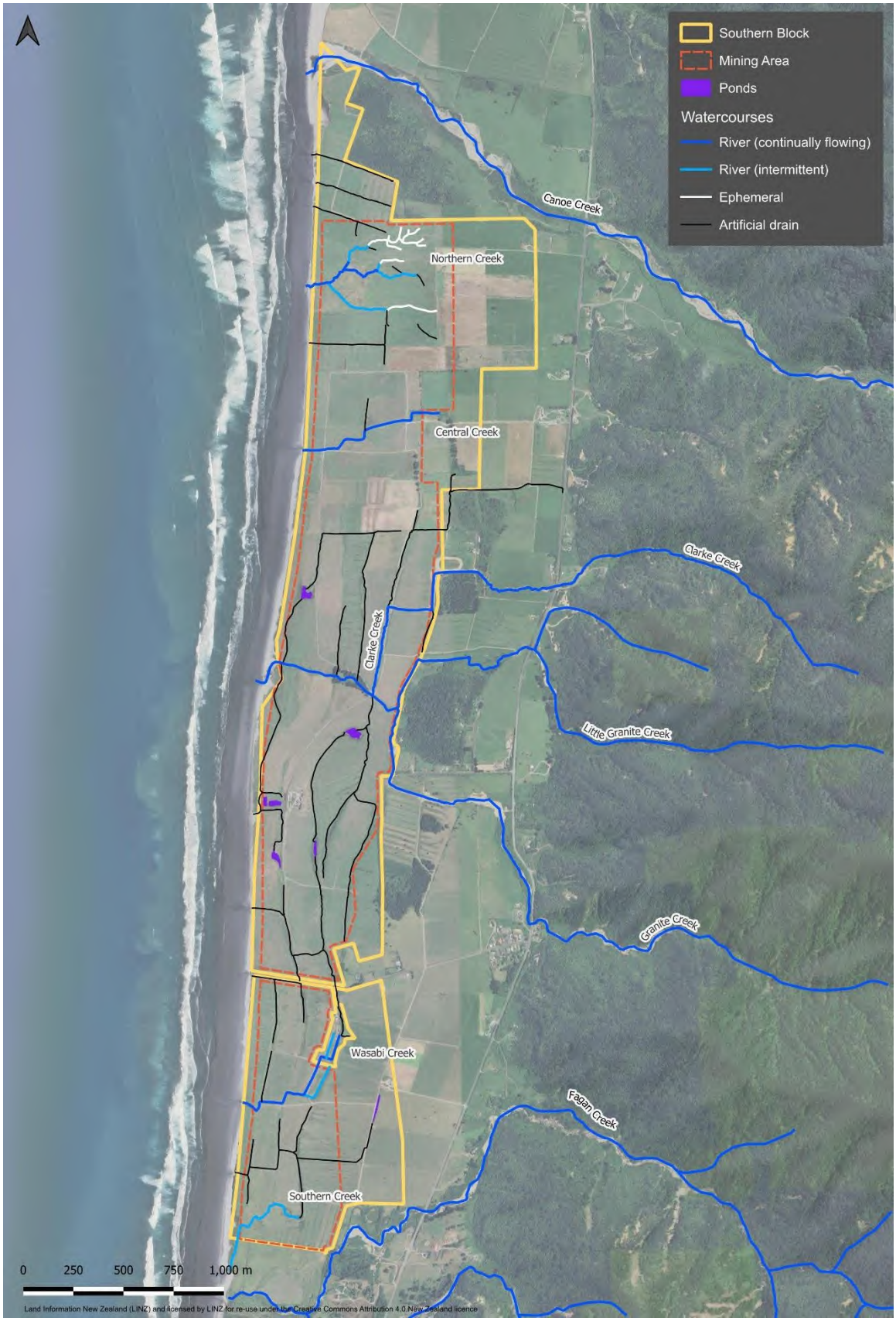


Figure 3: Creeks and drains within the SRB, including the five creeks requiring diversion.

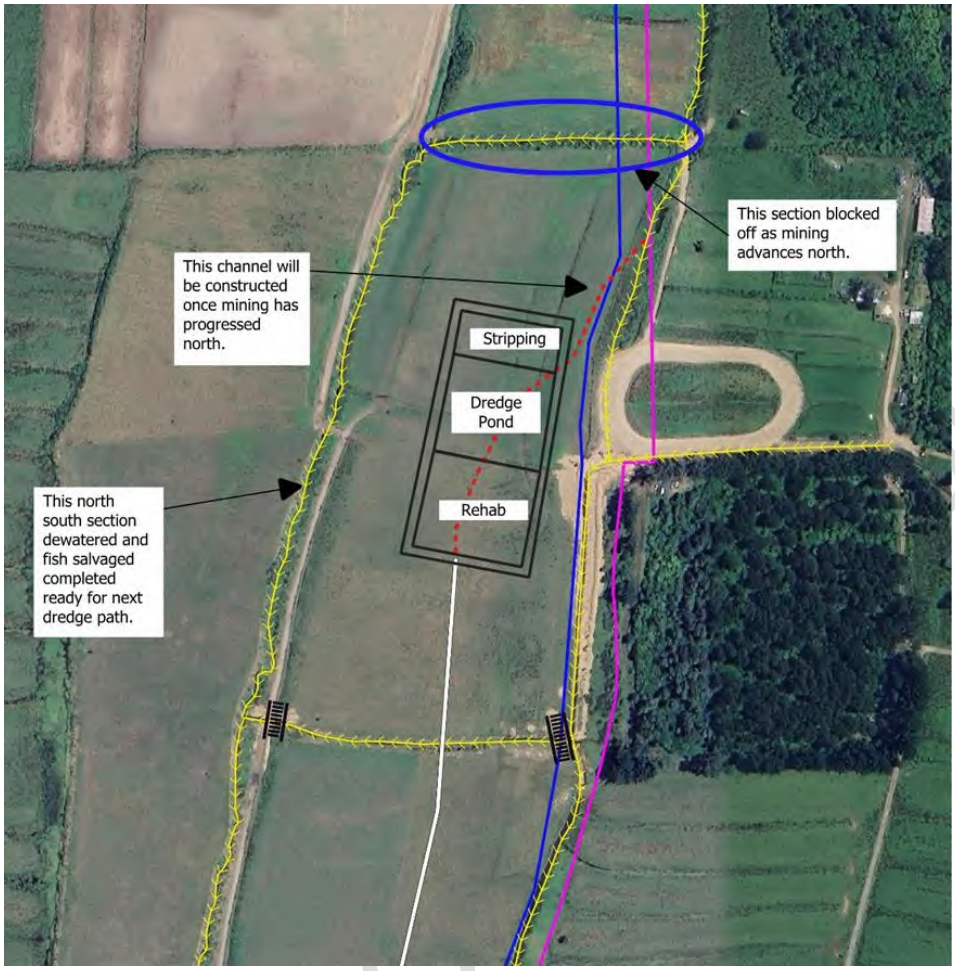
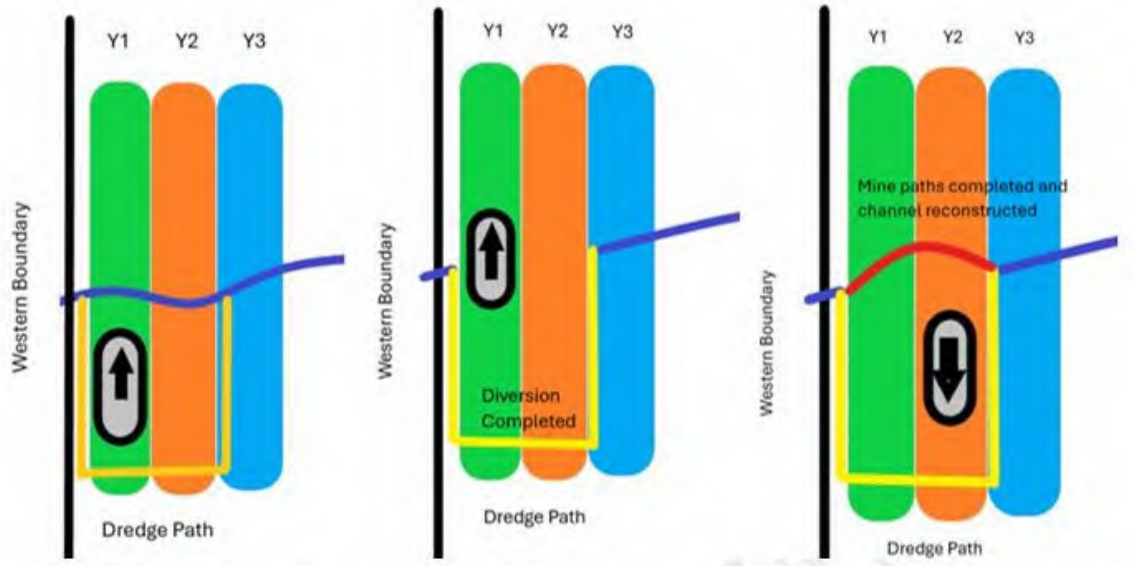


Figure 4: Diversion methodology for north – south watercourses.



As the dredge approaches the waterbody, a temporary diversion (shown in yellow) is constructed behind the mining void.

The waterbody is then diverted into this temporary channel, allowing the dredge to continue along its planned path.

Once the mining void has progressed beyond the proposed reconstructed waterbody alignment, the diversion is redirected into the newly rehabilitated channel (shown in red).

Figure 5: Diversion methodology for east – west watercourses.

2.5 Fish Relocation Methodology

2.5.1 Introduction

Mining will occur in stages over approximately 14 years, which will allow fish salvage and relocations to be undertaken in shorter manageable sections within the Site's extensive network of creeks and drains. The proposed approaches for the fish relocations are discussed in the following sections.

2.5.2 Stage 1 - Pre-Diversion.

Prior to the creation of the stream diversion reaches, a fine mesh exclusion net will be installed across the drain at the upstream and downstream extents of the reach to be diverted in order to prevent any fish moving into the affected section. Fish exclusion nets will be left in place until the fished section has been diverted and bunded (preventing fish entry) or until watercourses have been dewatered and fish removed. Regular maintenance of exclusion nets will be required to ensure they are functioning as intended, especially after high flow events.

Fyke Netting

Where practicable pre-works netting will be carried out in each reach using fine mesh fyke nets set at appropriate intervals if depths/vegetation allows. Nets will be baited, set overnight and cleared the following morning. Nets will be deployed with an air gap if dissolved oxygen levels are low to ensure fish can gulp air from the surface.

Netting will continue over consecutive nights for a minimum of three nights and until the mean catch rate within a salvage site fall to less than 0.25 fish/ trap/ night. Any fish captured will be handled as per protocols set out in the Fish Capture and Handling section below.

If fyke nets cannot be deployed, then the electric-fishing method will be used ensuring multiple passes and all instream habitat is surveyed.

Electric Fishing

On the day that trapping and/or netting in the impact section has reached the target catch rate, the section will be electric fished as a final check that fish have been removed. Electric fishing will involve multiple passes carried out in short sections to maximise fishing effort and to ensure as many fish as possible are captured prior to diversion.

After the ecologist is satisfied that electric fishing has captured as many fish as possible, the fished reach can be isolated (e.g., bunded) and diverted into temporary diversion channels and / or completed and stabilised.

2.5.3 Stage 2 - Dewatering Relocations

Fish (e.g., mostly eels) are likely to remain in streams even after netting/trapping and intensive electric fishing. It is proposed that any remaining fish will be salvaged during the dewatering stage when water is diverted into temporary diversion channels and the impact section isolated.

Any fish observed moving within the channel during the dewatering stage when water levels are lowered will be captured using hand-held nets and/or the potential use of an electric fishing machine if it is safe to do so. Any fish observed will be captured using hand-held nets and handled as per protocols set out in the Fish Capture and Handling section below.

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2.5.4 Stage 3 - Excavation Relocations

After dewatering, there is still potential for eels to be present within the channel as they can burrow into streambanks or the soft-bottomed silt/mud bed.

During the excavation stage, any material removed from the channel and deposited into designated holding areas will be inspected by the ecologist or contractor under the direction of the ecologist. Any fish observed will be captured using hand-held nets and handled as per protocols set out in the Fish Capture and Handling section below.

2.5.5 Stage 4 - Post Diversion Relocations

Following the completion of the dredging and the rehabilitation of the re-connected channel, exclusion nets will be installed at both ends of the diversion reach and fish will be salvaged using the methodology described in Section 2.42.

2.6 Fish Capture and Handling

The following procedures will be followed for the transfer of native fish or pest fish.

- All fish captured will be immediately transferred into a clean bucket or fish bin of water from the existing habitat and placed in a well-shaded location. Water may be collected from the release site to ensure it is cool and of good quality.
- Multiple fish bins will be used if there are large numbers of fish captured to reduce stress on captured fish.
- Battery powered aquarium pumps will be used to maintain dissolved oxygen in fish bins if required.
- Fish will be checked to ensure that all aquatic plant material is removed prior to transfer into the bucket/fish bin.
- Native fish will be monitored and released within two hours of capture if water quality is poor and fish are displaying signs of stress.
- Pest fish or diseased fish will be humanely euthanised.

If large numbers of eels are collected, immediately prior to release, eels will be transferred from fish bins into catch bags, to enable safer transport (i.e., carrying by hand) from the vehicle to the release site.

2.7 Fish Release Locations

Best practice during fish relocations is to ensure that the fish are returned to watercourses within the catchment of origin and to sites appropriate for their required habitat type which is set out in Table 1. Furthermore, the majority of fish species on site have a diadromous lifecycle, so wherever the fish are relocated, the site must not impede migrations to and from the ocean.

The location of the site is somewhat unique since it is located adjacent to the ocean and all the watercourses within the site are fed by low order streams originating in small catchments, so the relocation sites are restricted by these factors.

There is also a temporal consideration for movement of fish, in that creeks that will be reinstated for the final time after the dredge has passed through and rehabilitated fully, will likely also provide opportunities as relocation sites.

In some cases, fish may need to be moved multiple times to account for the complexities of the staging and life of the operation. The proposed fish release points are shown on Figure 6

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and in **Error! Reference source not found.**. These sites are considered most suitable given the constraints and habitat requirements, and should be decided upon based the final scheduling and diversion plans and the fish species recovered during the fish salvages.

Table 1: Habitat considerations for fish within the site.

Species	Threat Status*	Habitat
Shortfin eel	Not threatened	Streams, wetlands and drains. Boulders, logs, undercuts in stream banks.
Longfin eel	At risk - declining	Streams, wetlands and drains. Boulders, logs, undercuts in stream banks.
Torrentfish	Naturally uncommon	Fast flowing rapds of rivers and streams.
Redfin bully	Naturally uncommon	Runs and pools of bouldery streams.
Bluegill bully	Naturally uncommon	Swift broken water in open rivers and streams.
Common bully	Not threatened	Low velocity streams, wetlands and lake margins.
Banded kōkopu	Naturally uncommon	Small pools, small streams with pools and riffles andwith rocky substrates.
Kōaro	Naturally uncommon	Fast flowing streams in native forest catchments.
Giant kōkopu	Naturally uncommon	Slow flowing, overgrown boggy streams and swamps and lake margin.
Brown trout	Introducted and naturalised	Cool lakes, rivers and streams.

Note: Species records are based on NZFFDB, eDNA and electric-fishing surveys (Ecological Solutions 2026). *(Dunn et al 2025).

Table 2: Proposed fish release sites.

Site code	Location	NZTM 2000	
		Northing	Easting
CC1 (During mining - diversions)	Clarke Creek	5323546	1462063
CC2 (Post mining option)	Central Creek	5324278	1461087
NC1 (Post mining option)	Northern Creek	5325131	1461034
GC1 (During mining - diversions)	Granite Creek	5321854	1461948
LG1 (During mining - diversions)	Little Granite Creek	5323235	1461943
LG2 (Post mining option)	Little Granite Creek	5323115	1460870

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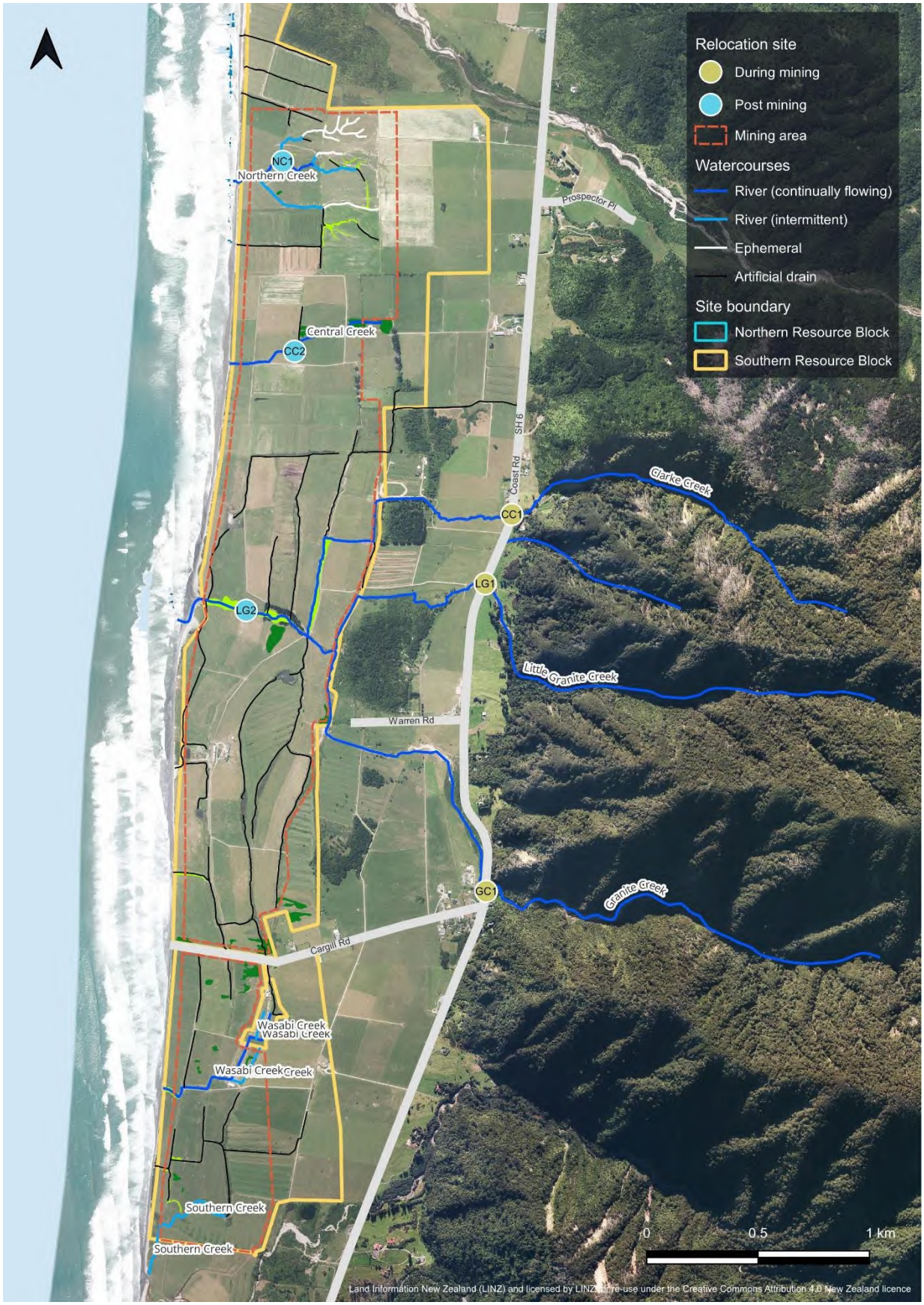

Figure 7: Fish relocation sites.

3.0 Reporting

The Consent Holder will report the results of the fish relocation work to the consent holder and West Coast Regional Council within one month of completing each stage. Results will include the following information:

- Fish species caught.
- Number caught.
- Health / condition.
- Location of capture.
- Location of release.

Results from a given year will also be incorporated into the annual environmental monitoring report to be provided to the West Coast Regional Council, Department of Conservation and Ngāti Waewae.

4.0 References

Dunn, N.R., Allibone, R.M., Closs, G.P., Crow, S.K., David, B.O., Goodman, J.M., Griffiths, M., Jack, D.C., Ling, N., Waters, J.M. and Rolfe, J.R. 2025. Conservation status of New Zealand freshwater fishes, 2017. New Zealand Threat Classification Series 24. Department of Conservation, Wellington. 11 p.

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Appendix F: Draft Lizard Management Plan

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ecoLogical Solutions
Environmental Consultants

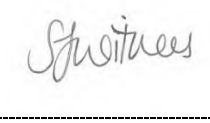
March 2026

Barrytown South Mineral Sand Project
Lizard Management Plan

Submitted to:
Tāiko Critical Minerals Limited

Quality Assurance

This report has been prepared and reviewed by the following:

Prepared by:	Dr Sarah Withers Ecologist	
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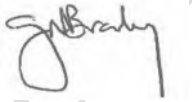
Reviewed by:	Gary Bramley Terrestrial Ecology Team Leader	

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1.0 Introduction

1.1 Background

Tāiko Critical Minerals Limited ('Tāiko') holds resource consents from the Grey District and West Coast Regional Councils for mineral sand mining near Barrytown, approximately 34km north of Greymouth. Tāiko is proposing to develop the 'Southern Block' (SB), located between Canoe Creek and Fagan Creek, approximately 408ha in extent and referred to here as 'the Site'. Activity would involve mining within the 'mining disturbance area' as well as earthworks outside this area but within the consented area shown in Figure 1.

This Lizard Management Plan (LMP) for the the Site outlines for how effects on lizards will be mitigated via search and salvage prior to and during works including responsibilities, relocation sites and monitoring and reporting.

1.2 Lizard fauna and lizard habitat at the Site

Desktop assessment and site surveys conducted as part of an Ecological Impact Assessment (EcIA) by Ecological Solutions Limited concluded that habitat for lizards on site was scarce and low quality, though higher value habitat was present adjacent to, but outside, the mining area in permanent rank pasture, rock piles, cobble and fragments of shrubland. No active survey for lizards using passive or active capture devices was undertaken.

Lizard species present near the Site are shown in Despite the highly modified and disrupted nature of the pasture habitat which comprises the majority of the Site, the lack of regular grazing of parts of the Site south of Cargill Road means that native skink species may be occupying that habitat, which would be mined during Years 12 and 13 of the Project as shown in Figure 1. Habitat for lizards is of slightly better quality outside the mining disturbance area and includes rank pasture, woody debris and cobblestone habitat which may provide refuge for Newman's speckled skink and Canterbury grass skink.

and include two species of native gecko (forest gecko - *Mokopirirakau granulatus* and West Coast green gecko - *Naultinus tuberculatus*) and one skink (Newman's speckled skink – *Oligosoma* aff. *newmani* "Westland"). The site is also within the known distribution of Canterbury grass skink (*Oligosoma aff. polychroma Clade 4*).

The gecko species are both primarily arboreal and so are unlikely to be using habitat within the mining area due to the lack of mature vegetation, the small, isolated and highly fragmented nature of the immature indigenous vegetation, the prevalence of highly modified pastoral habitat and the lack of pest control. Newman's speckled skink and Canterbury grass skink are unlikely to occur in the poor-quality habitats within the mining area, but their presence cannot be ruled out. Potential habitat for lizards is mapped in Figure 2, with examples shown in Figure 3. These habitat types include:

- rough exotic pasture (particularly south of Cargill Road);
- patches of indigenous coastal shrubland; and
- patches of flaxland.

Table 1: Lizard species within 10km of the Site

Common Name	Scientific Name	Conservation Status Hitchmough et al (2021)
West Coast green gecko	*Naultinus tuberculatus*	Threatened – Nationally Vulnerable

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Forest gecko	*Mokopirirakau granulatus*	At Risk – Declining
Newman's speckled skink	*Oligosoma* aff. *newmani* "Westland"	Threatened – Nationally Vulnerable
Canterbury grass skink	*Oligosoma* aff. *polychroma* Clade 4	At Risk - Declining

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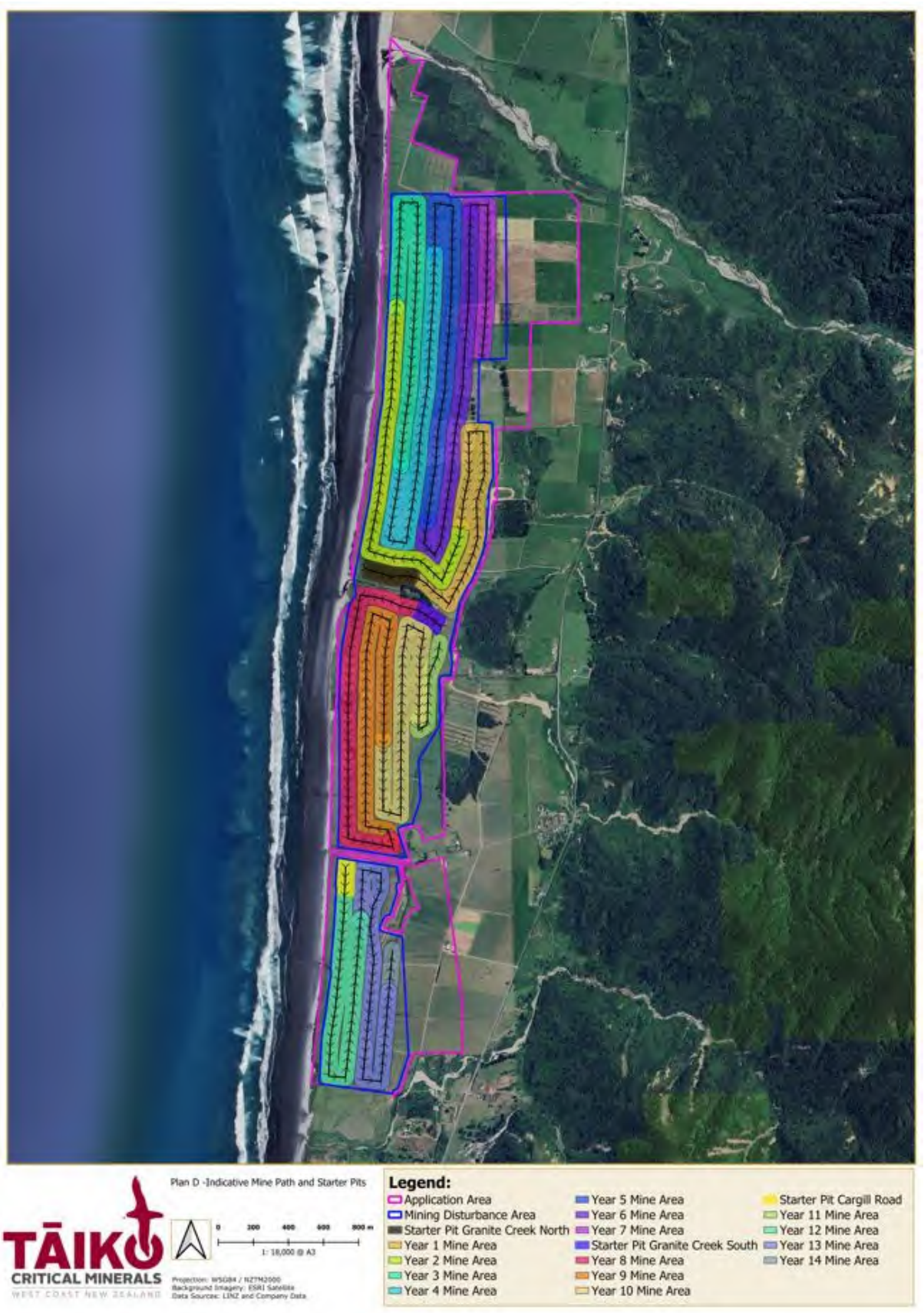

Figure 1: Staging Plan for Barrytown Southern Resource Block.

Location	Vegetation type	Area (ha)
1	Grazed pasture	273.46
2	Shelterbelts	0.32
3	Pine	0.22
4	Pine	0.75
5	Indigenous coastal shrubland	0.75
6	Flaxland	0.25
7	Rough pasture	1.15
8	Rough pasture	2.33

Figure 2: Vegetation types present within Southern Resource Block, Barrytown.

Figure 3: Potential lizard habitat present within SRB mining area, including rough exotic pasture (top), indigenous coastal shrubland (centre), and flaxland (bottom).

Despite the highly modified and disrupted nature of the pasture habitat which comprises the majority of the Site, the lack of regular grazing of parts of the Site south of Cargill Road means that native skink species may be occupying that habitat, which would be mined during Years 12 and 13 of the Project as shown in Figure 1. Habitat for lizards is of slightly better quality outside the mining disturbance area and includes rank pasture, woody debris and cobblestone habitat which may provide refuge for Newman's speckled skink and Canterbury grass skink.

1.3 Purpose and Objectives of Management

The purpose of lizard management is to minimise adverse effects on indigenous lizards during construction and operation.

This will be achieved via:

- Capture and relocation of indigenous lizards from identified lizard habitat to be cleared.
- Construction of artificial refuges (e.g., eco-stack/ piles of logs/branches/stones) in advance of lizard salvage at the lizard release site and then release any captured lizards there.

1.4 Responsibilities

This LMP has been prepared by Ecological Solutions Ltd.

The Consent Holder responsible for submitting this LMP to the West Coast Regional Council for certification and has overall accountability for the implementation of and compliance with this plan and any associated Wildlife Act Authority (WAA) conditions.

The lizard management plan will be implemented by a suitably qualified herpetologist and hold the required permit and valid Wildlife Act Authorisation (Graham Ussher).

1.5 Permits

The capture and relocation of native lizards will be carried out in accordance with a current Wildlife Act Authorisation to be issued by the Department of Conservation attached as Appendix A (To come as part of this Fast Track Application).

2.0 Approach

2.1 Introduction

The approach to lizard management will follow the principles set out by the Department of Conservation for lizard salvage and transfer in New Zealand (Department of Conservation 2019). The nine principles are as follows:

1. Lizard species' values and site significance must be assessed at both the impact (development) and receiving sites.
2. Actual and potential development-related effects and their significance must be assessed.
3. Alternatives to moving lizards must be considered.
4. Threatened lizard species require more careful consideration than less-threatened species.
5. Lizard salvage, transfer and release must use the best available methodology.

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6. Receiving sites and their carrying capacities must be suitable in the long term.
7. Monitoring is required to evaluate the salvage operation.
8. Reporting is required to communicate outcomes of salvage operations and facilitate process improvements.
9. Contingency actions are required when lizard salvage and transfer activities fail.

Due to the extent and nature of the Project activity, and the practical difficulty of searching for and capturing lizards at low densities, complete avoidance of actual or potential adverse effects on indigenous lizards and their habitats cannot be achieved. Mitigation and management of potential adverse effects will involve the implementation of a lizard salvage and relocation campaign in accordance with a Wildlife Act Authorisation, combined with release site habitat enhancement and augmentation as a means of providing additional resources for resident indigenous lizards.

2.2 Pre-mining lizard survey

Prior to any vegetation clearance a lizard survey of potential lizard habitats (including the proposed relocation sites) will be undertaken by a suitably qualified and experienced herpetologist, to allow an assessment of the appropriate approach to lizard mitigation for the site (e.g., extent of provision of habitat at relocation sites). The survey will involve targeted manual searches combined with artificial retreats (ACOs) to ascertain which species are present within the site, their extent and likely densities. During this survey, the location and extent of lizard habitat will be updated to ensure the information informing lizard management is current and identifies all areas for search and salvage. This information will be used to guide the Annual Work Plan and the level of search and salvage actions required.

The data gathered from the pre-mining survey will be used to prescribe the appropriate search and salvage protocol required for each mining section. Three salvage protocols will be operationalised depending on the species and densities found during this survey as follows:

- **Zero Detection Protocol** – if no lizards are found during the pre-mining lizard survey, no search and salvage plans are required. Results of the survey will be provided to the Department of Conservation to be assessed for their validity. In the unlikely event that any injured or incidentally killed lizards are recovered during mining operations, the Department of Conservation will be informed and operations will move to either the 'Not Threatened Species Protocol' (for 'Not Threatened' and 'At Risk' species) or the 'Threatened Species Protocol' (for 'Threatened' species) set out below depending on the species recorded.

- **Not Threatened Species Protocol** – if lizard species with a 'Not Threatened' conservation status (including 'at-risk' species) are detected during the pre-mining lizard survey, then the Not Threatened Species Protocol set out below will be followed. In the unlikely event that any injured or incidentally killed lizards which are regarded as 'Threatened' are recovered during mining operations, the Department of Conservation will be informed and operations will move to the 'Threatened Species Protocol' set out below.

- **Threatened Species Protocol** – if lizard species with a 'Threatened' conservation status are detected during the pre-mining lizard survey, then the Threatened Protocol set out below will be followed.

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2.3 Lizard Salvage

Site demarcation

Prior to undertaking any lizard salvage activities, the extent of the vegetation clearance and earthworks will be clearly marked (e.g., flagging tape, tree dazzle or pegs) to ensure that the project herpetologist and the machine operators clearly understand the full extent of the area of impact. Lizard salvage will be required where vegetation clearance is to be undertaken within identified lizard habitat and/or where non-threatened lizards have been identified during surveys. Examples of these habitat types are shown in Figure 3.

Lizard salvage

A Department of Conservation authorised herpetologist and suitably qualified assistant ecologist(s) will undertake targeted search and salvage campaigns prior to and during vegetation clearance. Vegetation clearance within lizard habitat areas (identified as rough exotic pasture, remnant indigenous coastal shrubland, and flaxland) and therefore lizard search and salvage campaigns, will be undertaken between October and April inclusive. The search and salvage campaigns will be undertaken in two phases.

- *Phase 1:* Pre-vegetation clearance systematic manual habitat searches, use of artificial retreats and a live capture and relocation programme.
- *Phase 2:* Within areas where native lizards are detected, machine assisted destructive search (vegetation clearance supervision at focused areas).

Any lizards found during these phases will be handled and subsequently released following methods set out in Sections 2.4 – 2.8 inclusive at the locations set out in Section 2.9. The specific salvage methods for each of the phases are detailed below.

In the event that a species regarded as 'Threatened' is detected, increased survey effort including a combination of expanded active searching (spotlighting, manual searches other methods as appropriate), increased / more widespread deployment of tracking tunnels and artificial retreats and other methods as appropriate will be implemented over a longer time period as appropriate for the species detected to be determined by the project herpetologist in consultation with the Department of Conservation Lizard Technical Advisory Group.

Phase 1: Pre-vegetation clearance systematic searches and live trapping programme

Systematic Searches

Diurnal (day) searches will be undertaken.

- Day time systematic manual habitat searches will be undertaken within lizard habitat areas to be cleared on days when temperatures are expected to be between 12–20°C and there is no rain. Manual searches will include lifting debris (e.g., logs, rocks, and organic and inorganic material), searching through vegetation foliage, scrub/rank grass and rock piles by hand or with the assistance of rakes.
- All native lizards will be released at the designated release site immediately upon capture and in all cases within no more than two hours.

Live Trapping

The following trap types will be used prior to vegetation removal:

- Artificial Retreats (Lettink 2012) will be installed across lizard habitat areas to be cleared at least six weeks prior to a minimum 4-day trapping period before vegetation clearance commences for 'Not Threatened' and 'At Risk' species. For 'Threatened' species the trapping period will be at least six days and deploy a wider range of capture techniques as appropriate.

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- All native lizards will be released at the designated release site immediately upon capture and in all cases within no more than two hours.

Phase 2. Vegetation clearance supervision and machine-assisted searches

Vegetation clearance supervision and machine assisted searching is a contingency measure, recognising that not every lizard may be captured during Phase 1.

- Destructive searches will involve searching through potential habitat during vegetation removal, and with the assistance of an excavator fitted with a toothed bucket or rake.
- Searches will cover all habitat where native lizards have been detected from the Phase 1 works, within the vegetation clearance area and continue until the supervising ecologist is satisfied that the potential habitats are sufficiently removed or degraded that lizards are unlikely to be present.
- Any lizards captured will be released at one of the designated release sites shown in Section 2.10 within no more than two hours.

Coordination and communication between the supervising ecologist and vegetation clearance contractors will be important to ensure injury to lizards, and the supervising ecologist, is avoided.

2.4 Lizard handling and temporary containment

All lizards will be placed in a temporary containment box, which will be filled with local vegetation matter and leaf litter and misted with water. Lizards will only be held temporarily for the period of the active searches or retreat inspections, or in all cases within less than two hours, by which time the lizards must be transported to and released at the approved relocation site set out in Section 2.11 below.

2.5 Morphometrics

When a native lizard has been captured, the following morphometric and geospatial information will be recorded:

- Species of native lizard;
- Gender;
- Time and date of capture;
- Age class (adult, sub-adult, juvenile);
- Net weight (minus holding container);
- Length – snout-vent, regenerating tail and original tail;
- Reproductive status;
- Photograph taken of animal (dorsal and ventral view to record colour and scale patterns) and habitat; and
- GPS coordinates of capture site and physical mark on high-definition aerial map of location.

In addition, the total time spent searching and number of personnel involved will be recorded to obtain an estimate of captures per unit search effort across days, habitats, and species.

2.6 Unintentional lizard injury or death

Injured lizards will be kept in an appropriate portable enclosure (i.e., a clean, well-ventilated

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plastic container) under the direction of the Project herpetologist to ensure the animal is handled appropriately until the lizard(s) can be assessed and treated.

The following steps will be implemented if any injured or dead lizards are found during the salvage campaign:

- The Project herpetologist will notify DOC (0800 DOC HOT (0800 362 468) at the earliest opportunity within 24 hours after any injured or dead lizard is found;
- Injured lizards found during salvage will be sent to West Coast Vets - Greymouth Clinic (35 Herbert Street, Greymouth 7805. 03 768 0370) as soon as possible for assessment and treatment.
- Any dead 'Threatened', 'At Risk' lizard species will be sent to Wildbase Hospital at Massey University (Manawatu Campus, Turitea 4410 wildbase@massey.ac.nz +64 6 350 5329) for necropsy.
- Appropriate measures will be undertaken to minimise any further lizard deaths.

2.7 Lizard salvage timeframe

The pre-clearance manual habitat searches and live trapping will be undertaken within the lizard season (October-April inclusive), over a period of four days of suitable weather (i.e., temperatures between 12–20°C, rain-free). However, the following contingency plan is proposed to ensure that all reasonable effort is made to salvage every lizard. If:

- No lizards have been caught over the 4-day search/ trapping period or the herpetologist has determined that the habitat is no longer suitable to support lizards, the salvage operation will cease, OR
- Lizards are still being caught on day four, searching and trapping will continue until no lizards are captured within a 24-hour period employing the same search effort.

Given their conservation status, more effort is proposed to salvage 'Threatened' lizards in the event that any are present.

2.8 Lizard habitat enhancement/augmentation

In addition to the mitigation planting provided around wetland and riparian areas, lizard refugia will be constructed ahead of salvage to provide immediate availability for salvaged and released lizards. Refugia habitat will be constructed within the release area using rock/coarse wood debris/log piles to create 'eco-stacks' that will be 1m x 1m in size. At least five eco-stacks will be created prior to vegetation clearance so as to ensure immediate refuge options for released lizards. The actual number of eco-stacks will be informed by the pre-mining lizard survey. If required, in addition to these, eco-stacks will be provided at a ratio of 1:10 (i.e. one eco-stack for every ten lizards salvaged). Eco-stacks are designed to provide adequate refuge habitat and thermal protection for released lizards. Eco-stacks will be created under the supervision of a suitably qualified herpetologist.

2.9 Lizard release

Release site

The successful transfer, re-establishment, and sustainability of relocated lizards is dependent on the quality and suitability of the relocation site. A relocation site should offer equal or greater opportunity (i.e., shelter, food resources, access to mates) for survival and long-term health of lizards compared to the habitat of origin. The approach is to release into sites improved by revegetation planting at locations where habitat was previously unsuitable, but is expected to be suitable as a result of the planting and provision of eco-stacks. This is

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considered appropriate due to the lack of suitable similar habitat nearby and the relatively extensive improved habitat which will be available on site. These habitats will become available as rehabilitation is completed and improve over time.

Since potential lizard habitat is primarily located in areas scheduled to be mined in the later stages of mining, revegetated areas that were planted during the first mining stages will be available. The post mining revegetation is shown in Figure 4. Within these planted areas, the following criteria, adapted from Department of Conservation for lizard salvage and transfer in New Zealand (DOC 2019) have been used in determining a suitable relocation site.

- Habitat quality – ensure the relocation habitat is similar (equal or greater quality), than the original capture site(s).
- Proximity to original population – limit the distance that lizards are relocated from their original capture site(s) to <500 m as much as is practicable.

The designated release sites include suitable habitat within the proposed restoration areas and in planted riparian margins. These areas are inside the SB boundaries, so are in close proximity to salvage areas, and will have been rehabilitated and planted c. 8 – 10 years prior so are expected to provide higher quality habitat than currently exists within the site. Appropriate habitat includes the following habitat types shown in Figure 4.

- Existing vegetation
- New 5m wide riparian planting next to existing creeks
- New native vegetation
- New native planting
- Final wetland riparian planting

Lizards will be released into sections of the appropriate available habitat depending on the densities and locations from which they are salvaged and at a scale matching the habitat lost.

Releases will focus on contiguous ‘riparian planting’ along Granite Creek in the first instance, followed by ‘existing vegetation’ and ‘wetland riparian planting’ areas surrounding and extending from Granite Creek if required (i.e., if the number of lizards salvaged warrants it). These areas provide habitat at a scale consistent with the estimated habitat to be lost, but allow for extended releases within connected habitat.

If rehabilitated sites are not available or not suitable when required, another site within the consented area will be selected at the discretion of the project herpetologist. The first option is within the Mean High Water Springs setback area along the western coastal boundary.

Release strategy

All lizards will be hard released (i.e., no staging pens) into appropriately enhanced habitat within the approved relocation site. It is expected that habitat enhancement will assist in achieving high survival and sustainability of relocated lizards at the release site.

All relocated lizard species will be recorded and measured with basic morphometric features photographed where possible and included in reporting as outlined in Section 4.0.

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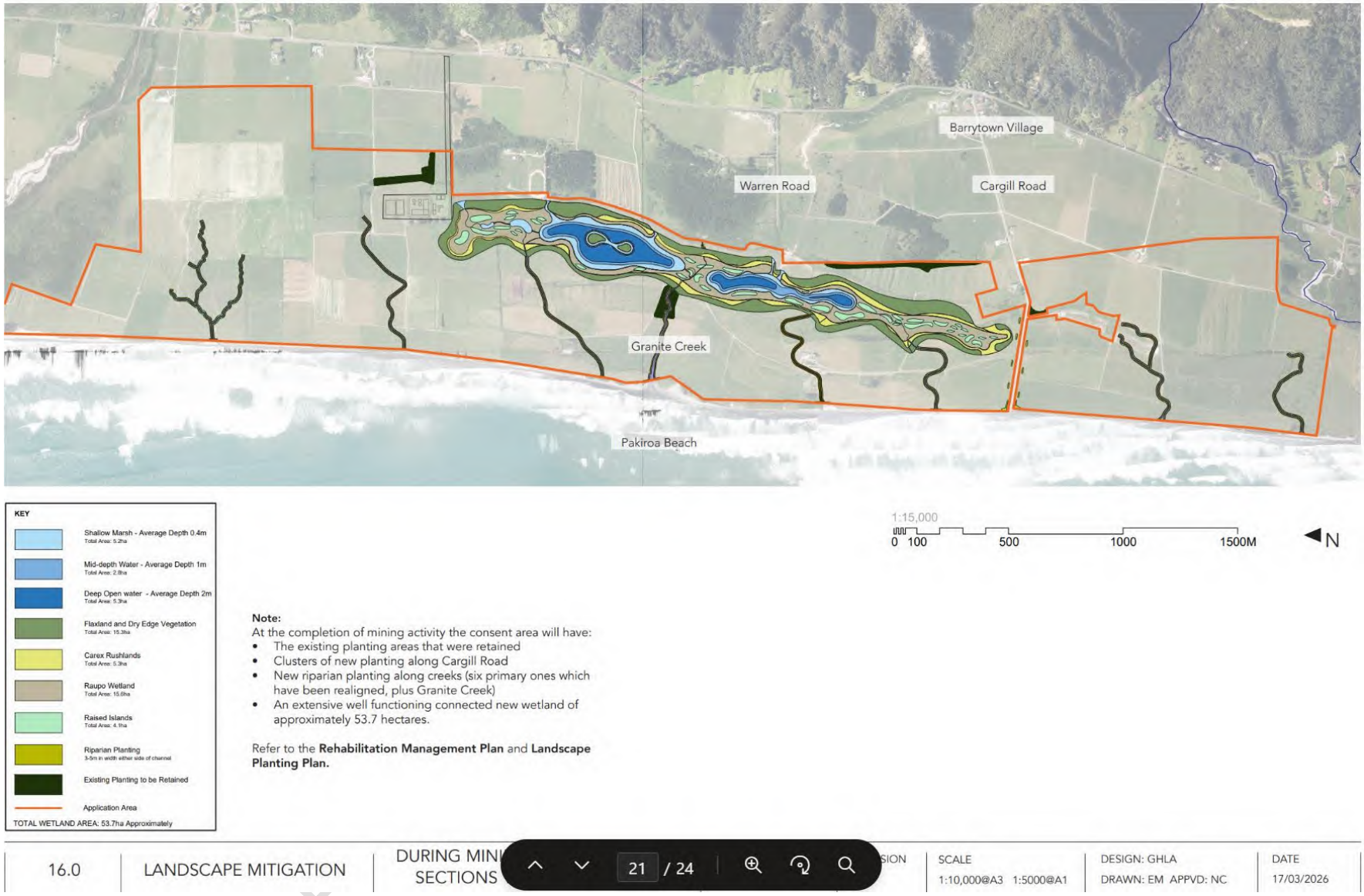

Figure 4. Landscape Mitigation Plan - Post Mining

3.0 Annual Work Plan

To ensure that lizard mitigation actions are coordinated appropriately with mining activity, the Annual Work Plan includes a section for upcoming lizard management as per the approach outlined above. The annual work plan will identify planned clearance areas, appropriate salvage protocols (based on lizard survey results) and potential release areas for the upcoming year so as to ensure the project herpetologist is available to oversee search and salvage operations and that appropriate pre-clearance habitat augmentation has occurred within the release site in advance of it being required.

Search and salvage methods are focussed on the low-quality habitats identified in the EcIA (Ecological Solutions Limited 2026) including rough exotic pasture and fragments of indigenous coastal shrubland and flaxland habitats, as well as any areas where lizards have been identified during pre-mining detailed lizard surveys.

The relevant phases for work planning should include:

Action	Timeframe
WAA	Obtained as part of the Site authorisations (i.e., prior to vegetation clearance occurring).
Pre-mining lizard survey	No more than six months prior to commencement of mining prior to Annual Work Plan finalisation
Establishment of ACO's	At least six weeks prior to vegetation clearance
Confirmation of specific release location	Prior to vegetation clearance
Habitat enhancement (creation of refugia/eco-stacks)	At least six weeks prior to vegetation clearance
Phase 1: manual searches and live trapping	Four days prior to vegetation clearance
Phase 2: clearance supervision and machine salvage	During vegetation clearance
Release of salvaged lizards	As salvaged, during vegetation clearance

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4.0 Reporting and Closure

The project herpetologist will report the results of the lizard relocation work to Tāiko Critical Minerals, the local Department of Conservation office and West Coast Regional Council within 20-days of completion. Results of lizard salvage including the methods applied, number of lizards salvaged and where they were released and will be reported to the Department of Conservation by way of an Amphibian and Reptile Distribution Scheme (ARDS) card and in accordance with any specific Wildlife Act Authorisation conditions by 1 October each year for the life of this Approval (covering the proceeding 1 July – 30 June period).

Results will include the following information:

- Date and time of capture.
- Capture method(s).
- Lizard species caught.
- Number caught (including any accidently killed).
- Length range.
- Health/condition (i.e., visible disease or injury).

- Location of release.

The Project herpetologist will notify DOC at the earliest opportunity within 24 hours after any injured or dead lizard is found. All lizard capture data will be uploaded to the DOC Herpetofauna Database.

5.0 References

Ecological Solutions Limited. 2026. Draft Ecological Impact Assessment. Unpublished report prepared for Tāiko Critical Minerals by Ecological Solutions Limited, Kāeo. February 2026.

Lettink, 2023: Herpetofauna: artificial retreats. DOC Science Internal Series DOCDM-797638. Department of Conservation, Wellington.

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Appendix G: Landscape Mitigation Package

GLASSON HUXTABLE
LANDSCAPE ARCHITECTS

BARRYTOWN MINERAL SANDS PROJECT: SOUTHERN BLOCK

LANDSCAPE MITIGATION PACKAGE

MARCH 2026 - REVISION D

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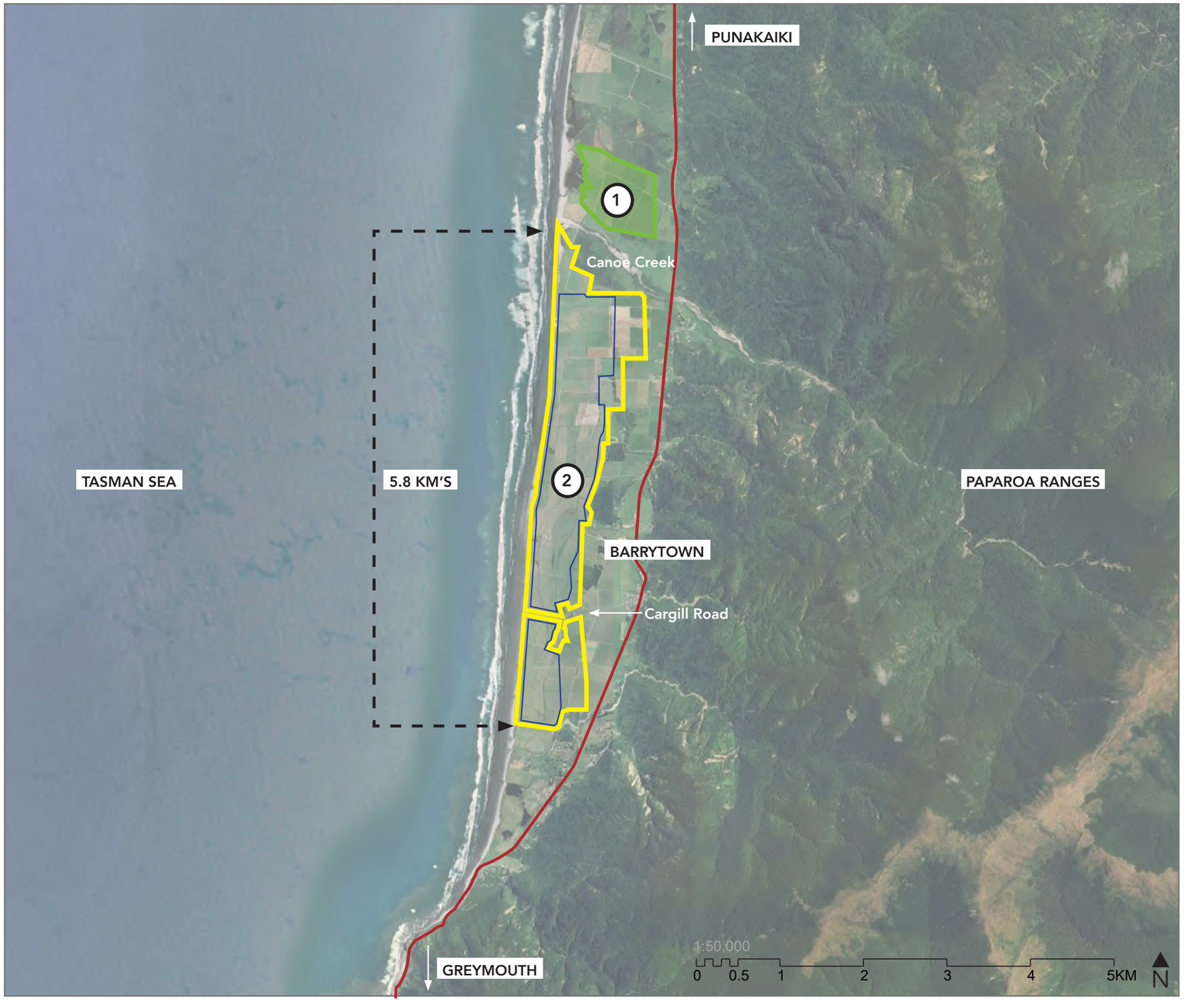
1.0 PROPOSED MINING AREA



KEY

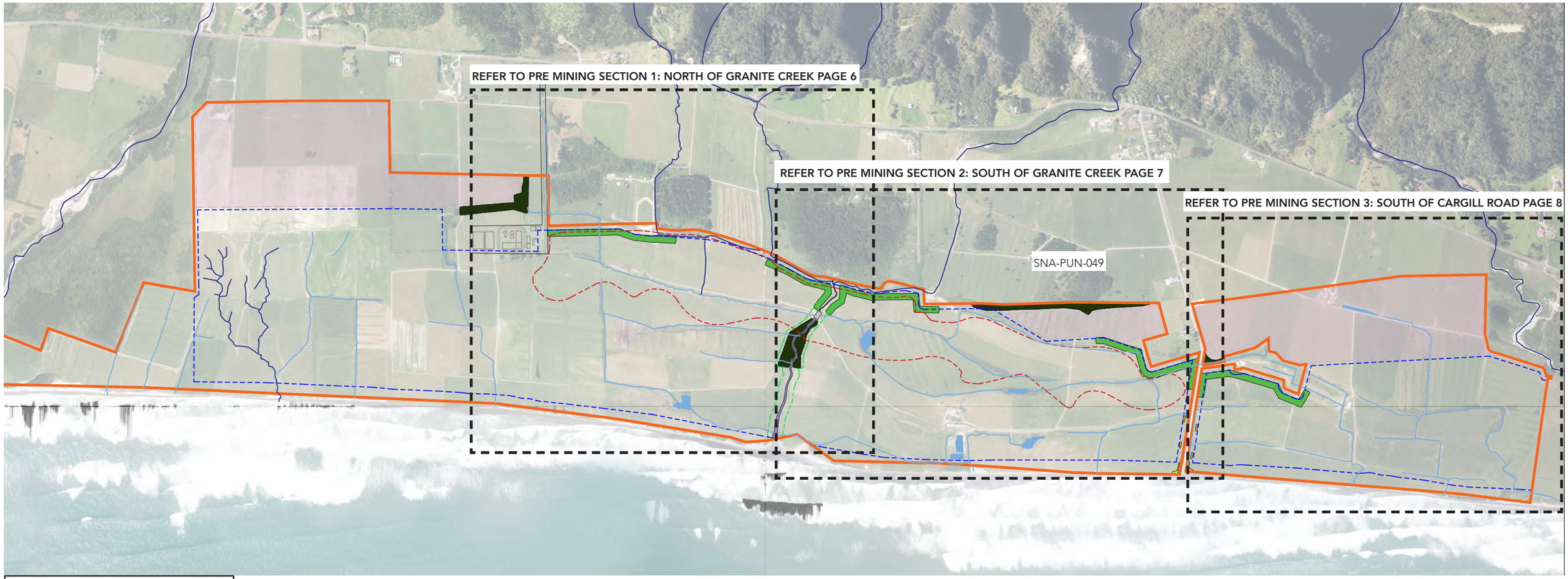
- PREVIOUS APPLICATION AREA (CONSENTED)
- PROPOSED APPLICATION AREA
- PROPOSED MINING DISTURBANCE AREA
- COAST ROAD/ STATE HIGHWAY 6

1 **CENTRAL BLOCK (CB)**
A favorable decision for the CB Mineral Sands Project was delivered by commissioners in April 2024 but was subsequently appealed. A successful resolution was reached in October 2024.
This area is not part of this application.

2 **SOUTHERN BLOCK (SB)**
This area is part of this Fast Track application and includes the mining disturbance area.

LANDSCAPE MITIGATION - PRE-MINING

2.0 LANDSCAPE MITIGATION - PRE-MINING KEY PLAN



KEY

- New Native Vegetation
- Retention of Key Vegetation Areas
- New Planted Bunds (For noise and visual purposes)
- Granite Creek (To be retained)
- Application Area
- Mining Disturbance Setback (Typically 20m Wide Unless Indicated Otherwise)
  - 20m from SNA-PUN-049
  - 20m from private property boundaries outside SRB
  - 20m from Granite Creek
  - 50m from MHWS
- 20m Setback from Granite Creek
- Existing River
- Existing Drain
- Future Wetland Area
- Earthworks (Beyond mining disturbance area for rehabilitation and bund construction)

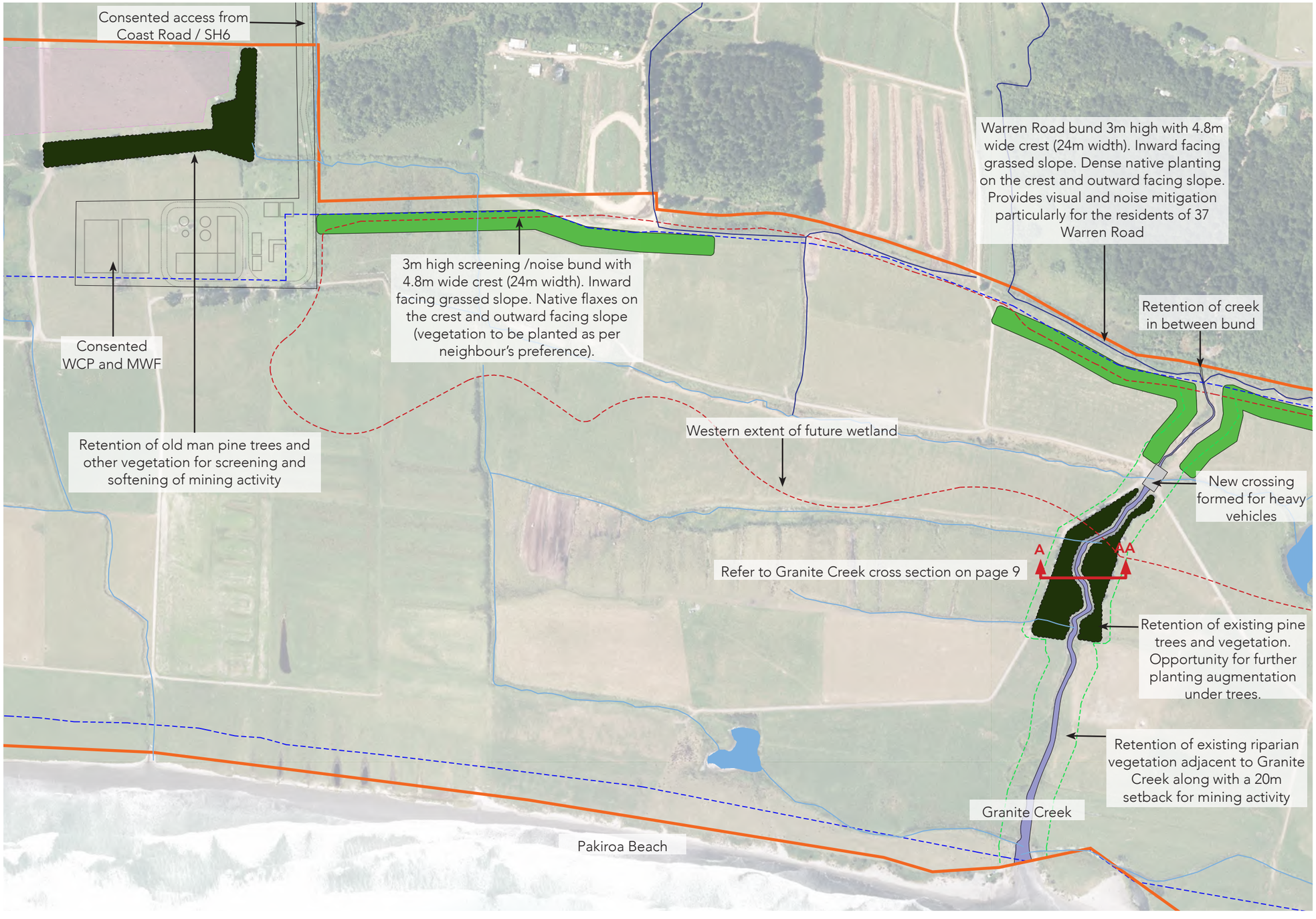
1:15,000

0 100 500 1000 1500M N

Note:
The aim of this Pre-Mining Key Plan is to set out the different landscape areas to undergo landscape mitigation prior to mining commencing. Each of the black boxes refers to an individual sheet (page). These pages correspond with the Mining Sections (stages) outlined in the Project Description accompanying the application.

Refer to the **Landscape Planting Plan** for further detail.

3.0 LANDSCAPE MITIGATION - PRE-MINING SECTION 1: NORTH OF GRANITE CREEK



1:5,000

0 50 100 200 300 400 500M N

KEY

- Retention of Key Vegetation Areas
- Granite Creek (To be retained)
- New Planted Bunds (For noise and visual purposes)
- Application Area
- Mining Disturbance Setback (Typically 20m Wide Unless Indicated Otherwise)
  - 20m from SNA-PUN-049
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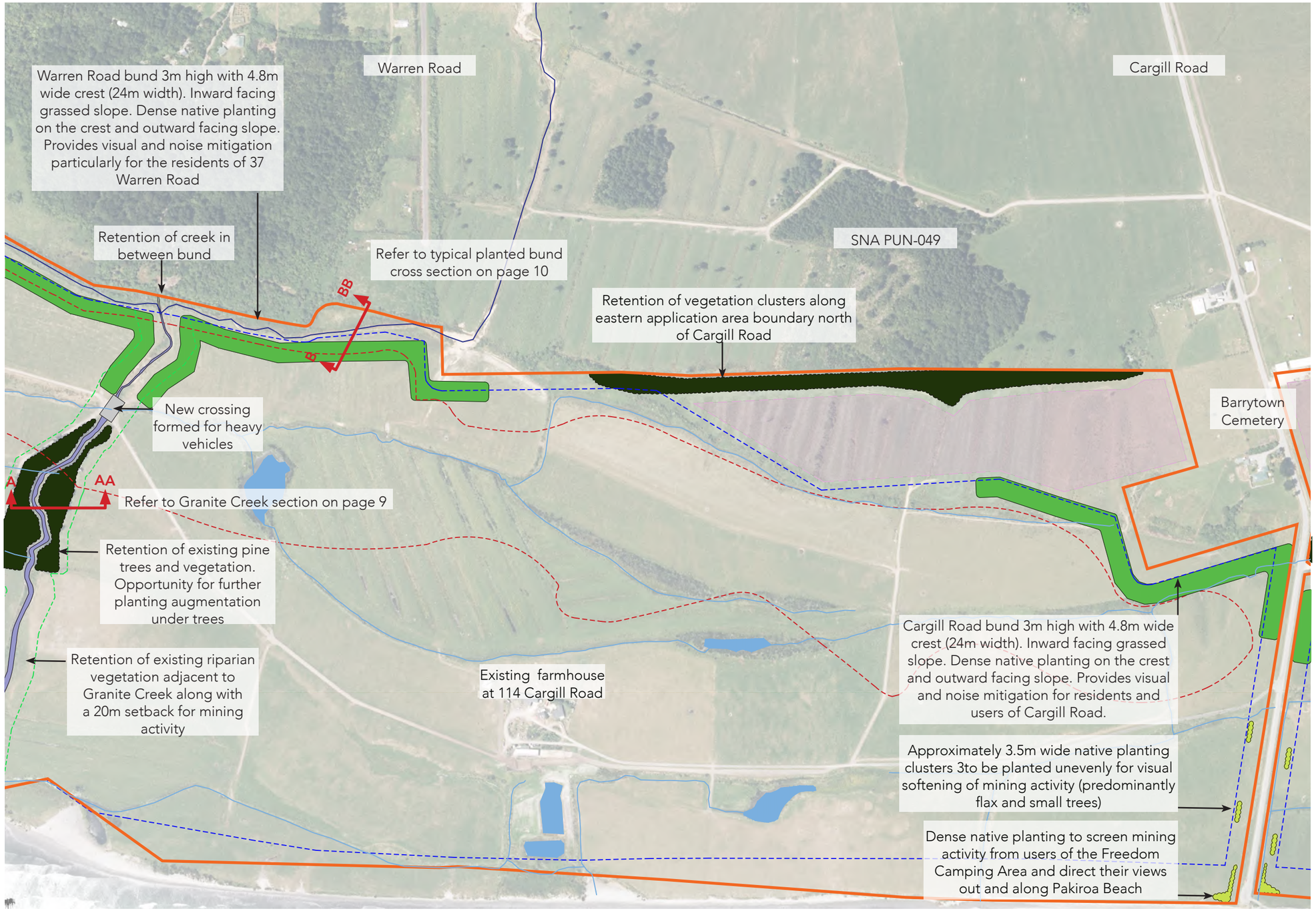
- Earthworks (Beyond mining disturbance area for rehabilitation and bund construction)

Refer to the **Landscape Planting Plan** for further detail.

3.0	LANDSCAPE MITIGATION	PRE-MINING SECTION 1: NORTH OF GRANITE CREEK	PROJECT NUMBER 2410	REVISION D	SCALE 1:5000@A3 1:2500@A1	DESIGN: GHLA DRAWN: EM APPVD: NC	DATE 17/03/2026

4.0 LANDSCAPE MITIGATION - PRE-MINING SECTION 2: SOUTH OF GRANITE CREEK



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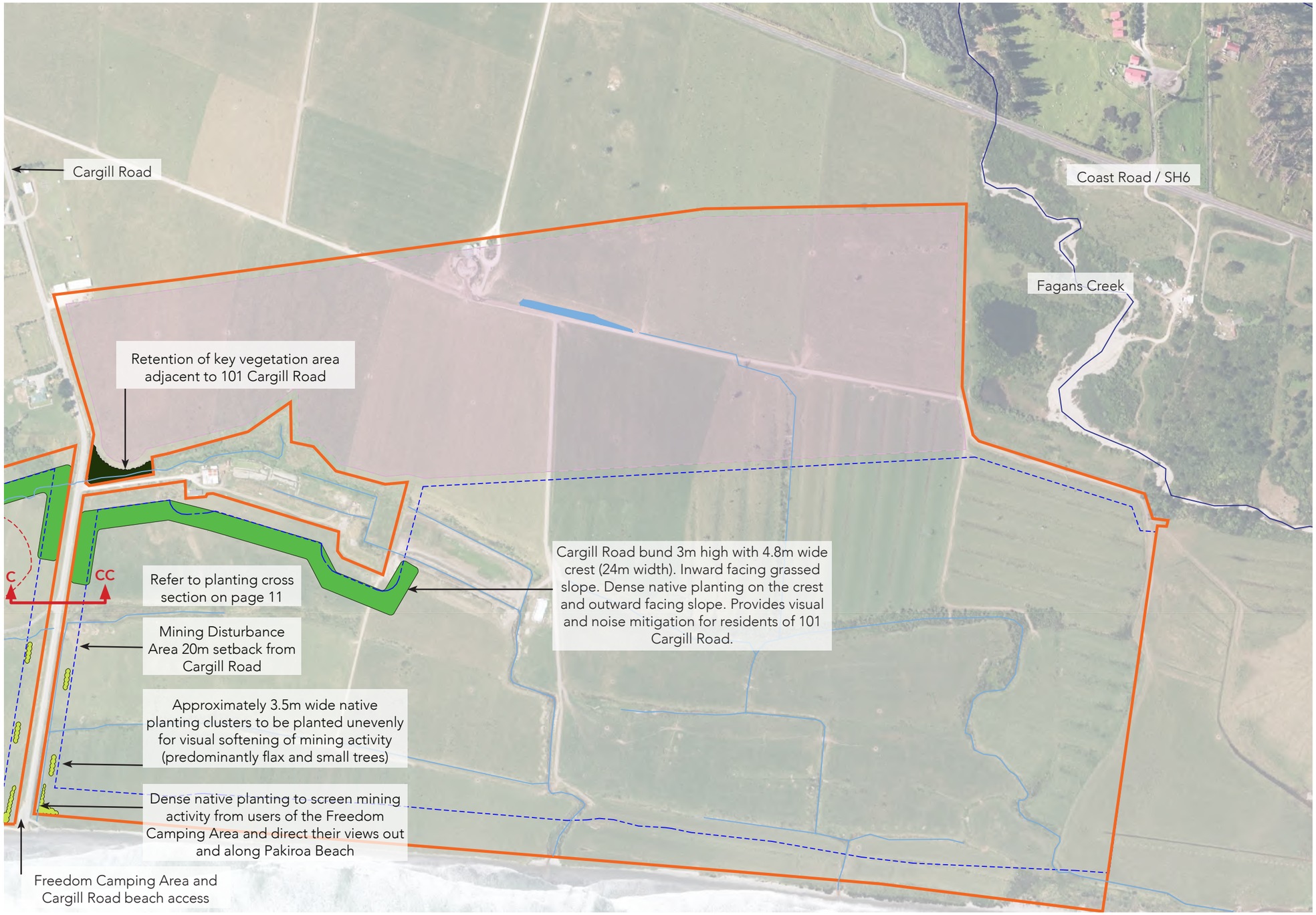
Refer to the **Landscape Planting Plan** for further detail.

5.0 LANDSCAPE MITIGATION - PRE-MINING SECTION 3: SOUTH OF CARGILL ROAD



1:5,000

0 50 100 200 300 400 500M N

KEY

- New Native Vegetation
- Retention of Key Vegetation Areas
- New Planted Bunds (For noise and visual purposes)
- Application Area
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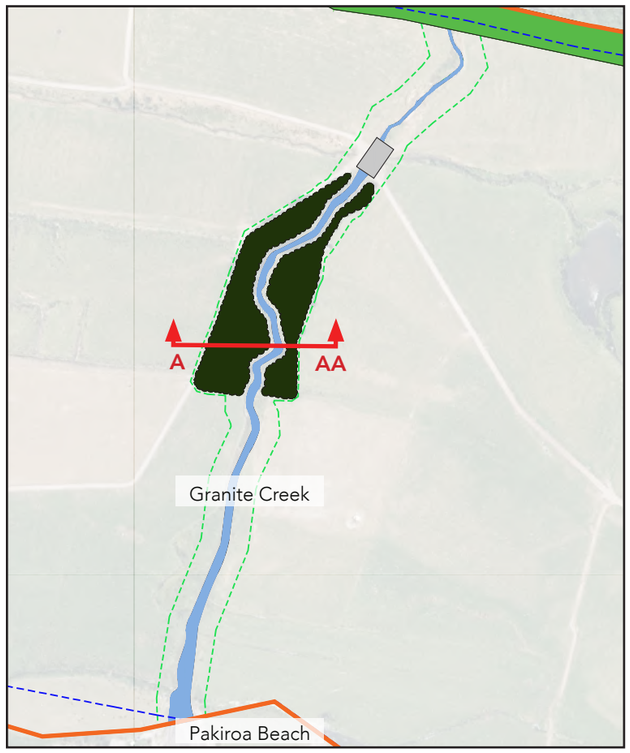
  - 20m from private property boundaries outside SRB
  - 20m from Granite Creek
  - 50m from MHWS
- 20m Setback from Granite Creek
- Existing River
- Existing Drain
- Earthworks (Beyond mining disturbance area for rehabilitation and bund construction)

Refer to the **Landscape Planting Plan** for further detail.

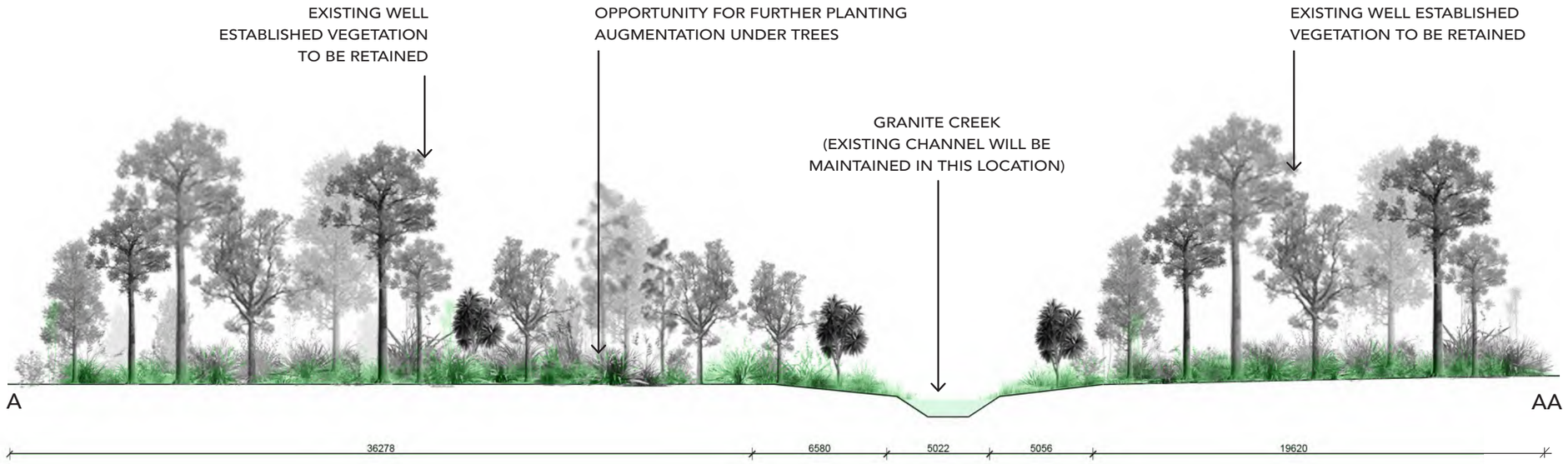
5.0	LANDSCAPE MITIGATION	PRE-MINING SECTION 3: SOUTH OF CARGILL ROAD	PROJECT NUMBER 2410	REVISION D	SCALE 1:5000@A3 1:2500@A1	DESIGN: GHLA DRAWN: EM APPVD: NC	DATE 17/03/2026

6.0 LANDSCAPE MITIGATION - PRE-MINING GRANITE CREEK



KEY PLAN - PRE MINING SECTION 1 FROM PAGE 6

Existing planting adjacent to Granite Creek (to be retained)

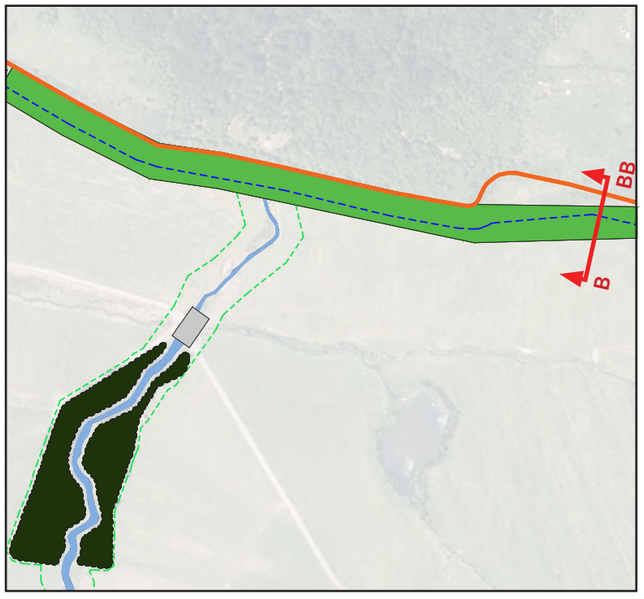


Refer to the **Landscape Planting Plan** for further detail.

SECTION A-AA_GRANITE CREEK SECTION - VEGETATION TO BE RETAINED
SCALE 1:250

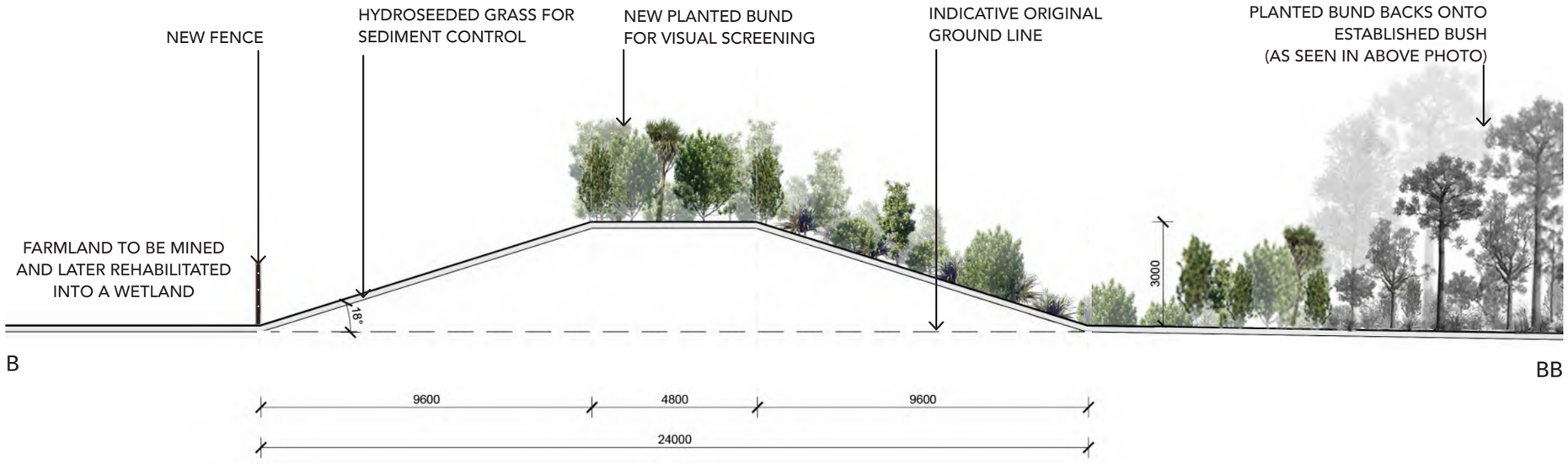
6.0	LANDSCAPE MITIGATION	PRE-MINING GRANITE CREEK	PROJECT NUMBER 2410	REVISION D	SCALE 1:250 @ A3	DESIGN: GHLA DRAWN: EM APPVD: NC	DATE 17/03/2026	9

7.0 LANDSCAPE MITIGATION - PRE-MINING PLANTED BUNDS



KEY PLAN - PRE MINING SECTION 2 FROM PAGE 7

Existing farm environment and adjacent bush, near where the new Warren Road planted bund will be located



B-BB BUND _ TYPICAL 3M HIGH BUND
SCALE 1:150

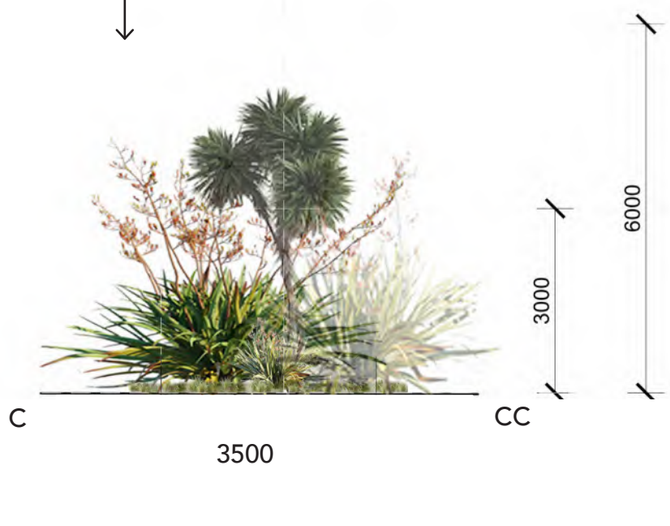
Refer to the **Landscape Planting Plan** for further detail.

8.0 LANDSCAPE MITIGATION - PRE-MINING CARGILL ROAD NATIVE PLANTING

KEY PLAN - PRE MINING SECTION 3 FROM PAGE 8

INDICATIVE CLUSTER SCREENING PLANTING - PLAN
SCALE 1:100

MULTIPLE ROWS OF STAGGERED VISUAL SCREENING FOR SOFTENING OF MINING ACTIVITIES
(Mixture of flax and small trees).



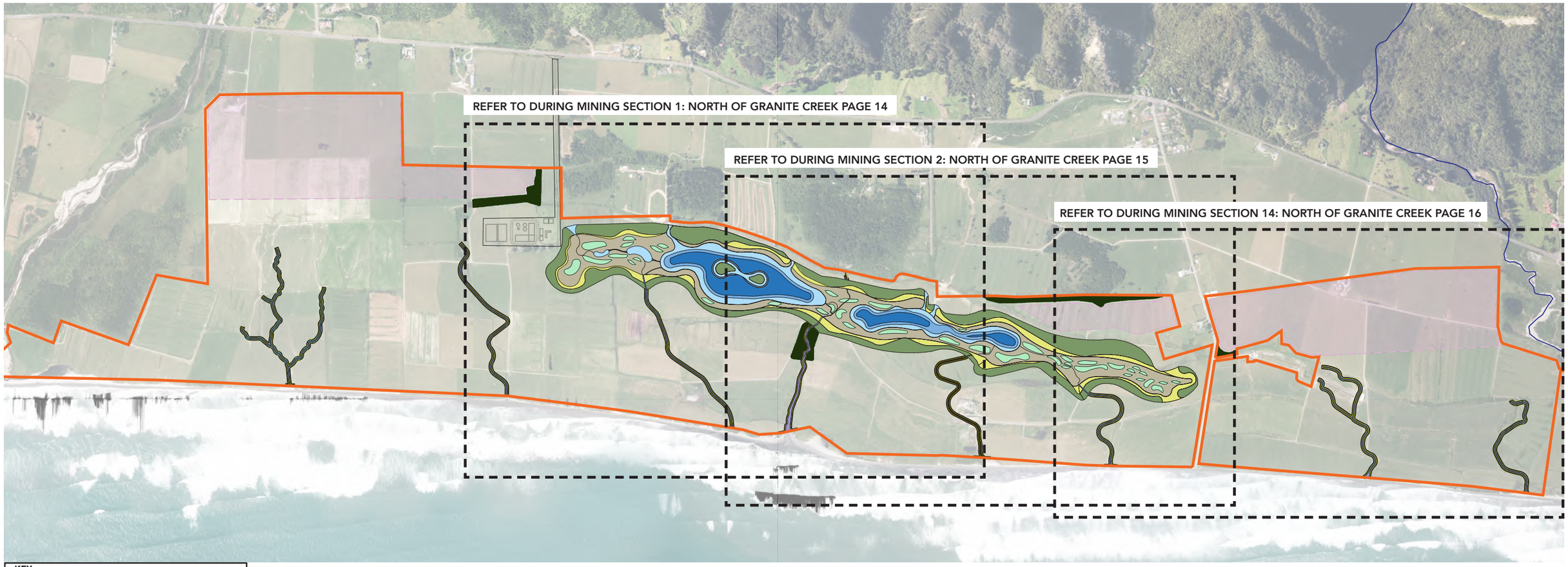
INDICATIVE CLUSTER SCREENING PLANTING - SECTION C-CC
SCALE 1:100

Notes:
The section shows a typical design for the clusters of planting that will be implemented along Cargill Road within the 20 metre setback area. The aim is to screen and soften some of the mining activity when it comes closest to Cargill Road. This is balanced with the desire to maintain some views up and down the coast and not create a 'tunnel' effect along Cargill Road.

Refer to the **Landscape Planting Plan** for further detail.

LANDSCAPE REHABILITATION - DURING MINING

9.0 LANDSCAPE REHABILITATION PLAN - DURING MINING KEY PLAN



KEY

- Shallow Marsh - Average Depth 0.4m
- Mid-depth Water - Average Depth 1m
- Deep Open water - Average Depth 2m
- Flaxland and Dry Edge Vegetation
- Carex Rushlands
- Raupo Wetland
- Raised Islands
- Riparian Planting
- Existing Planting to be Retained
- Application Area
- Earthworks (Beyond mining disturbance area for rehabilitation and bund construction)

1:15,000

0 100 500 1000 1500M

N

Note:
The aim of this During Mining Key Plan is to set out the different landscape areas to be rehabilitated into a large wetland and smaller riparian margins during mining. Each of the black boxes refers to an individual sheet (page). These pages correspond with the Mining Sections (stages) outlined in the Project Description accompanying the application. The end goal is to have a well functioning large connected wetland of about 53.7 hectares in size.

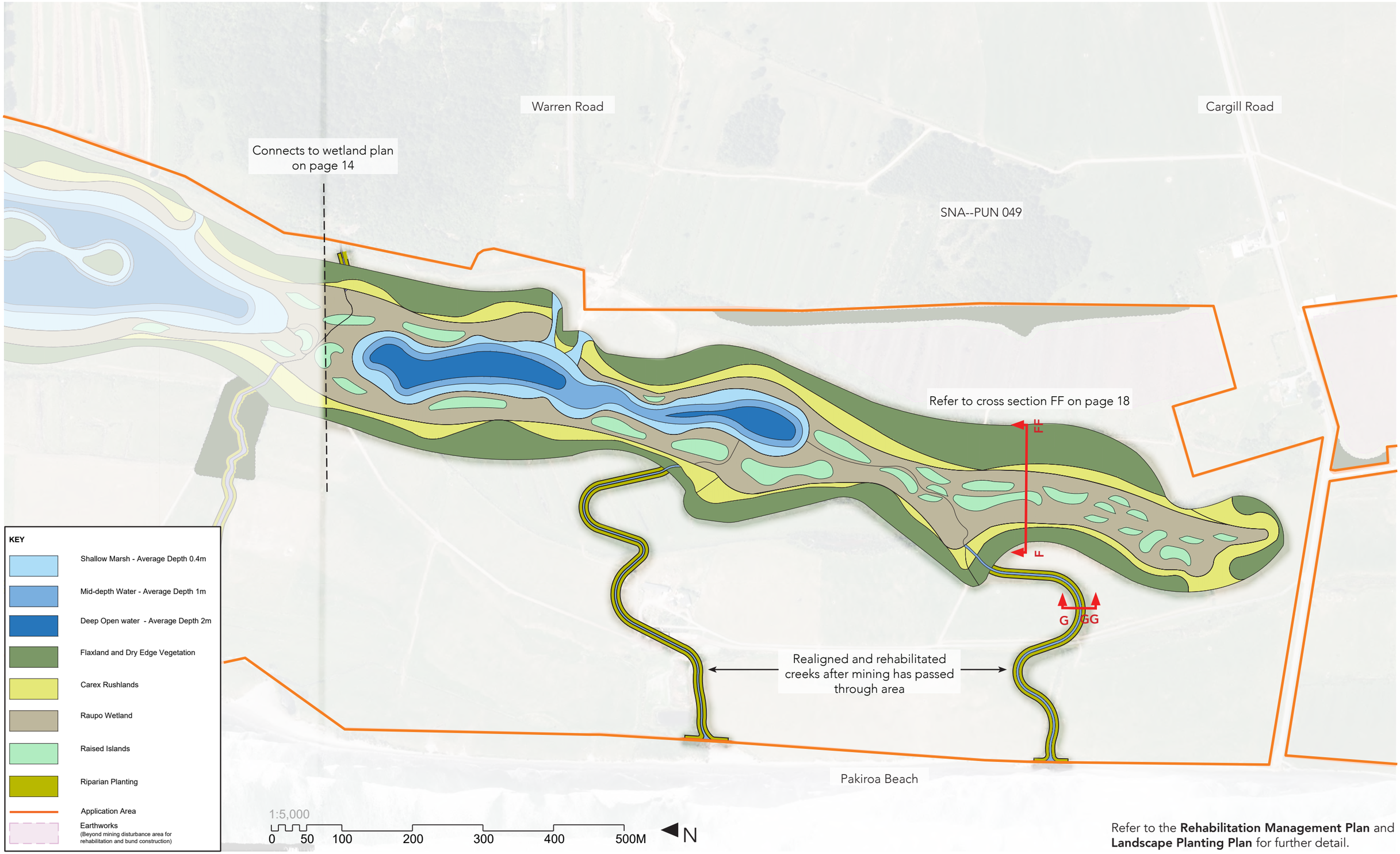
Refer to the **Rehabilitation Management Plan** and **Landscape Planting Plan** for further detail.

10.0 LANDSCAPE REHABILITATION PLAN - DURING MINING SECTION 1: NORTH OF GRANITE CREEK

Refer to the **Rehabilitation Management Plan** and **Landscape Planting Plan** for further detail.

10.0	LANDSCAPE MITIGATION	DURING MINING SECTION 1: NORTH OF GRANITE CREEK	PROJECT NUMBER 2410	REVISION D	SCALE 1:5000 @ A3	DESIGN: GHLA DRAWN: EM APPVD: NC	DATE 17/03/2026	14

11.0 LANDSCAPE REHABILITATION PLAN - DURING MINING SECTION 2: SOUTH OF GRANITE CREEK



Refer to the **Rehabilitation Management Plan** and **Landscape Planting Plan** for further detail.

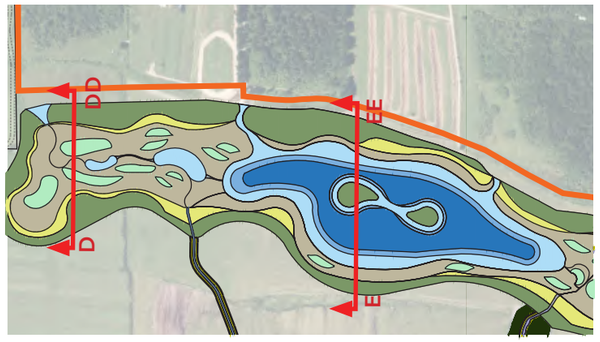
11.0	LANDSCAPE MITIGATION	DURING MINING SECTION 2: SOUTH OF GRANITE CREEK	PROJECT NUMBER 2410	REVISION D	SCALE 1:5000 @ A3	DESIGN: GHLA DRAWN: EM APPVD: NC	DATE 17/03/2026	15

12.0 LANDSCAPE REHABILITATION PLAN - DURING MINING STAGE 3: SOUTH OF CARGILL ROAD

Refer to the **Rehabilitation Management Plan** and **Landscape Planting Plan** for further detail.

12.0	LANDSCAPE MITIGATION	DURING MINING SECTION 3: SOUTH OF GRANITE CREEK	PROJECT NUMBER 2410	REVISION D	SCALE 1:5000 @ A3	DESIGN: GHLA DRAWN: EM APPVD: NC	DATE 17/03/2026

13.0 LANDSCAPE REHABILITATION - DURING MINING SECTION 1: NORTH OF GRANITE CREEK

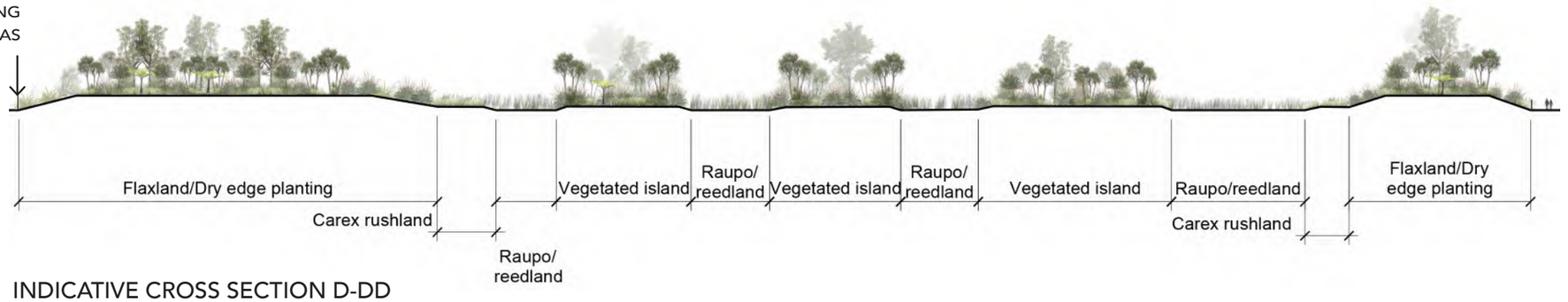


KEY PLAN - DURING MINING SECTION 1 FROM PAGE 14

Notes:
The design and layout of the well functioning large connected wetland has been informed by Landscape Architects, Ecologists and Hydrologists working together.

Refer to the **Rehabilitation Management Plan** and **Landscape Planting Plan** for further detail.

NEW STOCK PROOF FENCING ON THE OUTSIDE OF ALL THE PLANTING AREAS

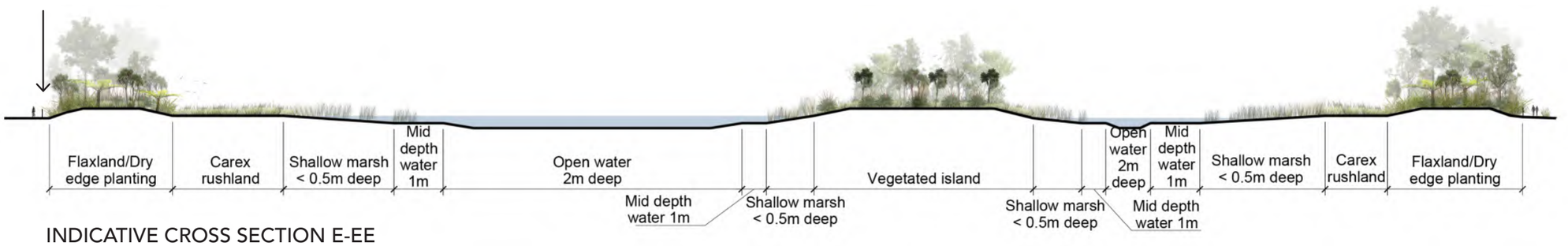


INDICATIVE CROSS SECTION D-DD

1:750

0 5 10 20 30 45 60M

NEW STOCK PROOF FENCING ON THE OUTSIDE OF ALL THE PLANTING AREAS



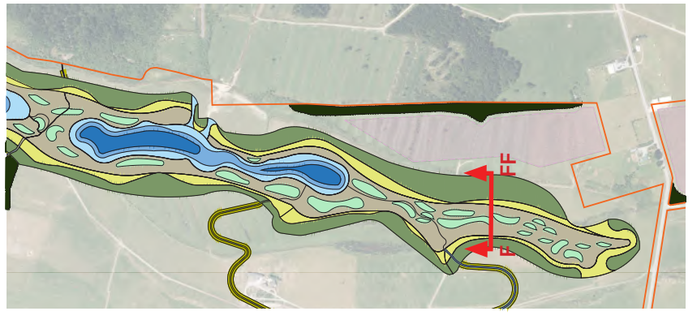
INDICATIVE CROSS SECTION E-EE

1:1,000

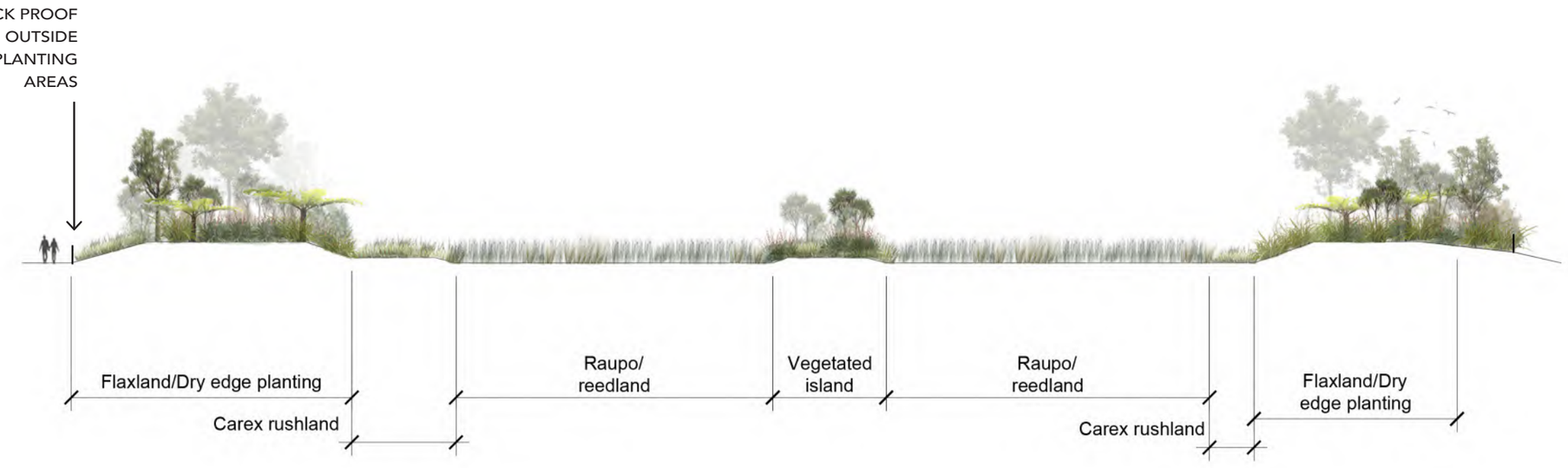
0 10 20 30 40 50 60 70 80 90 100M

13.0	LANDSCAPE MITIGATION	DURING MINING SECTION : NORTH OF GRANITE CREEK	PROJECT NUMBER 2410	REVISION D	SCALE AS SHOWN	DESIGN: GHLA DRAWN: EM APPVD: NC	DATE 17/03/2026

14.0 LANDSCAPE REHABILITATION - DURING MINING SECTION 2: SOUTH OF GRANITE CREEK



KEY PLAN - DURING MINING SECTION 2 FROM PAGE 15



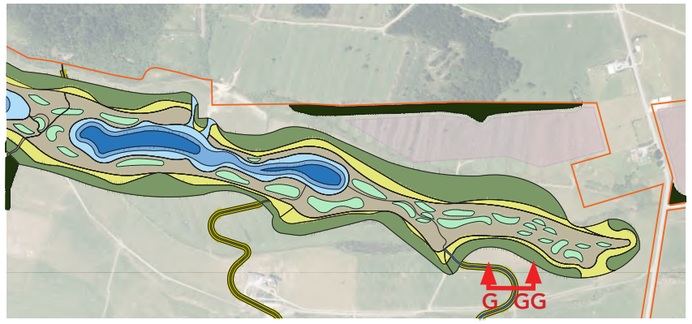
INDICATIVE CROSS SECTION F-FF

1:500

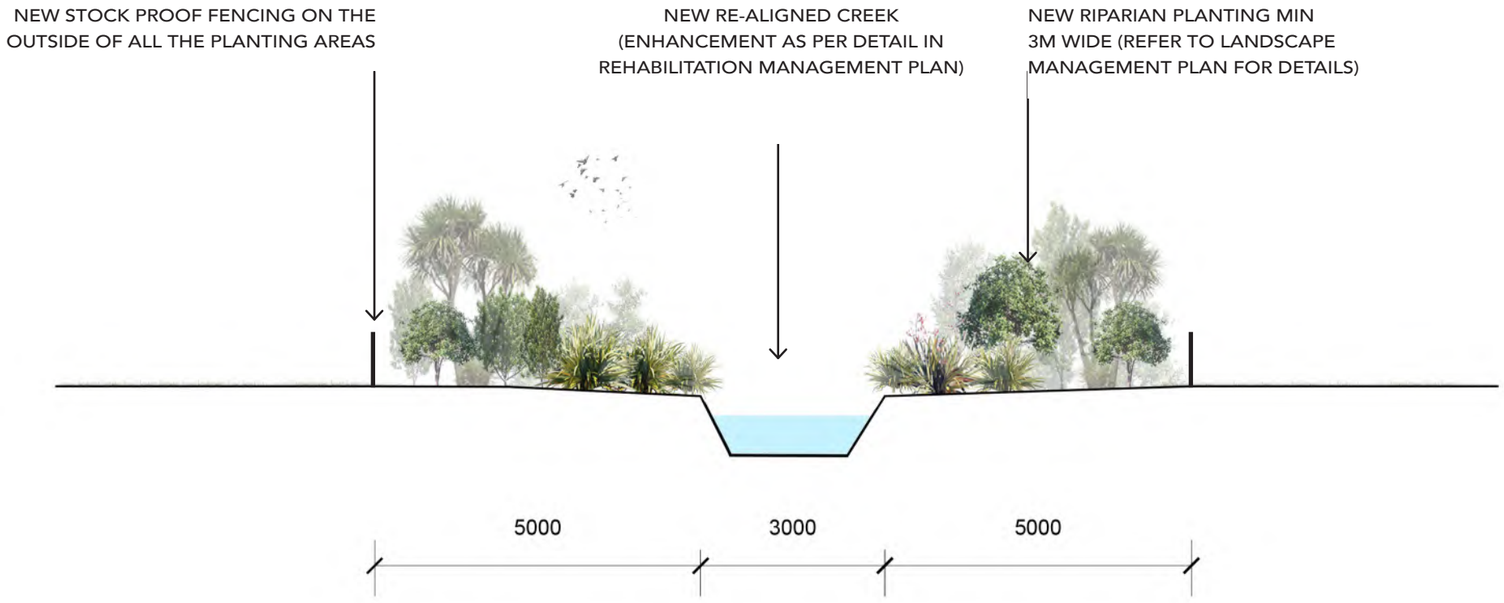
0 5 10 20 30 40 50M

Refer to the **Rehabilitation Management Plan** and **Landscape Planting Plan** for further detail.

15.0 LANDSCAPE REHABILITATION - DURING MINING SECTION 2: REALIGNED WATERWAY



KEY PLAN - DURING MINING SECTION 2 FROM PAGE 15



INDICATIVE CROSS SECTION G-GG

1:500

0 5 10 20 30 40 50M

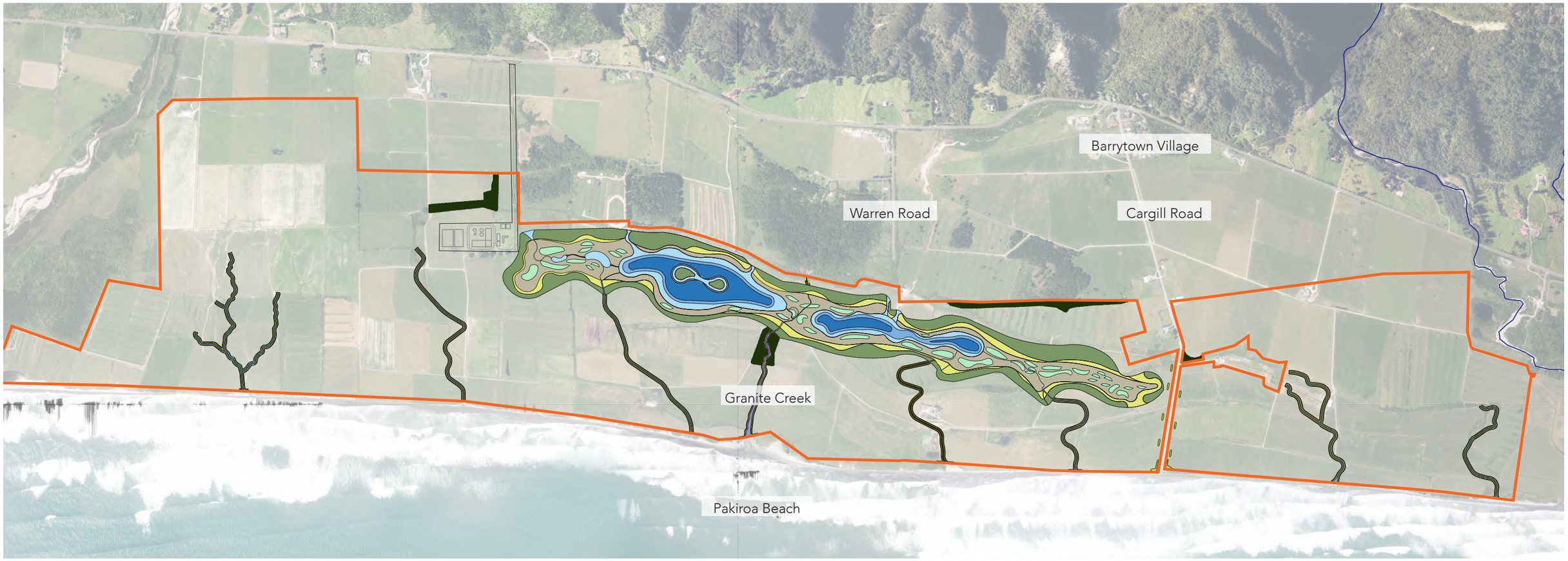
Notes:
Granite Creek will not be realigned.

Granite Creek riparian planting is to be a minimum width of 5m. All other realigned creek riparian planting is to be a minimum width of 3m.

Refer to the **Rehabilitation Management Plan** for stream enhancement details and the **Landscape Planting Plan** for riparian planting detail.

LANDSCAPE REHABILITATION - POST MINING

16.0 LANDSCAPE REHABILITATION PLAN - POST MINING FINAL OUTCOME: SECTIONS 1, 2 & 3 COMBINED



KEY

- Shallow Marsh - Average Depth 0.4m — Total Area: 5.2ha
- Mid-depth Water - Average Depth 1m — Total Area: 2.8ha
- Deep Open water - Average Depth 2m — Total Area: 5.3ha
- Flaxland and Dry Edge Vegetation — Total Area: 15.3ha
- Carex Rushlands — Total Area: 5.3ha
- Raupo Wetland — Total Area: 15.6ha
- Raised Islands — Total Area: 4.1ha
- Riparian Planting — 3-5m in width either side of channel
- Existing Planting to be Retained
- Application Area

TOTAL WETLAND AREA: 53.7ha Approximately

1:15,000

0 100 500 1000 1500M

N

Note:
At the completion of mining activity the consent area will have:

- The existing planting areas that were retained
- Clusters of new planting along Cargill Road
- New riparian planting along creeks (six primary ones which have been realigned, plus Granite Creek)
- An extensive well functioning connected new wetland of approximately 53.7 hectares.

Refer to the **Rehabilitation Management Plan** and **Landscape Planting Plan.**

16.0	LANDSCAPE MITIGATION	DURING MINING FINAL OUTCOME: SECTIONS 1, 2 & 3 COMBINED	PROJECT NUMBER 2410	REVISION D	SCALE 1:10,000@A3 1:5000@A1	DESIGN: GHLA DRAWN: EM APPVD: NC	DATE 17/03/2026

17.0 LANDSCAPE SPECIES AND INDICATIVE GROWTH RATES

Below are the plant species that will be used for mitigation and rehabilitation planting.

- An approximate growth rate of 0.40-0.60m per year has been determined in consultation with the project Landscape Architect [Mrs Crawford] and project Ecologist [Mr Bramley]. The combined experience of these two individuals notes that these plants will sit at a lower growth rate for the first two years following planting, and will have an increase in growth rates in following years. It is also noted that larger individual specimens have a longer 'sitting' period than smaller ones.
- Growth rates can be influenced by seasonal fluctuations, maintenance, moisture/precipitation, exposure, ground conditions, and type of plant species.
- **Note:** The plant species proposed to be used are shown in Schedule of Species below, although other similar species may be used in addition to those listed (e.g., if a particular species is unavailable to source or if for any reason a species is deemed unsuitable at a later stage).
- Refer to the **Landscape Planting Plan** for more detail on planting.

INDICATIVE PLANT GROWTH

Year of growth	Native Plant Height
1	Seed Collection
2	0.4 - 0.6m at planting
3	0.8 - 1.2m
4	1.2 - 1.8m
5	1.6 - 2.4m
6	2.0 - 3.0m
7	2.4 - 3.6m
8	2.8 - 4.2m
9	3.2 - 4.8m

SCIENTIFIC NAME	COMMON NAME	SCREENING	BUND	RIPARIAN	WETLAND	ULTIMATE SIZE (m) wxh
Aristotelia serrata	makomako, wineberry		x	x		3 x 6
Carex geminata	rautahi			x	x	1x1
Carex secta	purei			x	x	1.5 x1.5
Carex virgata	pukio	x	x	x	x	0.5 x 1
Carmichaelia australis	broom	x	x	x	x	2 x 3
Coprosma propinqua	mikimiki	x	x	x	x	2.5 x 5
Coprosma robusta	karamu	x	x	x	x	2.5 x 5
Cordyline australis	tī kōuka, cabbage tree	x		x	x	2 x 6
Dacrycarpus dacrydioides	kahikatea, white pine			x	x	5 x 50
Juncus edgariae	edgar's rush			x	x	1 x 1
Metrosideros robusta	northern rata		x	x	x	3 x 15
Melicytus ramiflorus	māhoe, whiteywood		x	x	x	2.5 x 8
Phormium tenax	harakeke, korari, New Zealand flax	x	x	x		2 x 3
Pittosporum eugenioides	tarata, lemonwood		x	x		3 x 6
Pittosporum tenuifolium	kohuhu		x	x	x	3 x 6
Rhopalostylis sapida	nīkau	x	x			3 x 15
Solanum aviculare var. aviculare	Poroporo	x	x			2 x 3
Typha orientalis	raupō, bull rush				x	1.5 x 2.3

18.0 PLANTING PALETTE

TREES

Aristotelia serrata
Makomako / Wineberry

Carmichaelia australis
Broom

Cordyline australis
Cabbage tree

Dacrycarpus dacrydioides
Kahikatea / White Pine

Metrosideros robusta
Northern Rata

Melicytus ramiflorus
Mahoe / Whiteywood

NATIVE SHRUBS

Pittosporum eugenioides
Tarata / Lemonwood

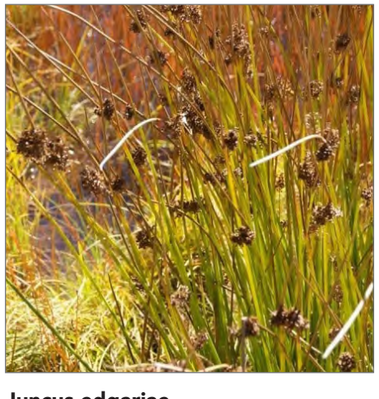
Pittosporum tenuifolium
Kohuhu / Black Matipo

Rhoplostylis spaida
Nīkou

Carex geminata
Rautahi, Cutty grass

Carex secta
Makura Sedge

Carex virgata
Pukio / Swamp Sedge



Juncus edgariae
Wiwi

Coprosma propinqua
Mingimingi

Coprosma robusta
Karamu

Phormium tenax
Harakeke / NZ Flax

Solanum aviculare var. aviculare
Poroporo

Typha orientalis
Raupo /Bull rush

Statement of Evidence – M Fitzpatrick (Water Quality)

In the matter of	an application for approvals under the Fast Track Approvals Act 2024
By	**Tāiko Critical Minerals**
	Applicant

Statement of evidence of Michael George Fitzpatrick in relation to Water Quality

17 March 2026

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Introduction

1 My name is Michael George Fitzpatrick.

2 My role in relation to the application (the application) by Tāiko Critical Minerals (TCM) for approvals relating to the Barrytown Mineral Sands – Southern Resources Block Project has been to provide expert advice in relation to water quality.

3 I contributed to the preparation of the 'Barrytown Mineral Sand Mine: Stages 2 and 3 Ecological Effects Assessment' (Ecological Solutions, 2026a), the Report. which has been provided in support of the application.

Scope of evidence

4 The purpose of this evidence is to:

(a) provide my qualifications and experience relevant to the Report;

(b) confirm my compliance with the Code of Conduct for expert witnesses, contained in the Environment Court of New Zealand Practice Note 2023;

(c) provide a brief summary of the key water quality aspects the Report and confirm its contents; and,

(d) comment on the proposed consent conditions.

Qualifications and experience

5 I hold the degrees of BSc in Chemistry from Waikato University (1985) and PhD in Chemistry from the University of Otago (1989).

6 I have been a scientific consultant for 33 years and work primarily in the areas of have been a director of Mike Fitzpatrick Consulting Ltd since 2003. I have been associated with Ecological Solutions Ltd since 2011 and I conduct all my environmental consulting via them.

7 My previous positions were Chief Scientific Officer at Feedback Research Ltd (2003-2011), Principal Environmental Chemist at Golder Associates (NZ) Ltd and Kingett Mitchell Ltd (1997-2011), Lecturer in Analytical and Environmental Chemistry at the University of Auckland (1995-1997), and Consultant Analyst at Grayson and Associates and Allan Aspell and Associates (1993-1995).

8 My work experience that is relevant to the proposed TCM project includes geochemical, water quality and aquatic toxicity assessments relating to

mineral extraction projects including those at Golden Cross (1997-2007), Mataura (1997-1998), Granity (1997-1998), Rotowaro (1998-2009), Benneydale (1999-2006), Macraes (1999-2010), Endako (Canada, 2000), Reefton (2000-2006), Te Kuha (2002), Stockton (2002-2006), Sadiola (Mali, 2003), Kapan (Armenia, 2006-2011), Waihi (2006-2010), Jinfeng (China, 2007-2009), Tsuneb (Namibia, 2009-2011), Greymouth (2014), and more recently at Coaldale (2021), Takitimu (2022), Maramarua (2022-2025), Barrytown (2023-2025), Rotowaro (2024-2025), Glencoal (2024-2025), and Mananui (2024-2025).

9 I have been involved in the water quality assessments of the Barrytown mineral sands proposals since 2023, and the current Barrytown South proposal since 2024.

10 My role in relation to TCM application, under the Fast-Track Approvals Act 2024 to establish and operate a mineral sands mine at Barrytown South (**application site**), has been to report on baseline water quality and to provide advice on the water quality related effects of the proposed project.

Expert witness Code of Conduct

11 While this application is not being considered by the Environment Court, I confirm that I have read the Code of Conduct for expert witnesses contained in the Environment Court of New Zealand Practice Note 2023 and that I have complied with it when preparing this evidence. Other than when I state I am relying on the advice of another person, this evidence is within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

Summary of water quality

12 My evidence relates to baseline water quality and the effects of the Application on such, and includes:

(a) a review of the existing environment of the Application Site relating to surface water and groundwater quality;

(b) modelling of surface waters following mineral sand excavation and backfilling of slimes and tailings;

(c) an assessment of effects on surface water quality; and,

(d) comments on consent conditions.

The existing environment

13 I visited the application site in April 2024, when I made observations and field measurements, and collected samples for water quality analysis.

14 The several streams and drains at the application site generally exhibit near neutral pH, low to moderate electrical conductivity and total dissolved solids (TDS) concentrations, and low turbidity and total suspended solids (TSS) concentrations. Dissolved oxygen concentrations are moderate to high at surface water sites with visible flows. Stream and drain waters are low to moderate in alkalinity and major cation and anion concentrations, and are classified as soft (i.e., hardness <50 g/m3, as CaCO3).

15 Stream and drain nutrient concentrations are either low or moderate. Ammoniacal nitrogen (Amm-N) concentrations place stream and drain sites in either in the NPS-FM annual median A- or B- attribute states. Nitrate nitrogen (NO3-N) and dissolved reactive phosphorus (DRP) concentrations places stream and drain sites in the NPS-FM A-attribute state for both parameters. With respect to the NPS-FM the attribute bands act as standards for setting national freshwater objectives, with "A" being the healthiest state and "D/E" bands indicating a degraded state below the "national bottom line".

16 Concentrations of dissolved metals and metalloids are low across stream and drain sites and generally meet relevant guideline value concentrations. Total metals and metalloids concentrations are undetectable or low, with the exception of iron and manganese which are present in moderate concentrations in most streams and drains. Iron oxyhydroxide deposition is evident in some surface waters.

17 At wetland and pond sites, there is a tendency to higher turbidity, TSS, major cation and anion concentrations, which in turn results in greater total dissolved solids (TDS) concentrations and electrical conductivities. Total nitrogen (TN) concentrations are elevated versus the other surface water sites, due to organic nitrogen, and organic inputs are also evidenced by elevations in dissolved organic carbon (DOC). Metals and metalloids concentrations are undetectable or low at wetland and pond sites, apart from iron and manganese. Iron oxyhydroxide deposition is evident in some wetlands and ponds.

18 Groundwaters are mildly alkaline, of low alkalinity, and have low metal/metalloid concentrations, apart from iron and manganese. Groundwaters from eastern bores generally have a greater carbonaceous signature, contain higher concentrations of nutrients, and are more

oxygenated than western bore groundwaters. There is no evidence of significant seawater intrusion in groundwater from western bores.

Water quality modelling

19 I have constructed water quality models to conservatively estimate the changes that will occur to groundwater quality, and subsequently the quality of surface waters, following mineral sand excavation and backfilling of slimes and tailings.

20 The models incorporated baseline water quality data and relied on hydrological estimates, and the slimes and tailings geochemistry reported by Kōmanawa Solutions (2025).

21 The water quality models used a mass-balance approach followed by the determination of concentrations of relevant chemical species using ion-association aqueous modelling.

22 Initial model outputs indicated that surface waters receiving modified groundwater could potentially fail to meet surface water quality guidelines for pH and various metals/metalloids, since slimes and tailings porewater has lower pH, is less alkaline, has lower hardness, and has greater metal/metalloid concentrations than baseline groundwater.

23 I then conducted refined modelling, which included lime addition to tailings and slimes prior to deposition in order to raise porewater pH and increase alkalinity and hardness, and this indicated that recipient surface waters would meet relevant water quality guidelines for pH and metals/metalloids.

24 I have subsequently conducted aqueous leaching trials to assess the effectiveness of lime augmentation on Barrytown South minerals sand washed tailings, and to determine leachate quality that simulates post-deposition porewater (Ecological Solutions Limited 2026b).

25 Mixing of hydrated lime (Ca(OH)2) with dry washed tailings ratio of 1:750 (w/w) proved effective in raising hardness and reducing concentrations of metals in the simulated post-deposition porewater.

26 Further lime dosing trials are required to understand optimal treatment regimens. The trials will occur prior to mining as part of establishing operating conditions at the Application Site such that modified groundwater, on mixing with surface waters, meets relevant water quality guidelines for pH and metals/metalloids.

Assessment of effects

27 Conservative modelling of the quality of surface waters that will receive modified, lime augmented groundwater at the Application Site indicates that all relevant water quality guidelines will be met, which will in turn prove protective to aquatic biota.

28 There will likely be some appearance of iron oxyhydroxides in some surface waters, which is the baseline case, but this should not result in smothering of surface water beds.

29 Key to the surface water modelling is that tailings and slimes will require augmentation with lime prior to deposition in order raise porewater pH and hardness and facilitate demobilisation of metals and metalloids.

30 Surface water quality following the proposed mining is expected to be altered in the short to medium term as the plume of modified groundwater moves westward through the mined zone toward the coast, after which quality will revert to baseline as groundwater regains its pre-mining geochemical signatures.

Consent conditions

31 I provided recommendations and have reviewed the proposed consent conditions that relate to water quality, i.e., proposed condition 23 concerning treated mine water, and proposed condition 24 concerning surface water and groundwater.

32 I consider the thresholds that are detailed in Condition 23.1 Tables A and B are appropriate as both discharge and receiving water quality guidelines, and will not result (after reasonable mixing) in discharges that will not give rise to any of the following effects in receiving water:

(a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials:

(b) any conspicuous change in the colour or visual clarity:

(c) any emission of objectionable odour:

(d) the rendering of fresh water unsuitable for consumption by farm animals:

(e) any significant adverse effects on aquatic life.

33 In addition, I consider the establishment of receiving water attribute states for visual clarity and DRP (Condition 23.1 advice note), or the assumption of pristine water quality, prior to the start of mining operations as important, since it will provide sound basis for measurement of environmental performance for the said parameters.

34 I consider consent Condition 24, which relates to water monitoring at the stated key locations, is appropriate both in terms of the suite of parameters and sampling frequency.

35 Notably, I consider Condition 24.4, requiring annual hydrological and water quality reporting, will ensure an appropriate degree of review of ongoing environmental performance.

36 The proposed consent conditions are in accord with those for the mineral sands mine at SH6 Barrytown and another local West Coast sand mining dredge operation that I have been involved in, and I consider them also appropriate for the Southern Block Project.

Conclusion

37 The models I have constructed conservatively estimate the changes that will occur to groundwater quality, and subsequently the quality of surface waters, following the proposed mineral sand excavation and backfilling of slimes and tailings.

38 From my model outputs I conclude that the potential adverse effects of mining due to the discharge of mine water will be avoided both during the operations and upon completion. Critical to my assessment is the need for augmentation of mine water with lime.

39 The effects of the mine water discharge are appropriately managed by the proposed conditions of consent which include the establishment of receiving water attribute states for visual clarity and DRP, appropriate water quality monitoring for a broad suite of parameters, and annual hydrological and water quality reporting.

Michael George Fitzpatrick
Dated this 17 day of March 2026

References

Ecological Solutions Limited. 2026a. Barrytown Mineral Sand Mine: Stages 2 and 3 Ecological Effects Assessment. Report prepared for Tāiko Critical Minerals. March 2026.

Ecological Solutions Limited. 2026b. Lime augmentation trials. Letter report prepared for Tāiko Critical Minerals. March 2026.

Kōmanawa Solutions Limited. 2025. Barrytown South Mineral Sand Project - Hydrological Effects Assessment. Unpublished report prepared for TiGa Minerals and Metals Pty Ltd. Report No: Z24011BTS-Rev0. November 2024.

Statement of Evidence – R Montgomerie (Freshwater Ecology)

In the matter of	an application for approvals under the Fast Track Approvals Act 2024
By	**Tāiko Critical Minerals Limited**
	Applicant

Statement of evidence of Richard Montgomerie in relation to freshwater ecology

27 March 2025

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Introduction

1 My name is Richard Montgomerie. My role in relation to the application by Tāiko Critical Minerals Limited (**the application**) for approvals relating to the Barrytown Mineral Sands – Southern Block Project (**the Project**) has been to provide expert advice in relation to freshwater ecology.

Qualifications and experience

2 I am an owner and the managing director of Ecological Solutions Limited, a specialist terrestrial and freshwater ecological consultancy. I hold the qualification of Master of Science in Freshwater Ecology from Otago University. I have worked as a freshwater scientist and environmental consultant throughout New Zealand since 1998. I have held senior positions at Kingett Mitchell Limited, the Water Research Centre (UK) and Golder Associates, Freshwater Solutions and Ecological Solutions.

3 I specialise in assessing and managing ecological effects in streams and rivers. I have assessed and managed effects in streams on a wide range of projects across rural and urban environments including preparing, implementing and monitoring stream restoration plans. I have undertaken numerous native fish assessments and prepared, implemented and monitored fish relocation and fish habitat restoration plans.

4 Throughout my 27 year career I have led or held senior consulting roles on mining projects including Pike River Coal, Francis Mining – New Creek, Roa, Echo and Rajah, Westland Mineral Sands, Newmont Waihi Gold, and various sand and hard rock mining operations. I was closely involved with the Tāiko (formerly TiGa) – Barrytown North Central Block consenting project and ongoing monitoring.

Expert witness Code of Conduct

5 While this application is not being considered by the Environment Court, I confirm that I have read the Code of Conduct for expert witnesses contained in the Environment Court of New Zealand Practice Note 2023 and that I have complied with it when preparing this evidence. Other than when I state I am relying on the advice of another person, this evidence is within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

Scope of evidence

6 The purpose of this evidence is to:

(a) provide an overview of aquatic ecological values within and immediate to the proposed mine site;

(b) provide an overview of the potential and actual aquatic ecological effects of the proposed construction and operation of the proposed mine with reference to the National Policy Statement for Freshwater Management (2020, amended 2025 the NPS-FM) to inform the assessment and application of the effects management hierarchy; and

(c) comment on the proposed conditions.

Aquatic ecological values and significance

Habitat

7 Granite Creek, Little Granite Creek and Clarke Creek originate in the hills east of SH6 and flow through the Site before discharging to the sea. There are seven highly modified natural creeks and several artificial drains within the Site. Modified natural rivers (creeks) within the Site include, from north to south, an unnamed creek in the northern area of the Site (referred to here as Northern Creek), unnamed creek in the north-central area (referred to here as Central Creek), Clarke Creek, Little Granite Creek, Granite Creek, the unnamed creek referred to here as Wasabi Creek and an unnamed creek in the southern area (referred to here as Southern Creek).

8 The Site is currently used for dairy farming and mostly comprises highly modified 'humped and hollowed' pasture. Granite Creek and Little Granite Creek have been fenced but the majority of the watercourses within the Site are unfenced. The banks of these unfenced streams are typically unstable and subject to erosion and pugging. The watercourses within the Site have been highly modified by mining and farming activities dating back to the 1930s.

9 Aquatic habitat provided by artificial drains was assessed as being of 'low' ecological value as they were not representative of natural stream environments.

10 Northern Creek, Little Granite Creek, Granite Creek and Wasabi Creek were highly modified due to channel realignment, but have retained some natural sections and were assessed as having habitat with 'moderate' ecological value due to the gravel/cobble bed being representative of

natural streams, and the moderately diverse habitat. Clarke Creek was assessed as having aquatic habitat of 'low' ecological value.

Benthic Invertebrates

11 Artificial drains and natural creeks support macroinvertebrate communities that reflect the highly modified habitat conditions and are dominated by taxa that are tolerant of poor water and habitat quality. Macroinvertebrate communities in all drains and creeks were assessed as having 'low' ecological value.

Native fish

12 Fish diversity in drains and modified creeks were generally comparable. Fish species of conservation interest recorded from drains included īnanga (Threatened – Nationally Vulnerable), longfin eel (At Risk – Declining), and banded kōkopu, redfin bully and bluegill bully (At Risk Naturally Uncommon) (Dunn et al. 2025). Overall the drains supported moderate-low native fish diversity including species of conservation interest.

13 Fish species of conservation interest recorded from modified creeks within the Site include īnanga (Threatened – Nationally Vulnerable), longfin eel and kōaro (At Risk – Declining), and banded kōkopu, redfin bully and bluegill bully (At Risk Naturally Uncommon). Giant kōkopu ('At Risk – Declining') appear to be widespread across the drains and creeks within the Site. The fish communities within the Site have 'high' ecological value.

Aquatic ecological effects

14 Mining will be undertaken sequentially in three sections including: Section 1 (Granite Creek North), Section 2 (Granite Creek South) and Section 3 (Cargill Road).

15 Temporary watercourse diversions will be constructed to convey surface water in creeks and artificial drains during mining. Granite Creek and Little Granite Creek will not be diverted. The diversion methodology will differ for each creek or artificial drain. Fish management will be implemented prior to and during the diversion of watercourses.

16 After an area has been mined and the land contoured and rehabilitated, creeks will be reconstructed in accordance with the conditions of consent, and the Rehabilitation Management Plan prepared by Tai Poutini Resources Limited.

17 Progressive rehabilitation of mined areas will be undertaken as mining occurs elsewhere on the Site. Rehabilitation of each area of mining

including watercourses is expected to be completed within 12 months of completion of mining within that section.

18 Other potential effects on modified creeks and artificial drains within the Site include:

(a) Earthworks and sedimentation resulting in altered habitat quality and ecological health of watercourses.

(b) Temporary loss or disturbance of aquatic habitat in the creeks and artificial drains.

(c) Native fish mortality.

(d) Reduced native fish passage.

(e) The potential for reduced flows in Canoe Creek as a result of the proposed water take.

19 In my opinion implementing the ESCP prepared by Ridley Dunphy Environmental Ltd will ensure that the overall level of effect of the proposed earthworks on freshwater ecology values will be **'low'**.

20 The five creeks (Northern Creek, Central Creek, Clarke Creek, Wasabi Creek, Southern Creek) to be diverted will be reconstructed with more natural meandering flow paths than currently. The average stream widths of the rehabilitated streams will be similar to the existing watercourses. The total length of the rehabilitated watercourses will be at least the same as what is existing and as a result there will be no loss of extent of stream habitat. Following complete rehabilitation of the Site, in my opinion the watercourses will provide an increased amount and higher quality habitat than the existing watercourses.

21 In my opinion implementing the RMP prepared by Tai Poutini Resources Limited and the accompanying Native Freshwater Fish Capture and Relocation Plan (NFFCRP) prepared by Ecological Solutions Limited will minimise the potential adverse effects of watercourse disturbance. In my opinion the overall level of effect on native freshwater ecology values will be **'very low'** in the short-term and there will be a **'net gain'** once the stream channels have stabilised and riparian plants are established.

22 In my opinion implementing the NFFCRP will minimise the potential harm or mortality of native fish and ensure that the overall level of effect on native freshwater fish values assessed as **'very low'.**

23 The proposed diversions will not impede fish passage. Any culverts will be installed and maintained to ensure that all native fish that require access to and from the sea can do so and as a result a special permit under the Fisheries Act 1983 is not required. With the proposed mitigations to avoid reducing fish passage in my opinion the overall level of effect will be **'very low'**.

24 The proposed water take from the lower Canoe Creek is not expected to affect instream habitat conditions, and in my opinion, the overall level of effect of the proposed water take on the amount and quality of habitat in lower Canoe Creek will be '**very low'.**

25 In my opinion applying the proposed conditions ensures that the project is consistent with the relevant NPS-FM policies.

Proposed conditions

26 I have reviewed the proposed conditions as they relate to my area of expertise. I consider that they are appropriate and support my assessment of effects, including the following conditions:

(a) Condition 5.1 requires an Annual Work Plan that details any management required for native fish, extent of creek diversions and reclamations, and need to include a description of measures to prevent adverse effects on natural waterbodies, including drainage works within the consent area, and the collection and treatment of site run-off. I agree with the inclusion of this condition and in my opinion it will assist in preventing adverse effects on creeks.

(b) Condition 6.0 requires a Native Freshwater Fish Capture and Relocation Plan. I support this condition and in my opinion it will avoid or otherwise minimise adverse effects on native fish present within the project area.

(c) Condition 9.1 sets out the need to reinstate existing creek and drainage patterns to reflect pre-mining catchment areas ensuring no loss of extent, with appropriate riparian planting, in accordance with the Rehabilitation Management Plan. I support this condition and in my opinion it will assist in managing adverse effects on creeks and native fish.

(d) Condition 15.1 and 15.2 identifies the need carry out activities in accordance with a Native Freshwater Fish Capture and Relocation Plan in order avoid or otherwise minimise adverse effects on native

fish prior to stream works. I support the NFFCRP covering the whole Site and that it be updated as required.

(e) Condition 22.1 sets out the need to operate the mine in general accordance with a Water Management Plan and states that the rate of take of water from Canoe Creek gallery is not greater than 10% of Canoe Creek's MALF. I support this condition and in my opinion it will avoid ecological effects in Canoe Creek.

(f) Condition 24.5 and 24.6 set out the annual instream and riparian habitat, macroinvertebrate and fish surveys in Northern Creek, Central Creek, Clarke Creek, Granite Creek, Wasabi Creek and Southern Creek and that they have to be conducted using Protocol P2 and C1 from the Ministry for the Environment Macroinvertebrate Guidelines and the samples must be analysed by an aquatic ecologist experienced in macroinvertebrate sampling and identification.

(g) Condition 28.1, 28.2 and 28.3 relate to creek diversions and requires certification of the Rehabilitation Management Plan by West Coast Regional Council prior to any streamworks, implementation of the plan during creek construction and riparian planting to ensure no loss of extent, and monitoring to ensure no loss of ecological health. I support this condition and in my opinion it will ensure no loss of creek extent and values.

(h) Condition 28.4 requires creek diversion activities to be undertaken in accordance with approved methodologies specified in the ESCP and SSESCPs. I support this condition and in my opinion will minimise potential sediment discharges and ecological effects on watercourses.

(i) Condition 28.5 relates to temporary and permanent diversions and how they will be designed according to specified design criteria. I support this condition and in my opinion it will ensure that effects on creek extent, ecological function, habitat quality and ecological health will be effectively mitigated.

Overall Significance of Effects

27 The Fast Track Approvals Act requires an overall assessment of the significance of effects. With respect to the potential and actual effects on freshwater ecology, having taken into account the species and habitats present, the nature of the proposed activities and actions to avoid, remedy and minimise/mitigate any effects, it is my view that the effects of the proposed project on freshwater values would be negligible.

28 In the medium–long term, the effects of the proposed project would be positive, in that there will be no overall loss of creek extent and that stream ecological values will be enhanced by naturalising and improving the instream and riparian habitat quality of creeks.

Richard Montgomerie

27 March 2026

Statement of Evidence – Dr Bramley (Terrestrial Ecology)

In the matter of	an application for approvals under the Fast Track Approvals Act 2024
By	**Tāiko Critical Minerals Limited**
	Applicant

Statement of evidence of Gary Neil Bramley in relation to terrestrial ecology

23 March 2026

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Introduction

1 My name is Gary Neil Bramley.

2 My role in relation to the application by Tāiko Critical Minerals Limited (**the application**) for approvals relating to the Barrytown Mineral Sands – Southern Block Project (**the Project**) has been to provide expert advice in relation to terrestrial ecology. I have also had input into the Wildlife Act Authority application which forms part of the Project.

Qualifications and experience

3 I hold the degrees of Bachelor of Science (1992) and Master of Science (First Class Honours in Ecology, 1995) both from Massey University, and a Doctorate of Philosophy in Biology from the University of Waikato (1999).

4 I am a member of the Ornithological Society of New Zealand, Ecological Society of New Zealand, New Zealand Native Plant Conservation Network and Environmental Institute of Australia and New Zealand.

5 I am currently the Terrestrial Ecology Team Leader and a Director and owner of Ecological Solutions Limited, which is a multi-disciplinary ecology company with offices in Kāeo, Auckland, Tauranga and Nelson. In that role I support our managing director and provide technical and administrative leadership to a team of 8 – 10 terrestrial ecologists at varying stages of their career from new graduates to experienced practitioners. I also typically manage up to 30 projects at any one time at a range of scales from single lot subdivisions to large scale infrastructure projects.

6 I have worked as a consultant ecologist since 2000, initially for NZ Environmental Limited and then Mitchell Partnerships Limited (now Mitchell Daysh). Between January 2016 and March 2022, I operated my own business (The Ecology Company) which merged with Freshwater Solutions Limited to become Ecological Solutions in April 2022.

7 I have published or contributed to twelve peer reviewed papers and more than 300 unpublished reports prepared for a variety of clients. I have been responsible for the preparation of specialist ecological reports, Ecological Impact Assessments, Assessment of Environmental Effects documentation, management plans and Department of Conservation concession and wildlife permit applications. In July 2017, I completed the "Making Good Decisions" programme and am a certified resource consent hearings commissioner.

8 As a consultant ecologist I undertake, lead and contribute to a large number of ecological investigations, significance assessments and assessments of the ecological effects of developments in a wide range of environments throughout New Zealand. I have been involved in a variety of development projects including plan changes, large-scale subdivisions and retirement villages, infrastructure projects (roading, electricity generation, a monorail, a cycle trail, wastewater treatment), irrigation projects and mining projects. I have been involved with several mining projects on the West Coast, including Bathurst Resources Limited at Stockton, Birchfield Mining Limited at Giles Creek and Strongman, Francis Mining near Reefton, Tāiko's application at the Central Block (north of the current application site), Westland Mineral Sands at Nine Mile and Mananui and several other smaller mining projects.

Expert witness Code of Conduct

9 While this application is not being considered by the Environment Court, I confirm that I have read the Code of Conduct for expert witnesses contained in the Environment Court of New Zealand Practice Note 2023 and that I have complied with it when preparing this evidence. Other than when I state I am relying on the advice of another person, this evidence is within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

Scope of evidence

10 The purpose of this evidence is to provide:

(a) an overview of terrestrial and wetland ecological values within and adjoining the Southern Block;

(b) a summary of the potential and actual effects on ecological values during the construction and operation of the proposed mine and the application of the effects management hierarchy in developing the proposal; and

(c) comment on the proposed conditions.

Existing Environment

11 The application is for mining at the 'Southern Block' (SB), located approximately 0.5 km south of the already consented area (Central Block), between Canoe Creek and Fagan Creek near Barrytown. The SB is approximately 408 ha, and mining activity would occur on 280 ha within the SB, which is known as the 'mining disturbance area'. A further 72 ha would

be subject to earthworks as borrow areas to supply material during the staged rehabilitation of the mining void.

12 Parts of the site are within the Coastal Environment and would be subject to the New Zealand Coastal Policy Statement (2010, amended 2025, the NZCPS). The National Policy Statement for Freshwater Management (2020, amended 2025 the NPS-FM) and the National Policy Statement for Indigenous Biodiversity (2023, the NPS-IB) are also relevant and have informed my assessments and recommendations for this project.

13 The first ecological surveys in the CB I was involved with were undertaken in early 2022. Quarterly (seasonal) bird monitoring surveys have been undertaken at that site since Autumn 2022. The location of the quarterly bird monitoring surveys was expanded in Spring 2023 and has included both a site at Burke Road (north of the CB) on two occasions and the SB since winter 2024. Myself and members of our team have visited the site multiple times over this period.

14 The SB is located in the Punakaiki Ecological District (ED) and North Westland Ecological Region, in an area known as the Barrytown Flats. The Barrytown Flats would have been entirely covered in lowland (coastal) forest and wetland prior to historical clearance. Vegetation modification within the ED has been concentrated on the Barrytown Flats, where nearly all of the vegetation has been removed or modified by historical forest clearance and drainage for timber harvesting, flax milling and mining, although some wetlands and fragments of lowland forest remain, including the high value Maher Swamp.

15 Vegetation in the SB is predominantly pasture, the only tall vegetation present being a small cluster of over mature pine (*Pinus radiata*) on the banks of Little Granite Creek, scattered isolated rātā (*Metrosideros* sp.) and a row of over-mature pine trees along a farm laneway. Other vegetated habitats include small fragments of indigenous coastal shrubland and flaxland and rough exotic pasture.

16 Land within the SB is currently used for dairy farming and mostly comprises highly modified ‘humped and hollowed’ ground vegetated with pasture. The SB is bordered by Canoe Creek Scenic Reserve at its northern boundary and Fagan Creek at its southern boundary. Granite Creek and Little Granite Creek, along with several smaller tributaries, flow through the proposed mining area to the coast. A number of small springs and farm drains are located throughout the site which currently provide water supply for livestock.

Terrestrial ecological value and significance

Vegetation

17 Vegetation in the SB is predominantly grazed exotic pasture and rough exotic pasture of 'negligible' value. The tall vegetation comprises mostly exotic species and is considered to be of 'negligible' value. Small areas of indigenous coastal shrubland (0.9 ha) and flaxland (0.3 ha) are of 'moderate' value with their value being limited by their small size and isolation from other natural vegetation and habitats.

Fauna

18 Avifauna observed within the SB during surveys were generally exotic or common native species and the avifauna community generally reflects the highly modified state of the habitats present. Habitat for birds within the SB is of 'negligible' value.

19 A greater diversity of bird species occurs nearby, associated with adjacent higher value habitats (e.g. forests to the east across State Highway 6), including 'Threatened' and 'At Risk' birds. Fourteen 'Threatened' and 'At Risk' species occur in the vicinity and may use the SB. Many of these are coastal seabirds or forest birds and so are likely to represent transient visitors, rather than residents, due to the lack of suitable habitat within the site. Pohowera/banded dotterel (*Anarhynchus bicinctus*)('At Risk – Declining') and both tōrea tai/variable oystercatcher (*Haematopus* unicolor)('At Risk – Recovering') and tōrea/South Island pied oystercatcher (*Haematopus finschi*) ('At Risk – Declining'), may use the site for foraging and breeding. Kororā/little blue penguin (*Eudyptula minor*)('At Risk – Declining'), are known to use the adjoining habitats and may cross the site to reach nests inland. No potential penguin burrows were detected during field surveys and the vegetation across the majority of the site is unsuitable for penguin nesting, although they are known to nest under buildings at some locations. Given the lack of forested habitat within the site, including limited foraging habitat and potential daytime roosts, it is unlikely that rōroa/great spotted kiwi use the SB. The site is located c. 4.5 km from the only known breeding colony of tāiko/wetland petrel (*Procellaria westlandica*) ('At Risk – Naturally Uncommon'). The avian community is considered to be of 'high' value due to the potential presence of these 'At-Risk' species.

20 The vegetation present in the SB provides habitat of 'negligible' value for lizards. Rough exotic pasture may provide intermittent, low-quality refuges

for skinks whilst ungrazed. There are areas of higher quality potential lizard habitat adjoining, but outside, the proposed mining area, including rock piles, rank pasture and cobble along the western (coastal) boundary.

21 Data from Department of Conservation databases indicates four lizard species may occur within or near the SB. There are records of two species of native gecko, forest gecko (*Mokopirirakau granulatus*) and West Coast green gecko (*Naultinus tuberculatus*) within 10 km of the SB, but these species are unlikely to use the site due a lack of habitat. Canterbury grass skink (*Oligosoma* aff. *polychroma* Clade 4) and Newman's speckled skink (*Oligosoma* aff. *newmani* 'Westland') are also found within the ecological district. Due to the 'At-Risk' conservation status of these species, the lizard fauna is of 'high' value if present.

22 Records in the national bat database indicate surveys have detected lesser short-tailed bat (*Mystacina tuberculata*, 'Threatened - Nationally Increasing') within 25 km of the site. A bat survey undertaken by Ecological Solutions Limited in 2023 for an unrelated client detected long-tailed bats (*Chalinolobus tuberculatus*, 'Threatened - Nationally Critical') at one location approximately 10 km south of the SB. Neither species is likely to use the site. With respect to potential bat roost sites, two isolated stands/shelterbelts of over-mature exotic pine trees are present within the proposed mining area; however, these would be retained. Outside the mining area, but within the SB, the dead indigenous snags near the southern boundary could also be suitable for bat roosting. In addition, relatively small indigenous forest fragments adjoin the boundary outside the SB to the north, east and south, which may provide long-tailed bat foraging or commuting habitat. Bat habitat is considered to be of 'low' ecological value within the SB, however the two bat species found within 10 km of the site are of 'very high' value.

Wetlands

23 Natural inland wetlands are present within both the SB and the mining disturbance area. Many wetlands within the SB are associated with deliberately constructed drains (e.g., hump and hollows, historical dredge pits from previous mining) and therefore do not meet the Resource Management Act or Regional Land and Water Plan definitions of a wetland, or the definition of a 'natural inland wetland' outlined in the NPS-FM.

24 The mining disturbance area includes c. 6.7 ha of 'natural inland wetland' within the current working farm which would be subject to the National Environmental Standards for Freshwater (NES-F) and the NPS-FM.

25 Floodplain wetlands associated with some creeks and drains are variable in size and species composition. Floodplain wetlands are of ‘moderate’ ecological value. Palustrine wetlands are of ‘low’ ecological value as they are dominated by exotic vegetation and provide little connectivity to other wetlands or indigenous vegetation.

26 A small coastal lagoon is present at the north-western extent of the SB, outside the proposed mining disturbance area but within 100 m of its boundary. The lagoon is fed by various sources including Canoe Creek and two drains that form part of the hump and hollow drainage system directly east of the lagoon. The coastal lagoon is of ‘moderate’ ecological value as it provides connectivity between wetlands.

Terrestrial ecological value and effects

27 Mining will remove up to 16 ha of predominantly pasture vegetation at any one time. Staged rehabilitation means that there would be only a short time lag between loss of any vegetation or habitat and replacement via planting. Vegetation within the site is predominantly of ‘negligible’ ecological value and therefore clearance results in a 'very low’ level of effect. Removal of habitats of ‘moderate’ value including the small areas of indigenous coastal shrubland and flaxland would result in a ‘moderate’ effect. The staged rehabilitation will establish riparian planting along the reinstated creeks and at the mouth of Granite Creek as well as c. 53.7 ha of new wetland vegetation. This includes coastal shrubland of similar or higher ecological value than that being removed. This will result in a ‘net gain’ in terms of extent and ecological value as a result of the Project over the long term.

28 Vegetation clearance would have a ‘low’ effect on common native birds due to the ‘negligible’ value of bird habitat within the site. Post-mining rehabilitation of the SB will provide equivalent or larger areas of shrubland, wetland and forest habitat and therefore the effect of clearance on birds is expected to be ‘low’. A small number of ‘At-Risk’ bird species are likely to use the site for foraging, roosting or breeding and may be at risk of injury or mortality due to mining activities. These species are of ‘high’ ecological value. The Avian Management Plan (AMP) has been developed to manage effects on these species and includes the following measures:

(a) Pre-mining and ongoing surveys to establish species at risk of mining activities and allow for appropriate interventions. These surveys include general seasonal surveys for all avifauna (using both 5MBCs and acoustic recorders), weekly breeding surveys, intensive nest surveys (twice-weekly), conservation dog surveys for kororā and the use of wildlife cameras to detect both kororā and tāiko.

(b) Setbacks of 50 m from the MHWS and 20 m from Granite Creek.

(c) Use of visual and acoustic deterrents to reduce the risk of 'At-Risk' species attempting to nest within the mining disturbance area, and the use of fences to avoid kororā attempting to transit the site.

(d) Lighting management to minimise the effects of lighting during dawn and dusk on navigation of tāiko and kororā.

(e) Accidental Discovery Protocols regarding handling of protected wildlife in the case of injury, mortality or grounding.

(f) Annual and event-based reporting to ensure the AMP is regularly updated based on the most recent information about the site.

29 A Lizard Management Plan (LMP) will ensure vegetation clearance avoids and/or minimises lizard injury and mortality via search and salvage carried out by experienced herpetologists. Adherence to the LMP and the rehabilitation planned in accordance with the Rehabilitation Management Plan will result in a 'very low' level of effect for lizards.

30 Effects on bats (if present) are considered to be 'low' in the short term and 'net gain' in the long term due to the increased amount of potential habitat at the rehabilitated site.

31 The wetlands within the proposed mining area will be removed and reconstructed as mining progresses, as guided by the conditions and set out in the Rehabilitation Management Plan. Wetland construction will occur in Years 1 and 2 in the north of the SB, and in years 10 and 11 in the centre of the SB. The final area of wetland to be constructed is approximately 53.7 ha which substantially exceeds the extent of natural inland wetlands to be removed. The overall level of effect is expected to be 'very low' in the short term and a 'net gain' in the long-term.

Proposed conditions

32 I have contributed to and reviewed the proposed conditions which accompany the application as they relate to my area of expertise. I consider that:

(a) Condition 5.1 requires an Annual Work Plan which details any management required for birds and lizards in the upcoming year. This will assist in ensuring management is timely and located and coordinated as required to manage effects.

(b) Condition 6.0 requires an Avian Management Plan and a Lizard Management Plan. I have contributed to the preparation of these documents, and reviewed them. In my view they are sufficient to avoid and/or minimise adverse effects on protected wildlife.

(c) Conditions 13.1 and 13.10 require regular and ongoing monitoring of avifauna necessary to provide quality data to inform ongoing management of effects on avifauna and the use of deterrents. The information collected will allow appropriate identification of affected wildlife and enable informed amendment of management plans where required. In my view the deterrents proposed are the most appropriate way to minimise the risks of avifauna attempting to nest within the boundaries of the mining disturbance area.

(d) Conditions 13.3 and 13.4 are precautionary and require use of wildlife cameras for monitoring of kororā and/or tāiko to ensure appropriate mitigation and management measures are taken to avoid effects on these species in the unlikely event that they are affected.

(e) Condition 13.5 requires annual kororā surveys using a certified conservation dog where available (or otherwise manual searches). This will ensure that detailed and reliable information regarding site use by kororā is gathered so that appropriate management can be enacted if penguins are found within the site.

(f) Condition 13.6 outlines the requirements for protective fencing to prevent kororā from entering the active mining disturbance area. This will avoid injury or mortality of kororā by excluding them from at-risk areas.

(g) Conditions 13.7 and 13.8 require the consent holder to adhere to the Avian Management Plan and provides details of what the AMP must contain. The AMP developed satisfies these conditions and should be applied to the entire site.

(h) Condition 13.9 requires annual review of the AMP. This will ensure any new information with respect to birds adequately incorporated into both the AMP and the Annual Work Plan and the consequent bird management.

(i) Condition 13.11 identifies the components of annual reporting which are required to be provided to the consent authority, mana whenua, the Department of Conservation, and relevant government and community parties of interest.

(j) Condition 14.1 requires adherence to the Lizard Management Plan. In my opinion the LMP sets out appropriately the risks to protected wildlife and the management actions necessary to avoid and/or minimise adverse effects on any lizards found within the very limited lizard habitat at the site.

(k) Condition 17 requires adherence to the Australian Government's National Light Pollution Guidelines for Wildlife May 2023 or subsequent amendments. Given mining would only occur during daylight hours, and any night time lighting would be minimal, I consider this is precautionary with respect to effects on tāiko and kororā.

Overall Significance of Effects

33 The Fast Track Approvals Act requires an overall assessment of the significance of effects. With respect to the effects on terrestrial ecology and wetlands, having taken into account the context, the species and habitats present, the specific location, nature and duration of the proposed activities and the actions proposed to avoid, remedy and minimise/mitigate any effects, it is my view that the short-term effects of the current project would be negligible. That is a barely distinguishable change which would have negligible effect on the known population or range of the species and habitats present.

34 In the medium – long term, the effects of the current project would be positive, in that there will be a substantial increase in the extent and value of wetland, shrubland and forest habitats within the site, and the riparian vegetation will better connect the habitats than the pre-mining condition.

Draft Conditions – Wildlife Act Authority

Appendix A: Wildlife Act Approval

BARRYTOWN SOUTHERN BLOCK - WILDLIFE ACT APPROVAL

Wildlife Act Approval

SCHEDULE 1

1	Authorised activity (Schedule 2, clause 2)	Activity: a) Avian and lizard surveys to confirm individuals at risk due to the mining activity. b) Deterring birds prospecting for nests from the mining area in advance of mining and discouragement of breeding there. c) Where nests can proceed without impeding progress of the dredge, nest protection and monitoring. d) Fencing to exclude kororā from active mining areas. e) Handling of grounded or injured birds. f) Capture and relocation of lizards to remove them from clearance areas. g) Enhancement/augmentation of lizard habitat.
2	The Land (Schedule 2, clause 2)	Areas marked as Application Area within the Southern Block, Barrytown on Figure 1 within the Wildlife Act Authorisation Technical Report.
3	Personnel authorised to undertake the Authorised Activity (Schedule 2, clause 3)	The proposed holders of the Wildlife Approval Authorisation for lizards will be: a) Dr Graham Ussher b) Matt Charteris The proposed holders of the Wildlife Approval Authorisation for birds will be: a) Dr Gary Bramley b) Dr Sarah Withers c) Patrick Stewart

Appendix A: Wildlife Act Approval

		d) Matt Charteris
4	Term (Schedule 2, clause 4)	[tbc]
5	Approval Holder's address for notices (Schedule 2, clause 8)	The Approval Holder's address is: Tāiko Critical Minerals Ltd Attn: Robert Brand C/- 100 Mackay Street Greymouth 7805 E: robert.brand@tigamm.com P: +61 421 388 222
6	Department's address for notices	The Department's address is: Māwhera/Greymouth Office PO Box 370 Greymouth 7840 E: greymouth@doc.govt.nz P: 0800 275 362

Appendix A: Wildlife Act Approval

NOTE: Interpretation

References in this Approval to the "Department" are to the Department of Conservation.

References in this Approval to the "Manager" are to the person holding the office of Operations Manager, Māwhera/Greymouth Office of the Department of Conservation and includes any person authorised by the Operations Manager to act on their behalf in respect of this Approval.

Appendix A: Wildlife Act Approval

SCHEDULE 2

STANDARD TERMS AND CONDITIONS OF THE APPROVAL

1. Interpretation

1.1. The Approval Holder is responsible for the acts and omissions of its employees, contractors or agents. The Approval Holder is liable under this Approval for any breach of the terms of the Approval by its employees, contractors or agents as if the breach had been committed by the Approval Holder.

1.2. Where obligations bind more than one person, those obligations bind those persons jointly and separately.

2. What is being authorised?

2.1. The Approval Holder is only allowed to carry out the Authorised Activity on the Land described in Schedule 1, Item 2.

2.2. Any arrangements necessary for access over private land or leased land are the responsibility of the Approval Holder. The Department does not warrant that such access can be obtained.

2.3. The Approval Holder must advise the Manager prior to carrying out the Authorised Activity (where possible, one week prior).

2.4. The Approval Holder and Authorised Personnel must carry a copy of this Approval with them at all times while carrying out the Authorised Activity.

2.5. The Approval Holder must comply with any reasonable request from the Department for access to any wildlife.

2.6. The Approval Holder may publish research results.

3. Who is authorised?

3.1. Only the Approval Holder, its employees, contractors and agents and the Authorised Personnel described in Schedule 1, Item 3 are authorised to carry out the Authorised Activity, unless otherwise agreed in writing by the Manager, such agreement is not to be unreasonably delayed or withheld.

4. How long is the Approval for?

Appendix A: Wildlife Act Approval

4.1. This Approval commences and ends on the dates set out in Schedule 1, Item 4.

5. What are the liabilities?

5.1. The Approval Holder agrees to exercise the Approval at the Approval Holder's own risk and releases to the full extent permitted by law the Department and the Department's employees and agents from all claims and demands of any kind and from all liability which may arise in respect of any accident, damage or injury occurring to any person or property arising from the Approval Holder's exercise of the Authorised Activity.

5.2. The Approval Holder must indemnify the Department against all claims, actions, losses and expenses of any nature which the Department may suffer or incur or for which the Department may become liable arising from the Approval Holder's exercise of the

Authorised Activity.

5.3. This indemnity is to continue after the expiry or termination of this Approval in respect of any acts or omissions occurring or arising before its expiry or termination.

6. What about compliance with legislation and Department's notices and directions?

6.1. The Approval Holder must comply with all statutes, bylaws and regulations, and all notices, directions and requisitions of the Department and any competent authority relating to the conduct of the Authorised Activity. Without limitation, this includes the Conservation Act1987 and the Acts listed in the First Schedule of that Act and all applicable health and safety legislation and regulation.

7. When can the Approval be terminated?

7.1. The Manager may terminate this Approval at any time in respect of the whole or any part of the Land, and/or the whole or any part of the Authorised Activity if:

a) the Approval Holder breaches any of the conditions of this Approval; or

b) in the Manager's opinion, the carrying out of the Authorised Activity causes or is likely to cause any unforeseen or unacceptable effects in relation to protected wildlife.

7.2. If the Manager intends to terminate this Approval in whole or in part, the Manager must give the Approval Holder such prior notice as, in the sole opinion of the Manager, appears reasonable and necessary in the circumstances.

8. How are the notices sent and when are they received?

8.1. Any notice to be given under this Approval by the Department is to be in writing and made

by personal delivery, post, or email to the Approval Holder at the physical or email address specified in Schedule 1, Item 5. Any such notice is to be deemed to have been received:

a) in the case of personal delivery, on the date of delivery;

b) in the case of post, on the 3rd working day after posting;

c) in the case of email, on the date receipt of the email is acknowledged by the addressee by return email or otherwise in writing.

8.2. If the Approval Holder's details specified in Schedule 1, Item 5 change, then the Approval Holder must notify the Department within 5 working days of such change.

9. What about the payment of costs?

9.1. The Approval Holder must pay the standard Department of Conservation charge-out rates for any staff time and mileage required to monitor compliance with this Approval and to investigate any alleged breaches of the terms and conditions of it.

10. Are there any special conditions?

10.1. Special conditions are specified in Schedule 3. If there is any conflict between this Schedule 2 and the special conditions in Schedule 3, the special conditions will prevail.

11. Can the approval be varied?

11.1. The Approval Holder may apply to the Department for variations to this Approval in line with clause 7(2) of Schedule 7 of the Fast-track Approvals Act 2024.

SCHEDULE 3
SPECIAL CONDITIONS

Application

1. These special conditions apply to the whole site, known as the Southern Block, encompassing the mining disturbance area, areas outside the mining disturbance area which may be subject to earthworks, rehabilitation areas and any associated buildings and roading.

Consents

2. All Activities authorised by this approval must be undertaken in accordance with the relevant conditions of the Consents for the Southern Block and with the relevant management and monitoring plans, or any amended versions:

    a. Consent [X] (whole site).

    b. The Lizard Management Plan that has been certified under condition [X] of Schedule [X].

    c. The Avian Management Plan that has been certified under condition [X] of Schedule [X].

3. All Activities authorised by this Approval that are undertaken in accordance with the certified management plans listed in Condition 2 must also be undertaken in accordance with relevant current DOC approved herpetofauna and avifauna protocols or DOC SOPs. This includes the Department of Conservation 'Herpetofauna inventory and monitoring toolbox'.

4. In accordance with Condition 13.8 of the Consent, the Approval Holder may make amendments to any of the management plans referred to in Condition 2 of the Consent at any time subject to any relevant certification requirements.

Lizard Capture and Handling

5. Lizards must only be handled by, or under the direct supervision of, Authorised Personnel named in this application.

6. Lizard capture and relocation must be undertaken between 1 October and 30 April when lizards are most active.

7. Capture and handling of lizards must involve only techniques that minimise the risk of infection or injury to the animal, following methods described in the Herpetofauna

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inventory and monitoring toolbox http://www.doc.govt.nz/our-work/biodiversity-inventory-and-monitoring/herpetofauna/.

8. The Approval Holder must ensure all live capture traps are covered to protect lizards from exposure and minimise stress.

9. The Approval Holder must ensure all live capture traps are checked daily within 12 hours of sunrise.

10. The Approval Holder must sterilise any instruments that come in contact with the lizards and/or are used to collect or measure lizards between each location. A separate holding bag must be used for each animal. All gear should be thoroughly cleaned and dried between sites.

11. The Approval Holder must ensure lizards are temporarily held individually in a suitable container (e.g. breathable cloth bag) and held out of direct sunlight to minimise the risk of overheating, stress, and death.

Bird Capture and Handling

12. Disturbance of avifauna via the use of deterrents must meet the requirements outlined in the Avian Management Plan.

13. Avifauna will not be handled unless in cases of accidental discovery of injured, grounded or dead wildlife as per the Avian Management Plan.

14. Handling of birds in the circumstances above requires minimal contact, placement in a lined dark box and immediate contact with the Department of Conservation for instruction on how to keep avifauna safe and where to transport avifauna for care by a suitably experienced and qualified handler.

Ownership and holding of Absolutely Protected Wildlife

15. This Approval gives the Approval Holder the right to hold absolutely protected wildlife for no longer than 12 hours in accordance with the terms and conditions of the Approval, but the wildlife remains the property of the Crown.

16. Unless expressly authorised by the Manager in writing, the Approval Holder must not donate, sell or otherwise transfer to any third party any wildlife, material, including any genetic material, or any material propagated or cloned from such material, collected under this Approval.

Death of wildlife

17. If any protected wildlife is found dead; the Approval Holder must contact the Manager's Māwhera/Greymouth Office at greymouth@doc.govt.nz (0800 275 362), with known

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details of the animal's history. Then, if the Manager requests it, the body must be sent to Massey University Wildlife Post Mortem Service for necropsy.

18. In that eventuality; the Approval Holder must, if requested by the Grantor:

    a. ensure that the body is to be chilled if it can be delivered within 24 hours, or frozen if it will take longer than 24 hours to deliver.

    b. Ensure appropriate measures are taken to minimise further deaths.

    c. Discuss with the Manager whether it is necessary to halt all further handling until full investigations of death(s) occur.

    d. Pay for any costs incurred in investigation of the death.

Records

19. All survey, salvage, handling and release records must be made available for inspection at reasonable times by officers of the Manager.

Lizard Salvage Reporting

20. Lizard Salvage Reporting must meet the requirements outlined in the Lizard Management Plan and conditions of Consent.

Bird Discovery Reporting

21. As per conditions of the consent and the Avian Management Plan, any interactions with absolutely protected wildlife are required to be notified to the Department of Conservation via:

    a. immediate contact with the DOC hotline (0800 DOC HOT) in instances where injured avifauna or grounded tāiko are discovered.

    b. immediate contact with the Māwhera/Greymouth Department of Conservation office in the case of any deceased kororā or tāiko discovered within the site.

    c. reporting of any interactions with wildlife identified through monitoring (including wildlife cameras) on a weekly basis from 1 October to 31 January and a monthly basis from 1 February to 30 September.

    d. an annual bird management report supplied each year by 30 June including details of mining activity, methods and results of avian surveys, any deterrents employed, nesting attempts and outcomes, any strikes/near misses/deaths of protected avifauna, autopsy outcomes, lighting audit findings, and revisions to the AMP.

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Appendix G: Wildlife Act Approval

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Appendix M6: Draft Rehabilitation Management Plan

Tai Poutini
RESOURCES

TĀIKO
CRITICAL MINERALS
WEST COAST NEW ZEALAND

TĀIKO CRITICAL MINERALS PROJECT

REHABILITATION MANAGEMENT PLAN

SOUTHERN BLOCK - BARRYTOWN

tprl.co.nz

March 2026

Quality Assurance:

This report has been prepared and reviewed by the following:

Prepared by: Tai Poutini Resources Limited

Reviewed by: Dr Gary Bramley (ecoLogical Solutions)

Jens Rekker (Komanawa Solutions Ltd)

Graeme Ridley (RidleyDunphy Environmental Limited)

Naomi Crawford (Glasson Huxtable Landscape Architects)

Status: Draft V2 **Issued:**

Draft for consultation

Revision schedule		
Rev. Number	**Date**	**Description**
0.		

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1. Introduction

1.1 Scope

This Rehabilitation Management Plan (the Plan) for the Southern Block sets out the framework to guide the rehabilitation activities across the site in order to return the area to a stable, self-sustaining landform reflecting the consent requirements.

The Plan will detail the progressive rehabilitation of the site including streamworks and diversions for creeks and drains, riparian and other planting and construction of the wetland. Central to the rehabilitation are the erosion and sediment control practices. The rehabilitation activities identified in the Plan take place throughout the life of the project.

Rehabilitation will restore productive pasture and ensure the rehabilitated land can be returned to viable agricultural use alongside the ecological enhancements made.

Rehabilitation will be undertaken progressively and works will take place pre-mining, during mining and post-mining. 'Progressive rehabilitation' is the staged restoration of mined land as each part of the site becomes available, rather than waiting until all mining has finished. It involves progressively reshaping the landform, redistributing and replacing material, reinstating drainage and creek systems, constructing wetland features and undertaking planting and stabilisation so that disturbed areas are returned to a stable and functional condition as soon as practicable.

In the context of the Southern Block, progressive rehabilitation means that final landform works will be completed in sequence behind mining, with tailings and borrow material used to establish the intended post-mining topography. This approach reduces the amount of land disturbed at any one time, allows rehabilitation outcomes to be integrated with mining operations and supports the early establishment of vegetation, drainage function and long-term land stability.

This RMP should be read in conjunction with the following documents:

(a) Landscape Mitigation Package;
(b) Erosion and Sediment Control Plan; and
(c) Native Freshwater Fish Capture and Relocation Management Plan.

The Rehabilitation Management Plan has been guided by the Conditions of the Project (refer Conditions 9.0 and 28.0 in particular).

1.2 Goals and Objectives

Rehabilitation is an integral component of the overall mining operation. The primary goal of rehabilitation is to restore the site to a stable, productive and environmentally resilient landscape that integrates with the surrounding environment. Rehabilitation of the site will be undertaken progressively as mining occurs across the site (progressive rehabilitation). At the completion of mining, the majority of rehabilitation will have been completed.

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Progressive rehabilitation will be undertaken to achieve the following outcomes to meet Condition 9.1:

1. Reinstatement of productive pasture;
2. Reinstatement of existing creek and drainage patterns to reflect pre-mining catchment areas ensuring no loss of extent, with appropriate riparian planting;
3. Construction of wetland and riparian areas;

At the completion of mining, t successful rehabilitation will have:

1. Created a landform with a similar contour and profile that existed prior to mining with improved drainage;
2. Established vegetation cover on all areas disturbed by mining activity;
3. Protected freshwater values associated with the natural waterways;
4. Reinstated existing creek and drainage patterns to reflect pre-mining catchment areas ensuring no loss of extent and values (refer Section 5.3 below); and
5. Constructed and established a permanent wetland that contributes to ecological enhancement, hydrological function and landscape integration at mine closure.

1.3 Project Description

Tāiko Critical Minerals Ltd (**TCML**) proposes to operate a mineral sand mine located between Fagan Creek and Canoe Creek and west of State Highway 6 on the Barrytown Flats approximately 32km north of Greymouth. The area is referred to as the Southern Block.

The Southern Block is approximately 408ha with mining activity to be undertaken across a mining disturbance area of 280ha. The maximum disturbed area at any one time is 16 hectares. Approximately 72ha to the east of the mining disturbance area will be used as 'borrow areas' to assist in land recontouring. This will be limited to 2ha areas at any one time and is included within the 16ha total disturbed area.

The mining disturbance area will be set back from key environmental features and boundaries as follows:

(a) 20m from the consent boundary;
(b) 20m from Granite Creek;
(c) 20m from Fagan Creek;
(d) 50m from Mean High Water Springs (MHWS);
(e) 20m from the SNA PUN-049, which is adjacent to Section 2 (Granite Creek South);
(f) 20m from all private property boundaries not within the consent area; and
(g) 200m from dwellings other than where noise bunds are proposed.

Mining on the Southern Block will be undertaken using a floating dredge within a 100m x 100m dredge pond (mining void) with mining to be undertaken in three sections:

(a) Section 1: Granite Creek North;
(b) Section 2: Granite Creek South;
(c) Section 3: Cargill Road.

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Mining will be undertaken in 100m wide strips across the respective sections, including some small areas of vegetation associated with creeks, drains and former dredge ponds. To facilitate mining, diversions of existing creeks and drainage channels will be required (refer Native Freshwater Fish Capture and Relocation Plan (NFFCRP) and Section 6 of this Plan).

Rehabilitation of the Southern Block will be undertaken:
- Progressively, as an area is mined and the dredge and mining void progress across the site;
- During the final mine-closure rehabilitation.

Progressive rehabilitation is the practice of restoring land concurrently with, or shortly after, disturbance occurs, rather than waiting until the end of operations. For this Project, it involves rehabilitating areas as soon as they become available (e.g. as the mining void moves forward), including deposition of tailings, recontouring, soil replacement and seeding, so that the overall disturbed footprint is minimised at any one time. This also includes the reconstruction of creeks, drains and constructed wetland.

This approach is intended to reduce environmental effects, improve rehabilitation success through early establishment of vegetation and allow for ongoing monitoring and refinement of methods throughout the life of the project. It also enables parts of the site to return to a stable and productive condition sooner, supporting both ecological and land use outcomes and minimising effects.

This Rehabilitation Management Plan specifies the following rehabilitation to be undertaken across the Southern Block for:
- Rehabilitated landform (Section 4)
- Diversions and streamworks (for the creeks) (Section 5);
- Riparian margins and other planting (Section 6); and
- Wetland construction and planting (Section 7).

2. Background

2.1 Ecological context

The site is located within the Punakaiki Ecological District, most of which remains in indigenous forest except for extensive pakihi in logged areas of the Tiropahi Valley, the strip of coastal flats near Barrytown and some lower valley flats and coastal gullies which are either farmed or have been modified by coal or gold mining.

The Barrytown Flats are comprised of a complex sequence of old dune ridges and alluvial deposits, which originally would have been entirely covered in lowland (coastal) forest and wetland. Nearly all of the Barrytown Flats have been modified by forest clearance and drainage for timber harvesting, mining, and farming, although remnants of wetland and forest remain. Since approximately 2010, there has been a concerted effort to rehabilitate sand plain forest on the 80ha

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former Rio Tinto property at the northern end of the Barrytown Flats (adjoining Nikau Scenic Reserve and known as Te Ara Tāiko Nature Reserve) with the aim of restoring ecological connection between the coast and habitats inland.

Wetland habitats within the Southern Block are generally limited, highly modified, and often associated with historic land disturbance, including drainage works, hump-and-hollow systems, and legacy dredge features. Within the mining disturbance area, approximately 6.7 ha of natural inland wetlands are present. These comprise a mix of floodplain wetlands of moderate ecological value, associated with creeks and drains, and palustrine wetlands of generally low ecological value, typically dominated by exotic species and offering limited ecological connectivity. A small coastal lagoon at the north-western extent of the SB, located outside but within 100 m of the disturbance area, provides some hydrological and ecological connectivity and is also considered to have moderate ecological value.

To the north of the Southern Block, Maher Swamp represents a higher quality and more intact wetland system, historically utilised for flax harvesting until the mid-20th century and notable for being comparatively nutrient-rich relative to other regional swamps as shown by the presence of raupō (*Typha orientalis*). In contrast to the largely modified wetlands within the Southern Block, Maher Swamp retains greater ecological significance and forms part of a broader landscape context that includes ongoing ecological restoration efforts at nearby Te Ara Tāiko Nature Reserve.

2.2 Site Description

Extensive land clearance, drainage, and mining activities, particularly during the 1930s and 1940s, have significantly modified the original landform and vegetation patterns. These historic activities, along with more recent drainage and farming practices, have contributed to the current low-relief landscape and altered hydrological conditions.

The Southern Block is currently used for dairy farming and is dominated by highly modified ‘humped and hollowed’ pasture. Remnant indigenous vegetation is limited, with only small areas of mature pine and scattered native trees present. The site is intersected by Granite Creek, Little Granite Creek, and several smaller tributaries, springs, and farm drains, which convey water to the coast. While some watercourses are fenced, some are unfenced and are subject to erosion and pugging due to unrestricted livestock access and limited riparian vegetation. Many channels have also been historically straightened or diverted, resulting in simplified and modified stream forms.

No Schedule 1 or Schedule 2 wetlands are located within or adjacent to the Southern Block, with the nearest being Maher Swamp to the north. Overall, the Southern Block is situated within a highly modified agricultural and historical mining landscape, with limited remaining natural vegetation and waterways that have been substantially altered over time.

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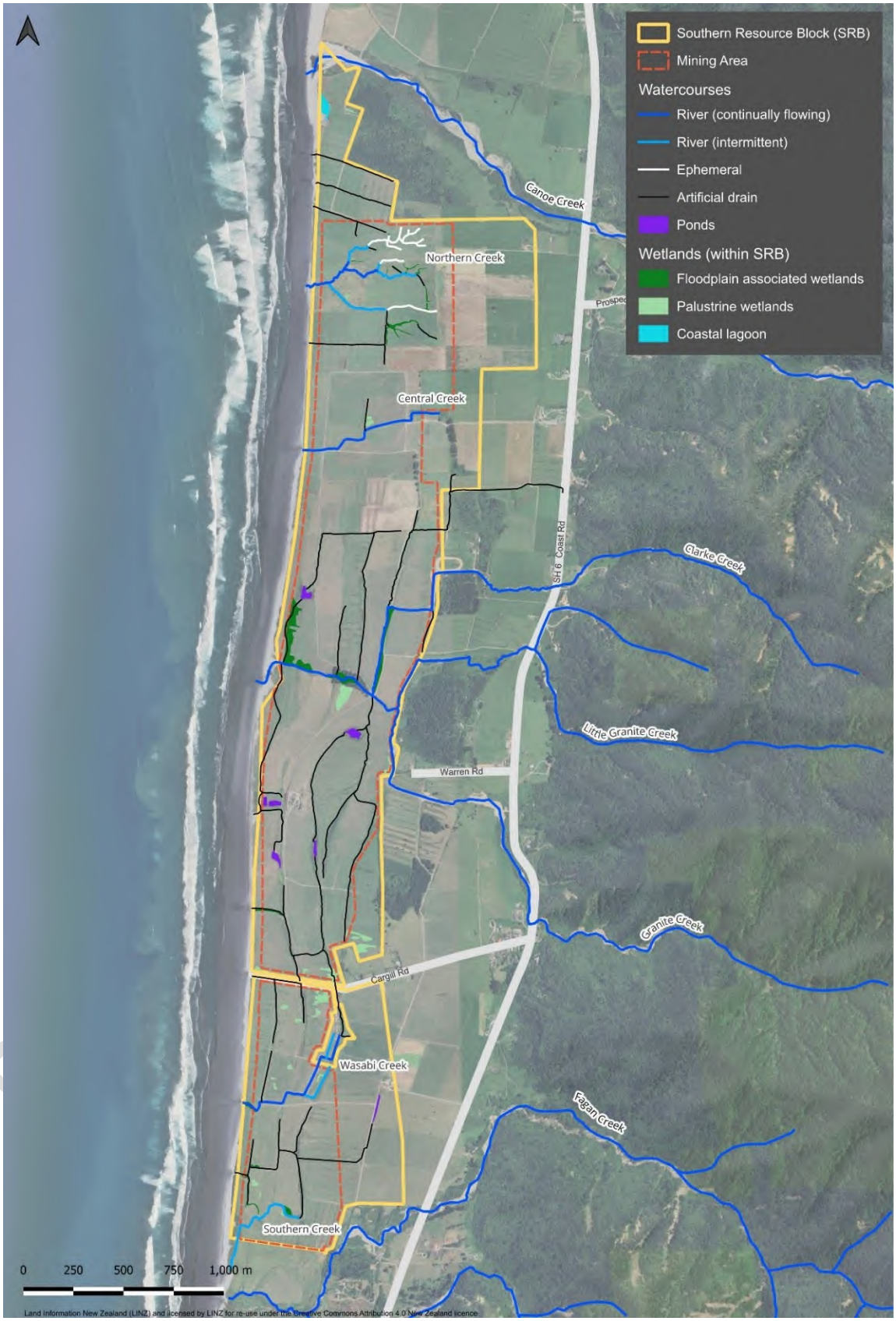

Figure 1: Waterbodies on the Southern Block (Source Ecological Solutions ECIA)

3. Pre-mining

3.1 Overview

As soon as practicable prior to mining in each section, bunding and planting are to be undertaken. These works will occur before mining commences.

3.2 Bund construction

Bund construction for Lot2 DP2178 and the Warren Road bunds will occur within year one of the project commencing. Bunds will be established on the north side of Cargill Road and adjacent to 114 Cargill Road in later years (approximately 2040 – 2045) due to timing of mining reaching this Section.

Bunds will be capped with topsoil and grassed on the mining disturbance side, with planting of taller (or indigenous) vegetation undertaken on the eastern side. Species to be used for planting on the bund adjacent to Lot 2 DP2178 are to be confirmed in consultation with this landowner. Plant species to be used for the bunds are illustrated on pages 22-23 of the Landscape Mitigation Package.

Bunds will have a maximum height of 3m and width of 24m, with variable total lengths depending on their location. Sediment retention fences will be installed during construction, and bunds will be progressively stabilised and revegetated. Once mining has been completed within a Section, bunds within that area will be deconstructed as part of the final landform rehabilitation.

Bund locations are illustrated on pages 5-8 of the Landscape Mitigation Package.

3.2 Planting

Refer Section 6 of this Plan.

4. Rehabilitated Landform Construction

4.1 Overview

Progressive rehabilitation will create a new landform across most of the mined area as mining concludes in each area. The final landform will replace temporary mining works with a stable, gently contoured landscape that integrates reconstructed creeks, farmland and new wetland area. This will blend the higher eastern terrace with the final landform of the mining area.

4.2 Process of Progressive Rehabilitation

Figure 2 illustrates the final post-mining landform, including the location of the constructed wetland and rehabilitated creek systems following completion of mining. Rehabilitation of the final landform will be undertaken progressively as mining is completed in each area, with the land south of Cargill Road being the final section to be rehabilitated.

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Figure 2: Final Mine Landform (Source: Landscape Mitigation Package)

Progressive rehabilitation starts immediately behind the advancing dredge pond in each section, before final landform contouring is completed across the wider mine path. As mining progresses, the mined void will be rehabilitated in a staged sequence that generally includes:

- Placement of mine tailings and slimes within the mining void (approximately 1 ha at any one time);
- Replacement of overburden and topsoil (approximately 0.5 ha); and
- Re-establishment of pasture and vegetation cover (approximately 1.5–3 ha at any one time).

These activities will generally occur within approximately 5 ha of the active mining area, so rehabilitation closely follows extraction rather than being deferred until the end of mining. This process enables disturbed land to be stabilised and revegetated as soon as practicable after the dredge has passed. Once pasture is established, the area is no longer considered disturbed and progressive rehabilitation is regarded as complete, even though final recontouring and broader landform integration may occur later as part of final closure and landform rehabilitation.

Management of Disturbance Area

The maximum total disturbed area is expected to occur approximately seven months after the commencement of mining and will be up to 16 hectares. From this point onwards, progressive rehabilitation will be undertaken concurrently with new disturbance to maintain a relatively constant disturbed footprint. Once 80% vegetative cover has been achieved the area is no longer considered to be ‘disturbed’.

Mine Closure

At mine closure, all temporary infrastructure, including internal haul roads, pipes, pumps, and any remaining noise control bunds, will be removed. Any recoverable resource material contained within these structures will also be extracted. By this stage, the constructed wetland will be fully formed and planted, and riparian margins along all reconstructed creeks will be established and fenced. **Figures 3 and 4** compare the pre-mining and post-mining contours across the site.

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Haul roads may be rehabilitated by ripping to a depth of approximately 50cm and adding topsoil as required to get grass to establish.

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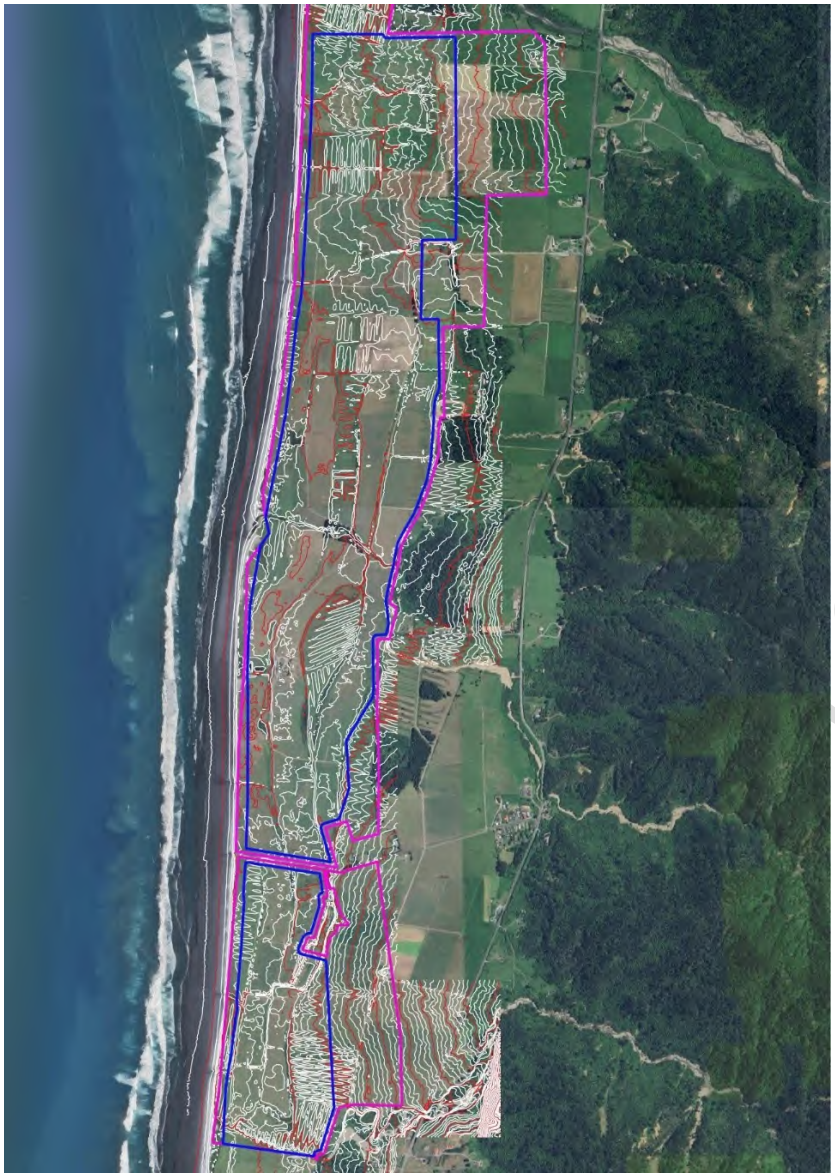

Figure 3: Pre-mining Land Contour

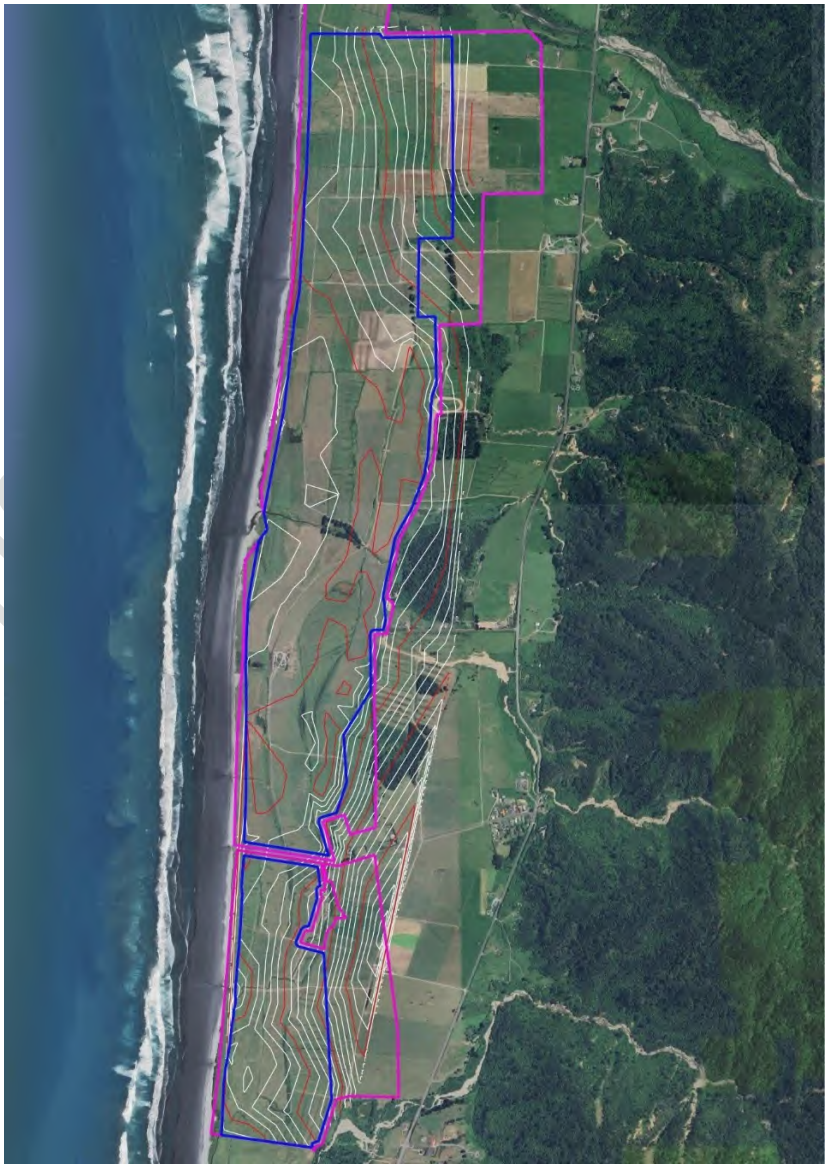

Figure 4: Post-mining Land Contour

4.3 Final Landform Topography

The final landform will replace the existing "hump and hollow" topography with a more stable and gently contoured landscape that integrates with surrounding rehabilitated areas and the site drainage network. Where humping and hollowing is retained or re-established, hollows will be formed at shallower depths than currently, so that they remain above the water table and reduce the potential for nutrient runoff to adjacent waterways.

Because material will be permanently removed from the site through extraction of Heavy Mineral Concentrate (HMC), additional fill will be required to achieve the final rehabilitated landform. This will be sourced through the strategic redistribution of material from designated borrow areas located between the consent boundary and the edge of the mining disturbance area, together with material generated through wetland construction. Approximately 72ha to the east of the mining disturbance area has been identified for this purpose, although disturbance within these borrow areas will be limited to discrete sections of up to 2ha at any one time and are included within the overall 16ha disturbance limit. Following extraction, these areas will be progressively recontoured and integrated into the surrounding rehabilitated landform.

Based on an average redistribution depth of approximately 1 metre, up to 1.1 million cubic metres of material will be available for final landform construction. This material will be used to create smooth transitions between rehabilitated areas, maintain long-term landform stability, and support future land use.

Over the life of the project, approximately 5.6 million tonnes of HMC (equivalent to around 2.6 million cubic metres at a bulk density of 2.2 g/cm^3) will be removed from the mining disturbance area. When balanced against the available redistributed material, this results in an average reduction in land height of approximately 0.63 m across the 408ha consent area.

The post-mining landform will be developed progressively as mining advances. In the western part of the mining disturbance area, rehabilitation will generally return the site to ground levels similar to those that existed prior to mining. As mining progresses eastward, the difference between pre- and post-mining ground levels will gradually increase, reflecting the net removal of HMC.

South of the processing plant, this elevation change will assist in forming the constructed wetland as part of the rehabilitation works. North of the processing plant, material will be redistributed from the higher ground located east of the mining disturbance area. This land rises from approximately RL 17 to RL 27, and 1–2 metres of material can be regraded from this area (as required) to address any landform shortfall resulting from heavy mineral concentrate extraction within that section (refer **Figure 5**). Borrow areas are as shown in Figure 6 of the ESCP.

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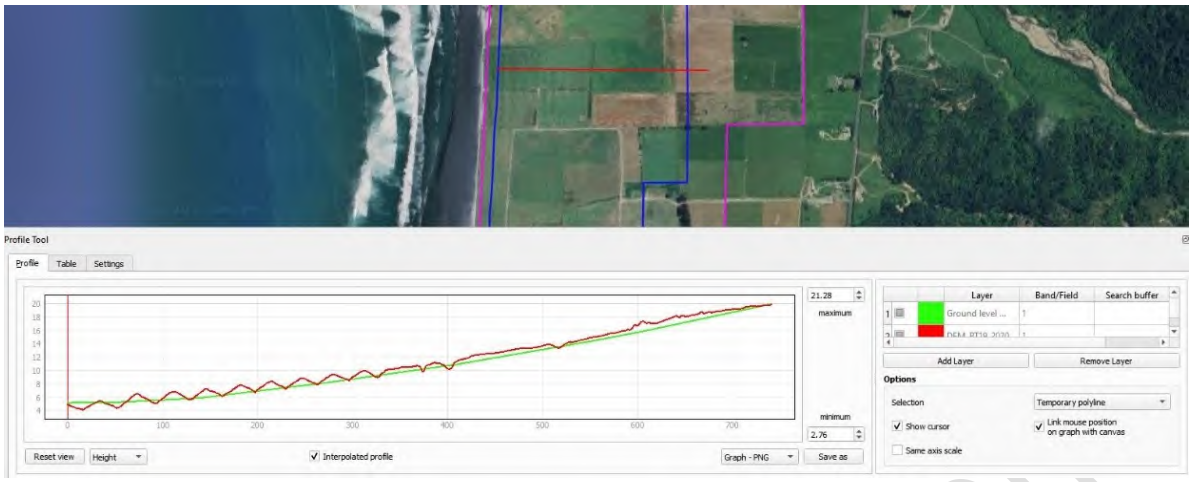

Figure 5: Northern Cross Section (existing landform – red; post-mining landform green)

A similar redistribution approach will be adopted within Section 3 (the land south of Cargill Road), although no wetland is proposed in this area. This will result in a consistent east-to-west land gradient across the rehabilitated land. In this section, ground levels rise from approximately RL 15 to RL 27, and it is similarly estimated that 1–2 metres of material can be redistributed to offset the volume removed through HMC extraction.

Figures 6 - 8 present representative cross-sections illustrating existing (red line) and post-mining (green line) ground levels across the site.

Figure 6: Granite Creek North Cross Section (existing landform – red; post-mining landform green)

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Figure 7: Granite Creek South Cross Section (existing landform – red; post-mining landform green)

Figure 8: Cargill Road Cross Section (existing landform – red; post-mining landform green

4.4 Erosion and Sediment Control for borrow areas

Erosion and sediment control through rehabilitation is to be undertaken in accordance with the ESCP. Earthworks associated with the borrow areas will be subject to the following criteria:

- The earthworks will form part of the Project maximum 16ha limitation and will also be subject to a maximum 2ha at any one time;
- To achieve the 2ha maximum open area the borrow locations will be progressively stabilised throughout the Project lifetime;
    - No creeks or wetlands will be diverted or removed as part of the earthworks borrow activity with the setbacks applying as per the mining disturbance area (set out earlier in the plan);

- If borrow earthworks are immediately adjacent to the mining void (or it remains practicable to do so) then the 2ha cut location will be fully bunded and all runoff diverted via diversion channels or pipes into the mining void;
- If not adjacent to the mining void (or it is impracticable to do so) the 2ha area will be independently managed and a sediment retention pond (as per GD05) established for each area which will discharge to land;
- As an alternative the 2ha borrow area will be fully bunded to impound any runoff and then pumped to the mining void or to the MWF treatment ponds as required;
- Any associated haul roads from the borrow area to the location of rehabilitation will be bunded on either side to contain any dirty water that eventuates and divert this to the mining void; and
- Progressive stabilisation of all exposed areas will occur.

5. Diversions and Streamworks

5.1 Overview

Diversions to the creeks are required to facilitate mining and as each mine path intersects a creek a diversion will be required. The intent of this approach is that the mine path will always operate in a "dry" environment with no flowing water entering the mine void. Given the presence of Northern Creek, Central Creek, Clarke Creek, Wasabi Creek and Southern Creek, and farm drains within the mining area, these works will be carefully planned and implemented to maintain water conveyance and fish passage, protect freshwater values and minimise adverse environmental effects.

Reconstruction will focus on achieving no net loss in creek extent and enhancing freshwater values through improved channel alignment and planting to a minimum width of 3m either side of the five creeks. Reconstructed creeks will be designed to provide a more natural form than the existing straightened alignments resulting from historic mining and farming activities.

5.2 Affected Watercourses

The five creeks subject to diversion and reconstruction activities include the Northern Creek, Central Creek, Clarke Creek, Wasabi Creek and Southern Creek. Each will be progressively reinstated during mining operations. Pre-mining and indicative post-mining channel lengths and diversion methods are outlined in **Table 1**. Granite Creek will not be diverted during the mining of the Southern Block.

Table 1: Creek extent pre-mining

Creek	Length pre-mining (based on continually or intermittent flow extent)	Diversion methodology to be applied
Northern Creek	1,178m	East West
Central Creek	764m	East West
Clarke Creek	681m	North South
Wasabi Creek	733m	North South / East West
Southern Creek	469m	East West

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Drains located across the site will also require diversion. Not all drains will be reconstructed. Land will be recontoured and drains constructed as required to maintain drainage patterns.

Planting of reconstructed creeks is set out in Section 6.

5.3 Design Principles

Diversions and reconstructed waterways will be designed in accordance with best practice fluvial geomorphology and freshwater management principles, and will:

(a) Maintain hydraulic capacity to convey design flows and prevent flooding;
(b) Minimise erosion and sediment generation;
(c) Promote stable channel forms and banks;
(d) Support the establishment of a variety of riparian and aquatic habitat;
(e) Integrate with final landforms and wetland systems; and
(f) Reflect, where practicable, natural channel patterns and gradients.

Diversion channels will be sized and aligned to accommodate expected flows and will incorporate gentle batters, stabilised beds and erosion-resistant materials where required.

5.4 Diversion Sequence and Methodology

The diversion methodology will vary between watercourses depending on their orientation, position within the mining sequence and long-term drainage function. Creek diversions could be temporary to allow a mine path to progress or permanent, where the diversion remains as a permanent location post mining in a completed rehabilitated location. In both temporary and permanent cases, the creek diversion will be necessary in order to establish an 'off-line' environment to allow mining works to be completed outside of active creek channels.

Both creeks and artificial drains will be managed in accordance with this Plan, with some drains potentially retired or replaced by new drainage channels.

North–south oriented creeks and drains will be diverted into a previously mined area before mining reaches the creek system. This is expected to require adjustments (widening or narrowing) of the mine path to facilitate this. A permanent reconstructed channel will be built in advance as part of the rehabilitation of the mined land, and the creek flow will then be redirected into it.

East–west oriented creeks and drains will also be diverted into previously mined areas (behind the mining void) and into the adjacent mine path (to the east as mining moves inland), prior to mining progressing through the creeks existing alignment. This requires a temporary diversion of the creek around the active mining area. Once mining has advanced beyond the temporary diversion, a permanent reconstructed channel can be constructed and the creek reinstated.

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To minimise the potential harm to native fish in creeks before they are diverted (either into temporary or permanent channels) it is proposed that fish relocations be carried out as per the Native Freshwater Fish Capture and Relocation Plan (NFFCRP).

The following outlines the sequence of works required to complete both temporary and permanent diversions:

- Excavation of the new diversion channel (likely to be through the completed mine path that has been rehabilitated) will be carried out offline from the existing creek, so that excavation works can be carried out in a dry environment. A solid plug will be left in place at each end of the diversion channel to ensure that the existing creek cannot breach and flow through the new channel prior to it being stabilised.
  - For temporary diversions the dimensions and design of the diversion will be such that it replicates the existing channel profile. This will be detailed within the SSESCP; and
  - For permanent diversions the dimensions and design of the diversion will be confirmed in the SSESCP process and will ensure ecological and hydrological function.
- Material excavated from the diversion channel will be placed in the mine path location or in stockpiles away from the creek diversion, with any flows to installed silt fences (refer section 4.3.2 of the ESCP);
- Stabilisation of the newly constructed diversion channel will be carried out to ensure it does not become a source of sediment. This may be achieved using natural materials such as coir matting, rip rap material or rock armour;
- Once the diversion channel is fully stabilised, the downstream and upstream plugs will be removed to allow creek flows to enter the diversion channel.
- A non-erodible dam (such as sandbags with an impermeable liner) will then be placed within the original channel immediately downstream of the inlet to the diversion channel in order to divert flows into it. A non-erodible dam will also be immediately placed at the downstream end of the original channel, upstream of the diversion channel outlet to prevent backflow into the mining area. Once the flows have been diverted and the dams placed, fish removal from the original channel can be completed. Mining activity associated with the mine path can then take place within the original channel location as required;
- There will remain a buffer zone between the creek and drain systems and the mining activity and in some circumstances, there will be the requirement to place silt fences between these two locations to ensure no dirty surface water runoff enters the creek. In addition to this, the mine void will continue to have bunding around the perimeter which will ensure all mine void water is fully enclosed;
- Once the mining and rehabilitation has been completed and the surrounding area stabilised then the channel can be reinstated back within its original position or remain in the new location as a permanent creek.

Creek and drain diversion activities will be programmed for fine periods of weather. In the event of forecast rainfall, or before leaving the work area for more than 24 hours the following will occur:

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- Any loose material that could enter a “live” creek or drain system is to be removed from the work area, depending on the quality of the material this will be to a stockpile area or? ;
- Where possible, all exposed areas will be covered with geotextile to ensure no flows overtopping the creek or drain banks create scour issues. It is expected that this will be achieved through geotextile with the geotextile appropriately trenched in at the head and toe of the area;
- All existing and additional erosion and sediment control measures will be inspected, secured and maintained where required;
- Additional mulch and geotextile / polythene will be kept onsite at all times to cover exposed areas and stockpiled material; and
- Extended working hours will be considered if it is of significant benefit with regard to programme and environmental impact.

5.5 Stream Rehabilitation Techniques

Reconstruction of diverted creeks will focus on enhancing ecological function, channel stability, and connectivity with surrounding habitats. Creeks within the mining area typically range from 1m to 3.5m in mean width and will be reconstructed using the following techniques.

Stream Channel Profile and Pattern

Creeks will have a base flow channel, a wider bank-full channel and floodplains either side. Appropriate water depths will be maintained within the active base flow channel at all times to provide permanent habitat for invertebrates and fish. Water will spill from the base flow channel into the wider floodplains during high flows to provide flood conveyance and connection with the floodplain (e.g., trap fine sediment, reduce flow velocities and erosive forces within the stream).

The channels will have variable channel widths and depths with habitat comprising deeper pools, moderately deep runs and shallower riffles. Indicative cross sections showing the run, riffle and pool habitats is shown in **Figure 9**. Variable channel widths and depths will enhance instream habitat diversity over time as natural erosive forces shape the channel into a natural state based on hydrology.

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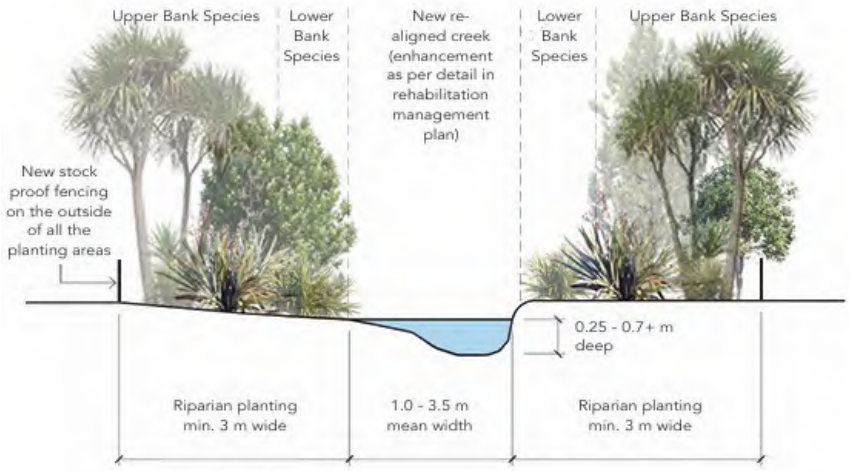


Realigned Creeks - Typical Cross Sections

This page includes three typical cross sections to illustrate how the five realigned creeks (Northern, Central, Clarke, Wasabi and Southern) will work once mining has gone past. Each of these creeks will have riparian planting a minimum of 3.0 metres width on either side. There will be no loss of extent of the creeks once mining is complete. Design details will be further developed through the **Rehabilitation Management Plan.**

Of note, Granite Creek and Little Granite Creek will not be disturbed by mining activity. Granite Creek will be enhanced with riparian planting a minimum of 5.0 metres width on either side.

Habitat sequences, widths and depths

The aim is to have: run -> riffle -> pool habitat sequences. There will be meandering channels with variable widths and depths as this will encourage the formation of different habitats. Floodplains will also be incorporated. There will typically be deeper pools on bends, moderately deep runs on straighter sections, and shallow riffles that can flow into pools or between runs. Habitat depths will depend on the future hydrology and catchment size.

Pool habitat

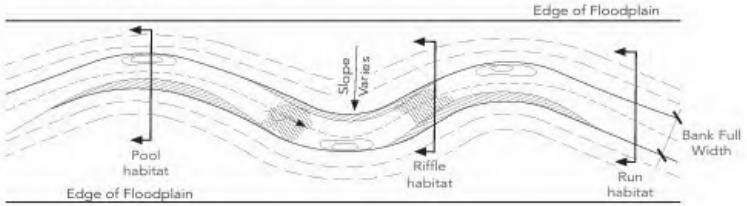
- Located on the meander bends of a channel
- Typically has fine sediment or small gravel
- Naturally grades from shallow on the inside of the bends to deeper on the outside
- Wider floodplains may occur on the inside of bends adjacent to pools

Riffle habitat

- Shallowest habitat
- Generally less common in lowland streams
- Bed has medium to large gravel plus small/large cobble plus the occasional boulder
- Typically narrower than pools and runs (but not always)

Run habitat

- Located on straighter sections of a channel
- Typically dominated by small to large gravel
- Can be more 'U' shaped but with variable depths if possible
- Typically narrower than pools



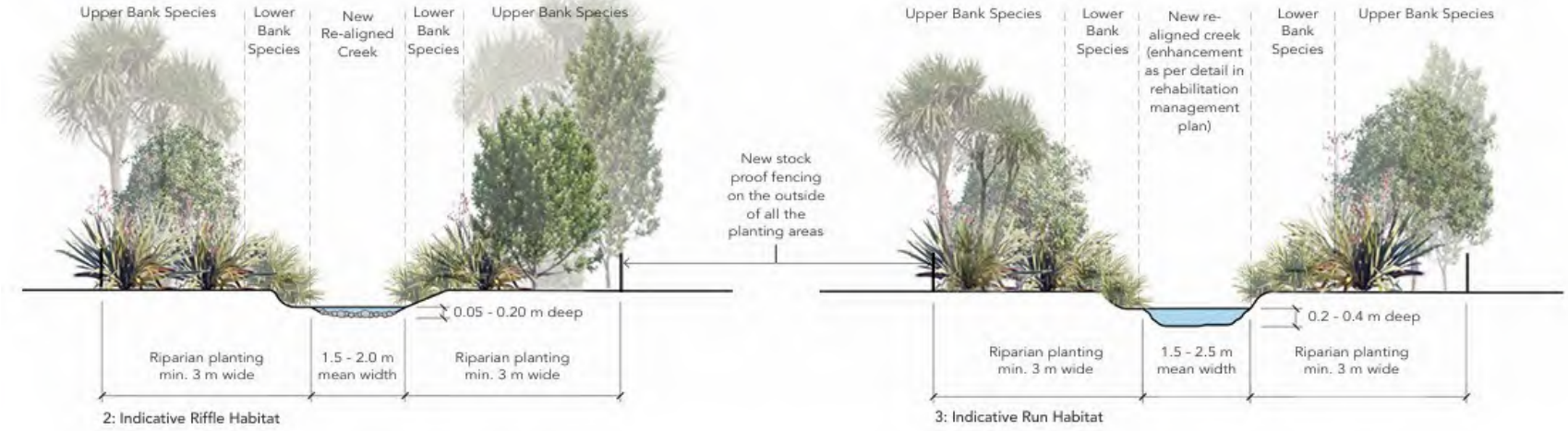


Figure 9: Indicative Pool, Riffle and Run Cross Sections

Existing channel dimensions for the five creeks are summarised in the below table and will provide a minimum for what the reconstructed channels will be.

	Widths								Depths								Habitat					Streambed					
Stream	Width 1	Width 2	Width 3	Width 4	Width 5	Min width	Max width	Mean width	Depth 1	Depth 2	Depth 3	Depth 4	Depth 5	Min width	Max width	Mean depth	Pool%	Riffle%	Run%	Chute%	Total	Bedrock	Boulder	Cobbles	Gravel	Sand/Silt	Total
Northern Creek	1.80	2.40	3.00	1.30	2.40	1.30	3.00	2.2	0.14	0.17	0.14	0.48	0.32	0.14	0.48	0.25	5	15	80		100	3	2	15	70	10	100
Central Creek	1.60	2.50				1.60	2.50	2.1	0.65	0.70				0.65	0.70	0.68	40		60		100				30	70	100
Clarke Creek	0.65	1.30	1.00	1.30	0.90	0.65	1.30	1.0	0.24	0.15	0.14	0.10	0.09	0.09	0.24	0.14	3		95	2	100				5	95	100
Wasabi Creek	5.30	2.80	2.50			2.50	5.30	3.5	0.19	0.18	0.30			0.18	0.30	0.22	20	40	40		100		5	45	50		100
Southern Creek	1.20	1.80				1.20	1.80	1.5	0.10	0.20	0.30			0.10	0.30	0.20	30		70		100			40	40	20	100

Table 2: Creek channel dimensions

Channel widths will be similar to the current channels (mean widths between 1.0–3.5 m). Existing channel widths may be constrained by historical channelisation so there is potential to have wider channels where appropriate to allow for greater channel width variability depending on area available (i.e., within the floodplain), location along the stream continuum (i.e., upper, mid, lower) and the type of habitat proposed to be created (i.e., run, riffle or pool).

Channel depths will be similar to the current range (mean depths between 0.15 –0.7 m) but will depend on the size of the channel, location in the catchment and habitat created (e.g., run, riffle, pool). The aim will be to maximise habitat diversity by having variable depths across various habitats. Pools will range in depths between 0.5–0.7 m, runs between 0.3–0.5 m and riffles between 0.05–0.2 m. Water depths in runs and pools will vary along the channels and will be shallower in upper sections than in mid-lower sections. Channels widths and depths along the stream are to be determined in conjunction with the project hydrologist, ecologist and engineers to ensure feasibility and confirm habitat value.

The width of the permanent base flow channel will be within a wider floodplain and will maintain an appropriate water depth in the channel at all times of the year to provide permanent habitat for aquatic life. Run habitats of various lengths with variable widths and depths will be the dominant habitat type (40–60%), pools the next most common on meander bends (10–30%) and shallow riffles the least common (10–20%).

The base flow channel profile will vary between sections with steeper streambanks and some sections with gentle sloping streambanks. Steeper streambanks will allow vegetation on floodplains (e.g., sedges) to overhang the channel and provide immediate stream cover for native fish species that prefer overhead cover (e.g., kōkopu species, eel). Steeper streambanks will also allow natural erosion to undercut banks over time and increase shelter for native fish (e.g., kōkopu and eel). Gently sloping streambanks along some sections (e.g., inside of bends of pools and along runs) will provide good connectivity with the floodplain and allow wetland plants (e.g., sedges) to encroach up to, and into, the channel.

The outside streambank on meander bends where pools will be formed, or form over time, will have a steeper streambank whilst the inside of the bend will have a more-gentle slope that

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extends into the floodplain where water from the base flow channel can spill out onto during higher flows and where riverine wetlands could form.

Armouring of streambanks with riprap on the outside of bends of pools may be required to minimise streambank erosion. The amount of armouring used will be minimised to maintain natural stream character and floodplain connectivity. Voids amongst boulder armouring would be filled with soil allowing riparian vegetation to establish.

Streambed and Woody Debris

Most creeks naturally have coarse streambeds dominated by gravel with lower proportions of cobble and sand/silt. The aim will be to have more small cobbles (64–128 mm), large cobbles (128 – 256 mm), gravel (2–64 mm) and occasional bounders (>256 mm) in riffles, more gravels in runs and occasional gravel in pools. Replicating the existing streambeds in channels will maintain the natural character and provide similar habitats for the invertebrate and fish species that currently exist.

Large woody debris (e.g., tree stumps, logs) will be anchored to streambanks and stream channel in selected locations in deeper runs and pool habitats to increase stable instream habitat for invertebrates and provide shelter for native fish (e.g., eel, kōkopu). **Figure 10** shows an example of the type of woody debris that can be used.

Large woody debris will be specified when doing detailed design and dependent on local site conditions at the to,e and secured to the streambed or streambanks so that they are not easily washed downstream during high flow events and cause blockages. This will be done by embedding a portion of the log/wood into the streambank when it is constructed.

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Figure 10: Example of large woody debris to be used in instream habitat construction

Fish Passage

Fish passage will be provided along the full extent of the reconstructed channels for the native species currently occurring within the watercourses. This means meeting conditions in regulation 70(2) of the National Environmental Standards for Freshwater (NES-F) for culverts (e.g., embedded culverts, bed substrate over length of culvert, similar velocity in culvert as that upstream and downstream) and avoiding introducing other barriers to fish passage (e.g., velocity barriers, steep rapids, ephemeral flows) as part of stream construction.

5.6 Clarke Creek Reconstruction

Clarke Creek will be reconstructed within the proposed wetland area, with **Figure 11** showing its indicative new alignment. The channel will be designed to convey flows from the upstream hill catchment through a meandering path across the northern lobe of the wetland complex before reconnecting with Granite Creek at a similar downstream location to its existing confluence. Reconstruction of Clarke Creek can occur alongside wetland formation and will incorporate a range of habitat features, including runs, riffles, and pools, although pool habitat is expected to predominate where the channel crosses the low-gradient wetland area.

The reconstructed Clarke Creek will include a variety of bed substrates to support ecological function, although finer organic material is expected to dominate within the pool habitats through the wetland complex.

Reconstruction in this manner will ensure compliance with Condition 28.2 and no loss of extent.

Figure 11: Clarke Creek reconstructed within the wetland complex

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5.7 Riparian Rehabilitation and Protection

Riparian planting and exclusion of livestock is addressed in Section 5. Planting will focus on stabilising banks, reducing erosion, providing shade and enhancing habitat connectivity.

5.8 Monitoring and Maintenance

Monitoring will be undertaken to assess the ecological recovery of diverted creek systems following rehabilitation. Two years after permanent diversion to the new channel and completion of riparian planting, fish and macroinvertebrate surveys will be carried out to confirm recolonisation and evaluate ecological health relative to pre-works conditions. The results will be used to determine whether the rehabilitated channel is functioning as intended.

If monitoring indicates that a pre-works equivalent state of ecological health has not been achieved (as defined in Condition 24.5), a specific stream or creek diversion and development plan will be prepared and submitted to the Consent Authority within two months of completing the monitoring. The Consent Holder will then implement any additional works identified in the approved plan within six months of approval, or within the next appropriate planting season, depending on the nature of the required measures.

6. Riparian Margin Planting and Planting

6.1 Overview

Riparian planting will form an integral component of the diversion, creek reconstruction and wetland rehabilitation works outlined in Sections 3 and 4 of this Plan. Along with the progressive reinstatement of permanent creek alignments and completion of landform reconstruction, indigenous riparian margins will be established along each of the five reconstructed creeks to enhance bank stability, water quality and ecological connectivity. Additional riparian planting will be undertaken along Granite Creek and further new planting will occur along Cargill Road and beside the Freedom Camping area.

6.2 Riparian Planting

Riparian planting on either side of the reconstructed creeks will extend across a minimum width of 3m on each side of the creek bank and will comprise eco-sourced native species appropriate to local conditions, including harakeke (flax), tī kōuka (cabbage tree), kōhūhū, Coprosma species, and Carex sedges. Granite Creek will be planted with a 5m riparian margin either side. Riparian planting will provide shading, reduce erosion, filter surface runoff and link habitat corridors across the site. Indicative planting for reconstructed creeks is illustrated in **Figure 12**. Plant species to be used for the riparian areas are illustrated on pages 22 and 23 of the Landscape Mitigation Package.

Planting will be undertaken in consultation with a suitably qualified ecologist to ensure appropriate composition and establishment densities, with a minimum density of one plant per square metre is applied to meet Condition 16.5. Riparian planting will be undertaken once creek segments have been reconstructed and all rehabilitation works (such as contouring) alongside the creek have been completed in that mine path.

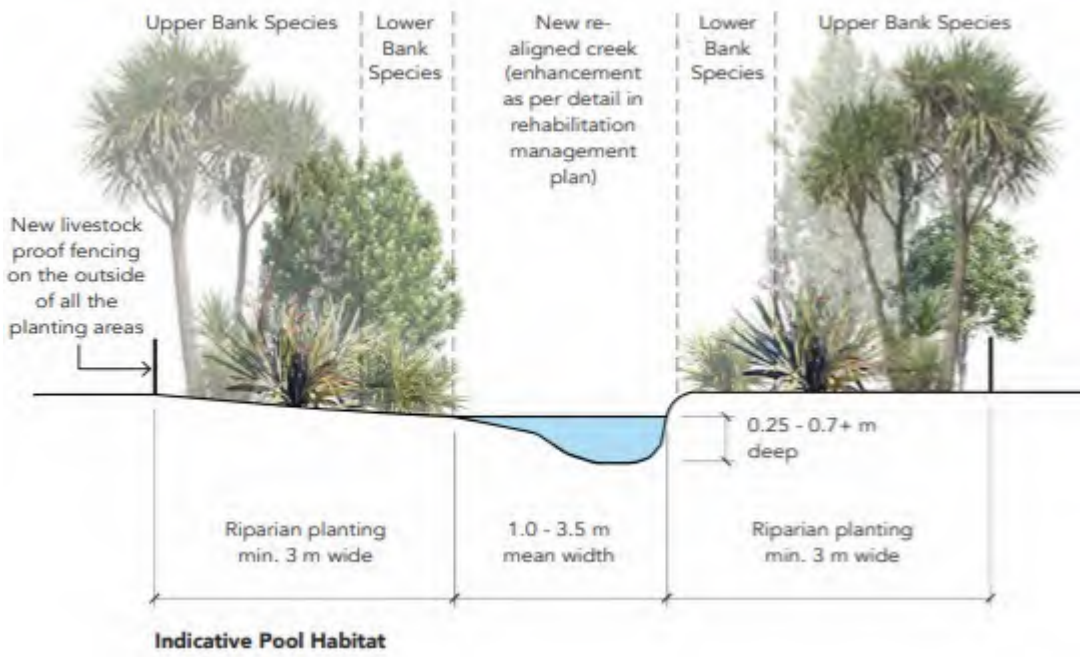

Figure 12: Reconstructed Creek Cross Section showing Riparian Planting

Planting within wetland areas will be undertaken in segments as each of the ponds are developed. **Figure 13** from the Landscape Mitigation Package shows a cross section of one area of the wetland showing the different water depths and type of vegetation to be planted.

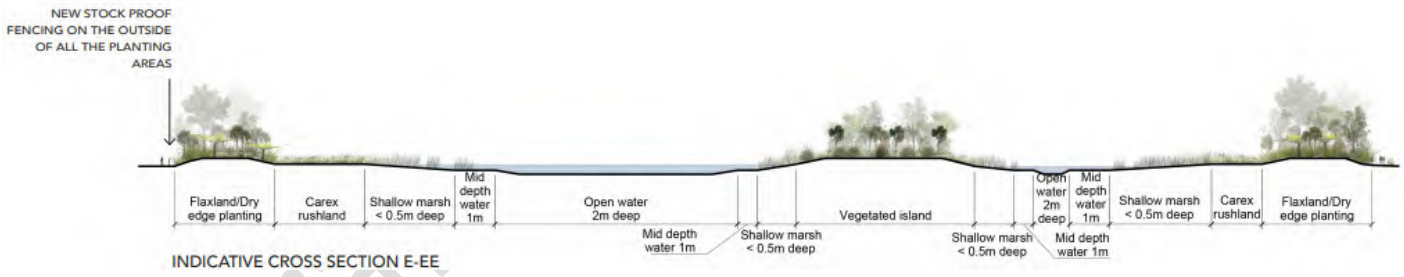

Figure 13: Wetland Habitat Cross Section

6.3 New Native Planting for Landscape Mitigation

Staggered informal 3.5m wide clusters of native vegetation are to be planted along the northern and southern sides of Cargill Road to screen and soften some of the mining activity when it comes closest to this point. This new planting is balanced with the desire to maintain some views up and down the coast and not create a 'tunnel' effect along Cargill Road. Refer page 11 in the Landscape Mitigation Package.

Cluster planting will include species such as flax and small trees identified in the Landscape Mitigation Package on pages 22 and 23 and be undertaken in consultation with a suitably qualified landscape architect to ensure an appropriate species arrangement, grade and quality of plants are established and maintained. This planting will be undertaken in year 1.

A cluster of dense native vegetation planting is to be planted either side of the Freedom Camping Area to screen the activity when it is closest to this area. Refer page 7 in the Landscape Mitigation Package, which illustrates the location of these two areas.

This planting will include species identified in the Landscape Mitigation Package on pages 22 and 23 and be undertaken in consultation with a suitably qualified landscape architect to ensure an appropriate species arrangement, density, grade and quality of plants are established and maintained. This planting will be undertaken in year 1.

6.4 Retention of Existing Planting

Existing vegetation offers immediate screening and visual softening of the site. There are clusters of vegetation which will be retained as identified in the Landscape Mitigation Package within the pre-mining section, pages 5 to 8. These areas include:

- The stand of Old Man Pines and the large cluster of vegetation near the consented WCP.
- Clusters of vegetation along the eastern application area boundary north of Cargill Road.
- The patch of vegetation adjacent to 101 Cargill Road.
- The stand of trees and other riparian vegetation adjacent to Granite Creek.

6.5 Protection and Management

Livestock will be prevented from entering riparian margins to protect establishing vegetation. Access points will be limited to designated maintenance locations. This exclusion may be undertaken via traditional post and batten or electric fencing, or as technology advances virtual fencing.

Ongoing maintenance of planting will be undertaken for a period of no less than three years and as required for the life of the consent to achieve the outcomes specified in the conditions (80% cover). This will include ongoing monitoring and eradication of woody weed species which may establish including blackberry and gorse. This will be programmed twice annually for three years. Where weeds are identified, appropriate control measures will be implemented, including manual removal, mechanical methods or targeted herbicide application, with priority given to aggressive or invasive species.

7. Wetland Construction

7.1 Overview

A wetland of at least 53ha will be progressively constructed at the location shown in **Figure 14** as part of the site rehabilitation. The lower elevation and profile of the wetland area will counteract the overall loss of material from the site due to the removal of Heavy Mineral Concentrate whilst minimising the reduction in elevation as well as having ecological benefits. The wetland will form an integral component of the final rehabilitated landscape and will be hydraulically and ecologically

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connected to reconstructed creeks and riparian margins. Further detail on the timing and location of wetland development is outlined in the Landscape Mitigation Package on pages 12 to 18.

7.2 Integration of the Constructed Wetland

The final landform at the SB will be a more gently contoured landscape as opposed to the current 'humped and hollowed' form with an approximate overall reduction in land height of 0.63m across the 408ha site. There will be fewer farm drains across the site due to the recontouring of land. The wetland will be constructed as mining progresses through Sections 1 and 2 (indicatively these are years 1 - 2, 8 and 10 - 11).

Figure 14: Approximate Constructed Wetland Area (Source: Landscape Mitigation Package)

7.3 Design Principles

The constructed wetland will be designed in accordance with best-practice wetland restoration and management principles and will:

(a) Maintain permanent and seasonal areas of open water and saturated soils;
(b) Provide sufficient storage and conveyance capacity for site drainage and stormwater flows;
(c) Promote sediment settling and nutrient uptake;
(d) Support indigenous wetland vegetation and fauna;
(e) Enhance connectivity between waterways and surrounding habitats; and
(f) Integrate visually and physically with the final landform.

The wetland will incorporate shallow margins, variable depths and gently sloping batters to encourage vegetation establishment and ensure long-term stability.

7.4 Construction Methodology

Wetland construction will be undertaken progressively as mining advances across the site, ultimately forming a network of up to 31 individual cells (as shown in **Figure 15**). Ponds will be gradually linked together to form the larger wetland complex as mining moves across the site.

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This staged approach ensures the total disturbance will not exceed the maximum 16ha exposed area limit for the project.

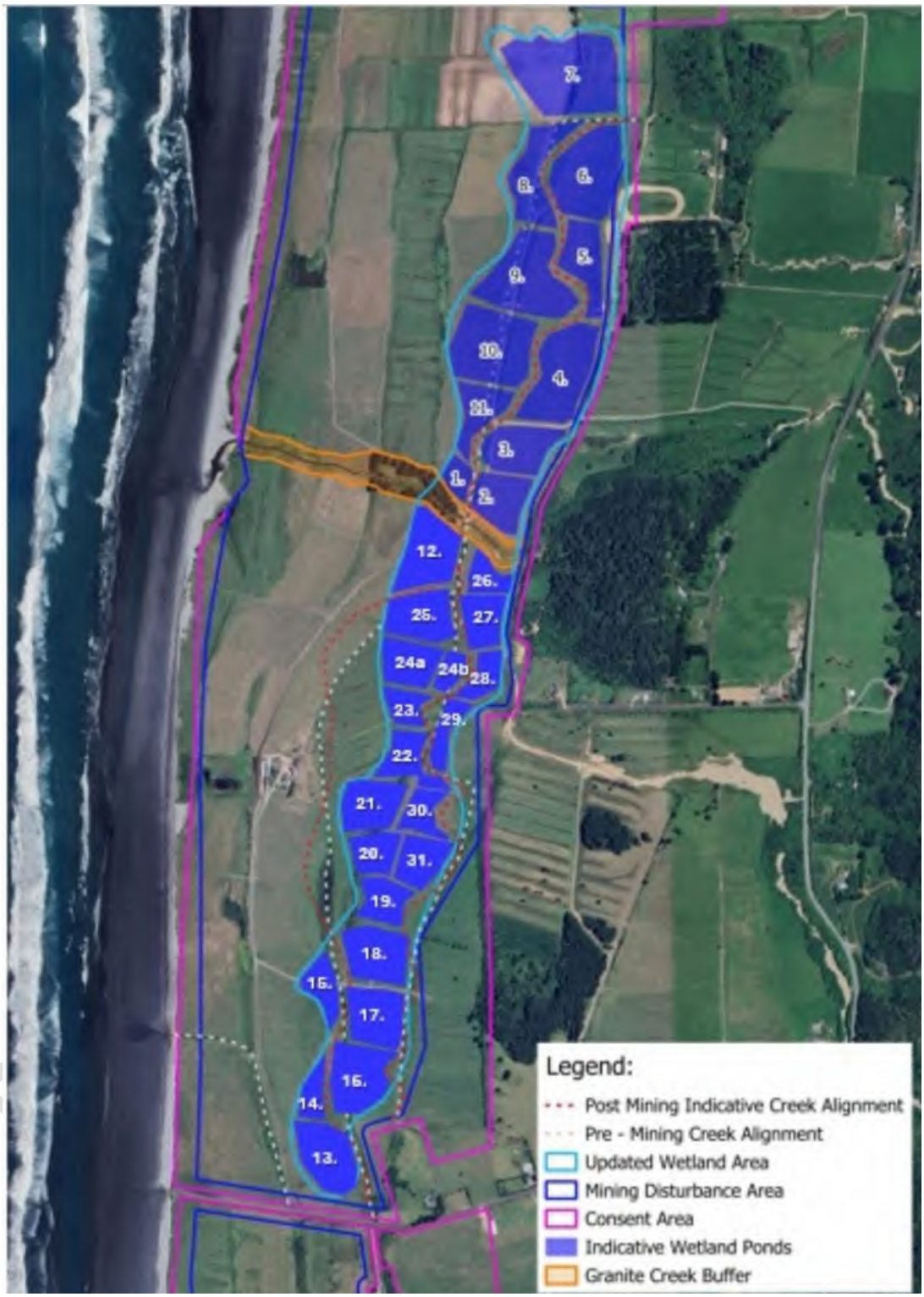

Figure 15: Wetland Construction using Individual Ponds

As set out in the ESCP, where creek systems intersect the mine path, they will be temporarily diverted around active mining areas to enable operations to proceed. Following completion of mining, permanent creek channels will be reinstated in their diversion locations at levels consistent with pre-mining conditions, allowing for full stabilisation and riparian planting.

Surrounding these channels, wetland features will be established at slightly lower elevations, forming interconnected ponds with shallow shelves, deeper pools, and transitional zones. Construction will be staged to minimise exposed surfaces and will be undertaken alongside erosion and sediment control measures, with wetland planting progressing in tandem with rehabilitation. The wetland establishment will utilise the mining void to divert any dirty water runoff.

The east-west segregation of initial ponds allows for the later formation of deep water, open water fens and marshes. This includes a midline running down part of the line of the future wetland allowing for further excavation linking the wetland ponds from west to east and linking low gradient creeks internal to the wetland complex.

Figure 14 displays the indicative final wetland complex. Clarke Creek and Granite Creek main stem enter the wetland from the east at elevations between 6 and 7 metres. Granite Creek main stem is an existing creek which is preserved from disturbance during operations. The main stem water course would be maintained somewhat hydrologically separate from the wetland complex by the original banks and bed gradient, slightly perched above that of the wetlands bounding the creek course.

7.5 Wetland Planting and Establishment

Wetland margins and internal zones will be planted with eco-sourced indigenous wetland and riparian species appropriate to local conditions. Planting will be undertaken progressively in tandem with wetland construction, with vegetation established as individual ponds are formed and continuing as these features are incrementally connected across the site. Planting will reflect moisture gradients and include emergent, marginal and riparian vegetation communities. The Landscape Mitigation Package sets out the indicative wetland area on pages 12 to 18 along with the various species on pages 22 and 23 to be planted as shown on **Figure 15**. Species will include Carex, rushes, sedges, harakeke (flax), tī kōuka (cabbage tree) and other locally occurring wetland plants. Planting will be undertaken in consultation with a suitably qualified ecologist to ensure appropriate species selection, composition and establishment densities, with a minimum density of one plant per square metre is applied to meet Condition 16.5.

The final wetland area, when planting has been completed, will cover an area of at least 53 ha with the following habitats:

1. At least 5.2ha of shallow marsh with an average depth of 0.4m
2. At least 2.8ha of mid-depth water with an average depth of 1m
3. At least 5.3ha of deep open water with an average depth of 2m
4. At least 13.4ha of flaxland and dry edge vegetation
5. At least 4.3ha of Carex Rushlands
6. At least 15ha of Raupo
7. At least 4.1ha of raised islands.

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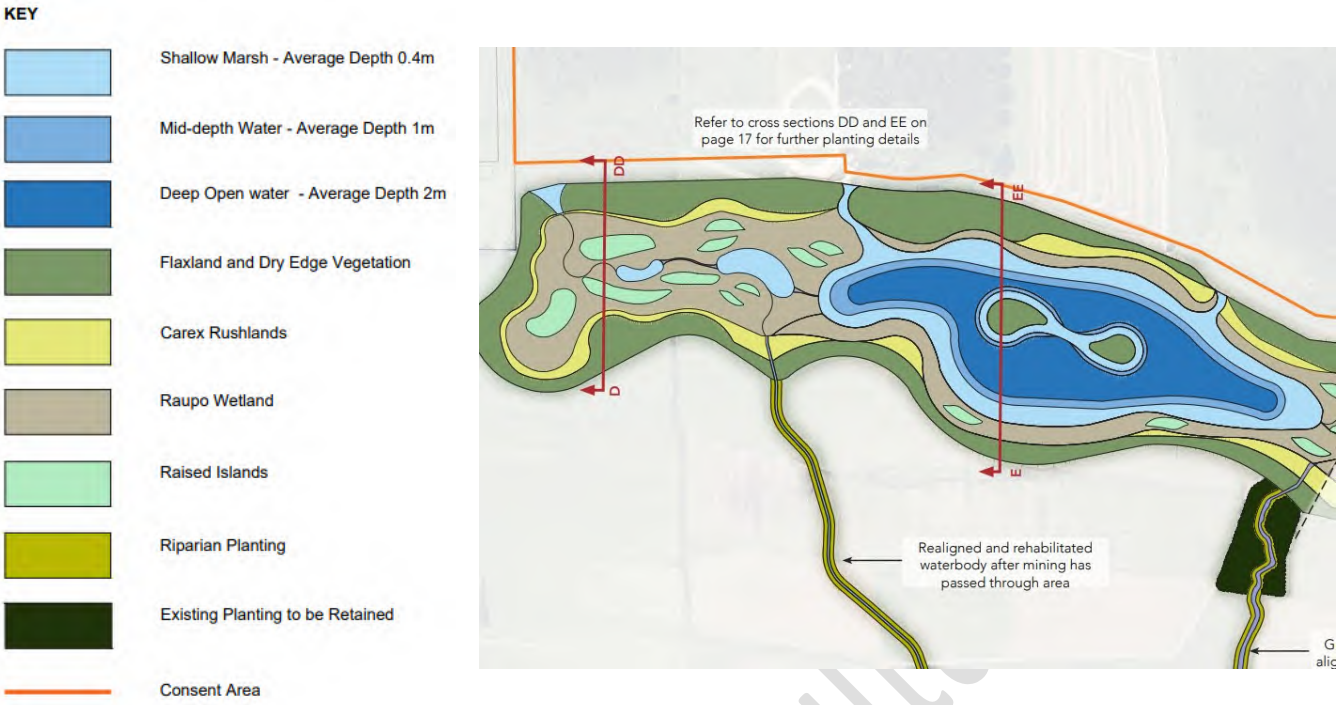

Figure 15: Indicative Wetland Formation and Planting Plan

7.6 Protection and Management

Livestock will be prevented from entering the wetland to protect establishing vegetation. Access points will be limited to designated maintenance locations. This exclusion may be undertaken via traditional post and batten or electric fencing, or as technology advances virtual fencing.

Ongoing maintenance of planting will be undertaken for a period of no less than three years and as required for the duration of the consent. This will include ongoing monitoring and eradication of woody weed species which may establish including blackberry and gorse. Where weeds are identified, appropriate control measures will be implemented, including manual removal or mechanical methods, with priority given to aggressive or invasive species.

8. Conditions

To be included

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Letter to Heritage New Zealand Pouhere Taonga

TĀIKO CRITICAL MINERALS
WEST COAST NEW ZEALAND

Mining with the environment
Working with the community
A world class, high grade critical minerals deposit

4 March 2026

Andrew Coleman
Chief Executive of Heritage New Zealand Pouhere Taonga
Antrim House
63 Boulcott Street
PO Box 2629
Wellington 6140
By email: acoleman@heritage.org.nz

Kei te rangatira, tēnā koe

Tāiko Critical Minerals Limited – Barrytown Minerals Project – Fast-track Approvals Act 2024 application

1 As you are aware, Tāiko Critical Minerals Limited (**TCM**) is the authorised person with respect to the Barrytown Minerals Project (**Project**), which is a Schedule 2 listed project in the Fast Track Approvals Act 2024 (**FTAA**).

2 We are writing to Heritage New Zealand Pouhere Taonga (HNZPT) in its capacity as a relevant administering agency (of the Heritage New Zealand Pouhere Taonga Act 2014) in terms of Section 11 of the FTAA to confirm that TCM will be applying for all approvals necessary under the FTAA to mine the Southern Block of the Barrytown Minerals Project, including an archaeological authority.

3 The Fast Track Approvals Amendment Act 2025 will replace consultation requirements with the requirement to notify HNZPT on 31 March 2026. As TCM commenced consultation with the Council prior to that date, it is required to finish consultation with HNZPT and is not required to notify the Council under the new provisions (see FTAA, Schedule 1, clause 10).

4 A comprehensive project description is contained at **Appendix A**.

5 By way of summary, the Project is to undertake mineral sand mining to obtain ilmenite, garnet and other minerals across an area of the Barrytown Flats, in the Grey District. Resource consent has already been granted to TCM for initial stages of the Project, including to undertake mineral sands mining to the north of the Project site (on the Central Block), to establish and operate a Mineral Separation Plant at Rapahoe (including transportation from Barrytown Flats to the MSP) and to establish and operate a Wet Concentrator Plant for processing on site. Mining of the Southern Block is likely to take place over approximately 14 years, followed by rehabilitation of the site, including construction of the wetland.

6 The application will seek all approvals for mining and related activities within the Southern Block including (but not limited to):

(a) the extraction of sand using a floating dredge over approximately 280 hectares;

(b) remediation, rehabilitation and closure activities, including the establishment of a constructed wetland and reshaping of contours over 408 hectares.

7 Approvals sought that are of particular relevance to HNZPT include:

(a) Land use consents, water permits, and discharge permits related to mining activities normally required under the Resource Management Act 1991;

(b) Approvals normally required for under the Heritage New Zealand Pouhere Taonga Act 2014 to modify or destroy recorded and unrecorded archaeological sites.

8 New Zealand Heritage Properties Ltd (NZHP) has undertaken an archaeological assessment of the Project site, a draft of which is attached at **Appendix B**. NZHP's assessment identifies two recorded archaeological sites (find spots) and thirteen points of interest either within or near the site. The proposed archaeological conditions have been informed by the archaeological assessment. It is also proposed to include the accidental discovery protocol conditions in the resource consent conditions.

9 The FTAA requires Māori values of archaeological sites to be assessed as part of the application for an archaeological authority. The archaeological assessment identifies some Māori values including the two artefact find spots, potential midden/oven sites, and potential mining and historic-domestic sites. The assessment also notes that Ngāti Waewae are best placed to comment on Māori values of archaeological sites and suggests that the report be provided to them as part of consultation. TCM has been consulting with Ngāti Waewae in the preparation of the application and they have been invited to provide an assessment of Māori values on archaeological sites if they so wish.

10 Proposed conditions for the archaeological approval are attached at **Appendix C**. These conditions have been informed by the archaeological assessment. It is also proposed to include the accidental discovery protocol conditions in the resource consent conditions.

11 The Māori Heritage Council has also been invited to consult on the application.

12 We would appreciate confirmation that you have received this letter and any feedback you may have on the proposed conditions for the archaeological authority. If any further questions or matters arise that you would like to discuss, please do not hesitate to contact us. We would be grateful for your response by 27 March 2026. We are happy to make NZHP available for any questions or further discussions you consider necessary.

13 We thank HNZPT for its contribution to date.

Nāku, nā

Mike Meehan

Project Director

E: mike.meehan@tigamm.co.nz

Ph: 021-289-8636

Appendix A

Project Description

Barrytown Critical Minerals Project
Southern Block

Project description – draft for consultation
4 March 2026

1. Overview

1.1 This section sets out a detailed description of the Project to inform the applications made for approvals under Schedules 5, 7, and 8 of the FTAA.

1.2 Tāiko Critical Minerals (formally TiGa Minerals and Metals, the **Applicant**) holds various resource consents from the Grey District Council and the West Coast Regional Council authorising the extraction, processing, and transportation of mined material in the form of Heavy Mineral Concentrate (**HMC**) from the Central Block (**CB**) at Barrytown, as part of its critical minerals project on the Barrytown Flats. Minerals sought to be obtained through the process are ilmenite, garnet, zircon and gold.

1.3 The initial resource consent for mining, HMC production, transportation and associated ancillary activities was subject to a publicly notified process. Through this extensive process, all aspects of the company's operations were assessed against the relevant District and Regional Plans, the Resource Management Act 1991, and applicable national direction. This enabled full participation by interested parties and agencies and resulted in a robust set of consent conditions, which have informed the company's Fast-track application, including the substantive environmental data set the company has produced and which is ongoing.

1.4 Following the granting of the substantive resource consent for the CB (north of Canoe Creek), an additional resource consents have been granted for a Mineral Separation Plant (**MSP**) at Rapahoe. Consent for the establishment, operation and maintenance of a centralised Wet Concentrator Plant (**WCP**) adjacent to the Southern Block (**SB**), associated water management infrastructure (known as the Mine Water Facility (**MWF**)) and access road, is currently being processed by the Grey District Council. Consent for the earthworks component of this activity was granted by the West Coast Regional Council in February 2026. The MSP and WCP will process material from the CB and the SB.

1.5 In adopting this approach, the company has undertaken extensive consultation with the local community, mana whenua, Councils, and relevant agencies throughout these community-facing processes. This engagement has contributed to the development and acceptance of comprehensive consent conditions and management provisions. It has also enabled the assessment and approval of high interest matters, such as trucking activities on State Highway 6. As a result, the Fast-track application is focused on seeking all necessary approvals for the mining activity within the SB. **Plan A** shows the three resource blocks of the Barrytown Critical Minerals Project.

1.6 The SB comprises approximately 408ha on the Barrytown Flats as shown in **Plan B**. All land subject to this application is privately owned with access to the site approved by the respective landowners. Mining activity is proposed to occur on approximately 280ha of the total area, which is known as the 'mining disturbance area' and shown in **Plan B**. Earthworks will be undertaken on parts of the SB outside the mining disturbance area to assist with recontouring and rehabilitation.

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1.7 Mining on the SB will be undertaken using a floating dredge of modern design. Mining will be undertaken in three sections as follows (shown on **Plan C**), although only one section will be mined at a time:

(a) Section 1: Granite Creek North;

(b) Section 2: Granite Creek South;

(c) Section 3: Cargill Road.

1.8 Mining of the SB is expected to commence in approximately 2034 - 2035 once the mineral resource on the CB has been exhausted. The WCP and MWF will be used to process material from both the CB and SB.

1.9 Various measures are proposed for the avoidance, minimisation and mitigation of ecological (terrestrial and freshwater), landscape, visual, noise and dust-related effects. The Project also includes significant ecological and landscape enhancements in the form of an extensive wetland, realignment of creeks into natural patterns, riparian planting and stock exclusion fencing.

1.10 Mining of the SB is expected to take approximately 14 years (excluding preparation and rehabilitation), based on the extraction rate of 2,000,000 tonnes per year (producing 400,000 tonnes of HMC per year). This will extend the overall mining component of the Barrytown Minerals Project to approximately 30-35 years. Taking into account pre-mining construction works and post-mining final rehabilitation and mine closure works, it is anticipated that the Project will be completed between 2055 and 2060. Approvals are sought for 35 years to provide sufficient time for mining activity to occur over stages, final rehabilitation and operational factors to take place.

1.11 The anticipated work programme for the Project is as follows:

(a) Bunding and initial mitigation planting – 1 year (2027);

(b) Mining of the Central Block (consented) – 6 years (2029 – 2034);

(c) Mining Section 1: Granite Creek North (Stage 1) – 7 years (2035 - 2042);

(d) Mining Section 2: Granite Creek South (Stage 2) – 4 years (2043 – 2047);

(e) Mining Section 3: Cargill Road (Stage 3) – 3 years (2047 - 2050);

(f) Final rehabilitation – 3 years (2050 – 2053); and

(g) An operational contingency period of 6 years (2050 – 2056 followed by the final rehabilitation proposed in (f)).

2. Consents sought and relevant land parcels

2.1 All resource consents necessary are being sought, including for the following activities:

Consent type	Activity	Rule breaches
Grey District Plan		
Land use consents	Clearance of indigenous vegetation	Rule 19.7.5(vii): Clearance of indigenous vegetation exceeds

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		permitted activity volumes outside of an SNA
Decisions Version Te Tai o Poutini Plan Rules under appeal are noted with an * e.g. ECO-R1*		
Land use consent	Clearance of indigenous vegetation	ECO-R9*: the clearance of indigenous vegetation in the coastal environment and riparian margins will exceed the permitted activity volumes
	Earthworks within riparian margins	NC-R4*: because the earthworks will be undertaken across the mining disturbance area including creeks and their riparian margins
	Structures within riparian margins	NC-R5*: existing farm bridges will be replaced post mining which are not permitted under this plan
	Structures in the coastal environment	CE-14*: existing farm bridges will be replaced post mining which are not permitted under this plan
	Mineral extraction	GRUZ-R25*: do not comply with permitted activity rule due to volume of material to be extracted, mining to be undertaken within the riparian margins of creeks and wetlands, will disturb two historic heritage sites; undertaken within 250m of a sensitive activity on an adjoining site; and operate outside permitted hours.
West Coast Regional Land and Water Plan		
Land use consent	Earthworks within riparian margins; Earthworks in the non-erosion prone area outside riparian margins; Vegetation disturbance in riparian margins	Rule 16 WCRLWP: do not comply with permitted activity rule as earthworks will exceed permitted volumes and vegetation clearance will take place in riparian margins with creeks to be mined across the site
Land use consent	Activities within the bed of a river outside of a wetland identified in Schedule 1 or 2	Rule 35 WCRLWP: Creek beds will be reconstructed in the same or similar locations and represent meandering

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		pathways, and water will be drained during diversions
Water permit	To take and use water for the purpose of mineral sand processing	Rule 55 WCRLWP: the take and use of water from Canoe Creek to operate the Wet Concentrator Plant is a restricted discretionary activity
Water permit	To take and use ground water for the purpose of mineral sand mining and processing	Rule 56 WCRLWP: to take and use groundwater intercepted during mining to pump run-of-mine material to the Wet Concentrator Plant.
Land use consent	Diversion of water	Rule 58 WCRLWP: five creeks across the SB will require diversion which is a discretionary activity
Discharge permit	To discharge water to the mining void	Rule 71 (discharge to water and land) WCRLWP: to discharge water to the mining void is a discretionary activity due to the augmentation of lime
Regional Air Quality Plan		
Discharge permit	To discharge dust to air from stockpiling and handling gravel, sand and soil	Rule 16: consent being sought as precautionary measure to authorise unanticipated dust emissions
Freshwater NES		
	Vegetation clearance within, or within a 10m setback from, a natural inland wetland	Section 45D(1)
	Earthworks within, or within a 10m setback from, a natural inland wetland	Section 45D(2)
	Earthworks outside a 10m, but within a 100m setback, from a natural inland wetland that will result in partial or complete drainage of the wetland	Section 45D(3)
	Diversion of water within, or within a 100m setback from, a natural inland wetland	Section 42D(4)

	Discharge of water into water within, or within 100m setback from, a natural inland wetland	Section 45D(5)
	Reclamation of bed of rivers	Section 57

^For completeness it is noted that the mining activity relies on a number of permitted activity rules in the district and regional plans.
*Rule under appeal.

2.2 The application relates to the following land parcels:

Legal description
Section 4-6 Block V Waiwhero Survey District contained in Record of Title WS2D/1085
Section 7-8 Block V Waiwhero Survey District contained in Record of Title WS2D/855
Lot 1 DP 3548 and Rural Section 2927 contained in Record of Title WS8C/143
Part Section 2928 Block V Waiwhero Survey District and Defined on DP 764 contained in Record of Title WS1A/1166
Lot 1 DP 2719 and Lot 2 DP 339364 contained in Record of Title 161879
Section 2929 and Part Section 2634 – 2635 Block V Waiwhero Survey District and defined on DP 764 contained in Record of Title WS2A/228
Rural Section 2930 contained in Record of Title WS1B/293
Rural Section 2931,2932,2933,3316 and Part Rural Section 2639 contained in Record of Title WS8B/528
Section 4033 Block V Waiwhero Survey District contained in Record of Title WS1A/892
Part Section 5 Block IX Waiwhero Survey District contained in Record of Title WS2B/591
Lot 1 DP 406050 contained in Record of Title 486401.

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3. Initial works

3.1 Initial works on the site will be undertaken prior to the commencement of any mining. These include:
(a) Bunding, planting (associated with noise bunds) and fencing; and
(b) Establishment of the mine starter pit.

3.2 A mine starter pit is required in each of the three sections to establish the initial dredge pond in which the floating dredge will operate. Separate starter pits are necessary because the sections are divided by physical features that will not be disturbed i.e. Granite Creek separates Sections 1 and 2, and Cargill Road separates Sections 2 and 3. These starter pits enable the dredge to begin operations independently within each section.

3.3 The floating dredge will be transported to each mine starter pit using conventional mining equipment transport methods in order to avoid adverse effects on the surrounding environment. This approach is consistent with the methodology proposed for transporting the dredge to the Application area and for its initial assembly.

3.4 The mine starter pit will be developed by excavating into the water table. An area of approximately 100m wide x 300m long, and up to 10m deep will be excavated using an excavator and trucks, removing approximately 270,000m^3 of material. This size allows for:

(a) A dredge pond (mine void) of approximately 100m x 100m;
(b) A 100m x 50m area behind the dredge for the deposition of tailings following processing; and
(c) A 100m x 100m area in front of the dredge pond at various stages of excavation, ready to be mined.

3.5 The first mine starter pit will be located in Section 1: Granite Creek North. Material extracted from the starter pit will be used for the construction of the noise control bunds adjacent to Lot 2 DP2178 and another near Warren Road, located along the eastern boundary. Both bunds will be approximately 3m high with a 4.8m crest. The Warren Road bund will extend approximately 280m. Constructing the bunds at this early stage enables associated planting to be carried out in advance and allows time for vegetation to establish. The location of the starter pit is shown in **Plan D**. The construction of both the starter pit and the Section 1: Granite Creek North bunds are anticipated to take approximately two months.

3.6 A similar approach will be taken for Sections 2 and 3, with a mine starter pit excavated prior to the commencement of mining in each section. For Section 2, material excavated from the starter pit will be used to construct an 'L-shaped' noise control bund on the northern side of Cargill Road. For Section 3, material excavated from the starter pit will be used to construct a noise control bund along the southern side of Cargill Road near 101 Cargill Road. Both bunds will be approximately 3m high with a 4.8m crest.

3.7 The location of the noise bunds are shown in **Plan E**. Any excess material not required for bund construction will be stockpiled for future processing and rehabilitation.

4. Indicative mining sequence and setbacks

4.1 Following construction of the mine starter pit, the dredge will extract ore in strips. The indicative mining sequence, showing the anticipated pattern and extent of mining over time, is shown in **Plan D**. Mining will generally progress in a north/ south direction, although there will be some mining in an east/west direction where the dredge turns to commence a new strip. **Plan D** also shows the location of each mine starter pit.

4.2 The indicative mine path is influenced by both ore grade distribution and the long-term rehabilitation of the site. Commencing mining in areas with higher ore grades provides an earlier return on investment for the company. Mining from the western (coastal) side and progressing eastward allows previously mined areas to be progressively rehabilitated back to existing ground levels while maintaining natural drainage gradients towards the coast. Land on the western side of the site will be rehabilitated to existing ground levels.

4.3 As mining advances inland, ground levels will be progressively lowered contributing to the formation of a constructed wetland as part of the final landform across Sections 1 and 2

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(Stages 1 and 2). To achieve the post-mining contours across all three Sections (Stages), material will be sourced from areas outside the mining disturbance area but within the wider application boundary. Approximately 110 hectares within the application area provide a readily accessible source of fill material. These areas will be selectively cut and regraded, with suitable material transferred over short haul distances, typically within approximately 100m, using bulldozer "cut and carry" methods. This material will be progressively redistributed into backfilled mining areas to recontour the landform, achieve stable final ground levels and integrate rehabilitated areas with the surrounding landscape.

4.4 Each mining strip will be approximately 100m wide and excavated to a depth of 10m below ground level noting that the depth of mining is dependent on the ore distribution. The coloured strips on **Plan D** represent the expected extent of mining for each year. The total disturbed land area at any one time will be 16ha. Disturbed land means the land within the application area that has been directly affected by mining or associated activities, including areas subject to vegetation disturbance, topsoil stripping, excavation and active mining in the mining void, tailings deposition, overburden placement, bund construction or areas undergoing progressive rehabilitation prior to the re-establishment of stable landform and 80% vegetative cover.

4.5 The dredge is expected to progress at an average rate of approximately 2,200 metres per year or approximately 166 metres per month or 6 metres per day (based on 26 working days in a month). This rate will yield 2,000,000 tonnes of raw material per year and is subject to variation depending on the depth of the ore body, the average grade of the ore encountered and the need to ensure that the total disturbed area for mining is no more than 16ha. Weather conditions can impact progressive rehabilitation, i.e., influencing the rate of growth of vegetative cover (see Section 7 for progressive rehabilitation and vegetation cover).

4.6 It is proposed to set mining back from key environmental features and boundaries as follows:

(a) 20m from the consent boundary;
(b) 20m from Granite Creek;
(c) 20m from Fagan Creek;
(d) 50m from Mean High Water Springs (MHWS);
(e) 20m from the proposed SNA PUN-049, which is adjacent to Section 2 (Granite Creek South);
(f) 20m from all private property boundaries not within the consent area; and
(g) 200m from dwellings other than where noise bunds are proposed.

4.7 These setbacks are shown on **Plan F**.

5. Mining methodology

5.1 Once the mine starter pit has been constructed, the following steps will be undertaken to enable the extraction of ore:

(a) Removal of pasture, small areas of farm vegetation and wildlife checks;
(b) Stripping of topsoil and overburden;
(c) Diversion of streams and drains;
(d) Extraction of run of mine material;
(e) Initial screening of run of mine material and deposit of waste material;
(f) Pumping of run of mine material to WCP.

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5.2 This process is illustrated by **Figures 1** and **2** below and discussed in detail in the following sections.

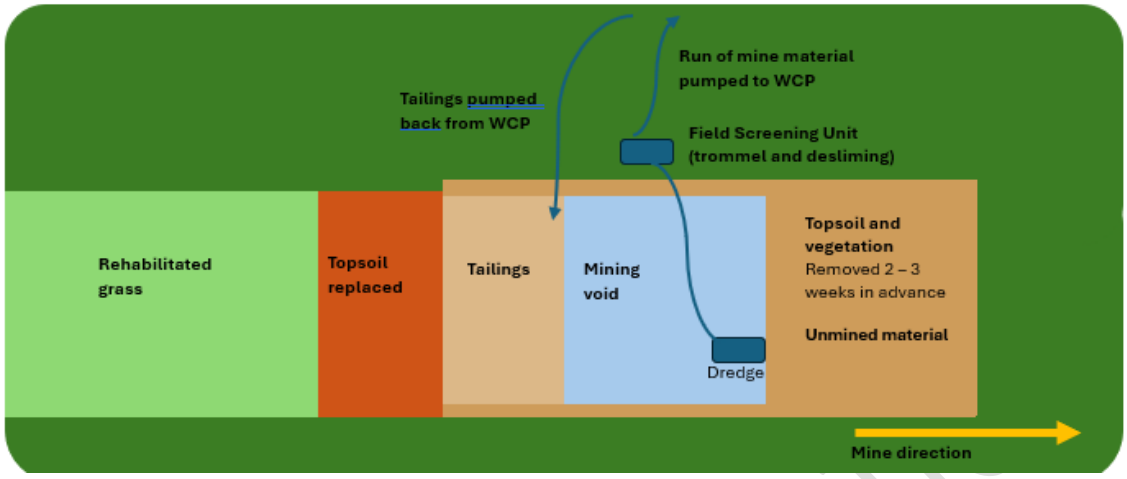

Figure 1: Schematic representation of the mining methodology in plan view

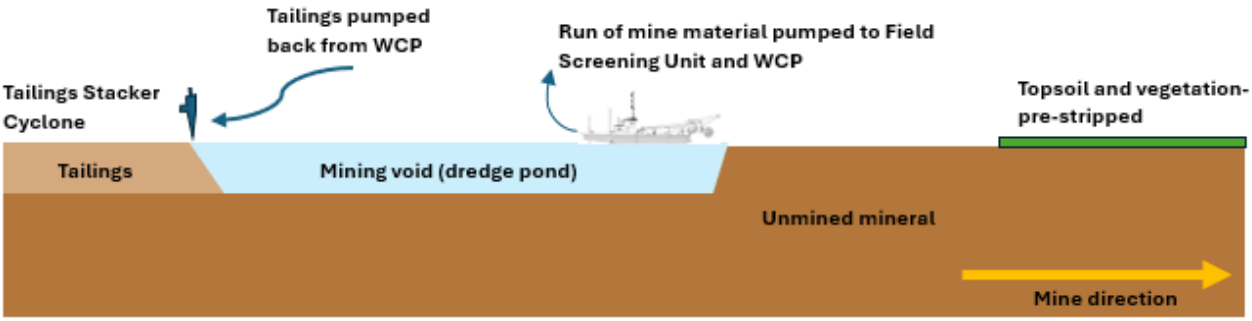

Figure 2: Schematic representation of the mining methodology in profile view

Archaeological Assessment

5.3 An archaeological assessment of the SB has been carried out. The SB was extensively dredged and modified in the 1930's and 1940's and then humped and hollowed for farming purposes. There are two recorded archaeological sites (find spots) within the mining disturbance area. The artefacts from both find spots have been removed and there is no evidence that further features or deposits relating to the site remain in situ. Earthworks on site will proceed under an archaeological authority.

Vegetation removal and wildlife checks

5.4 There are small areas of vegetation located around some creeks, drains and former dredge ponds, which will need to be removed at the same time as topsoil is removed (i.e., 2 – 3 weeks prior to mining). Some of that vegetation has been identified as potential habitat for lizards. In addition, open pasture can potentially be used by breeding birds. **Plan G** shows the waterbodies on site.

5.5 It is proposed to undertake regular surveys of areas scheduled for mining before and during the breeding season to identify any breeding behaviour in the area. Where those surveys identify that nesting is possible, birds will be discouraged from establishing nests through methods such as walkovers, visual cues, audible bird scarers and machinery placement. These actions will be undertaken more frequently and at a greater distance

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from the mining front than in traditional mining operations, reflecting the operational requirements and movement patterns of the floating dredge. Where monitoring identifies the presence of Kororā (little blue penguin), relocatable fencing will be erected around the active mining area (including stripped area, mining void, tailings deposition area and contoured land awaiting resowing) to prevent penguin access and minimise risk of harm.

5.6 Lizard monitoring will be undertaken by a suitably qualified ecologist prior to mining an area of potential lizard habitat. If lizards are confirmed to be present, it is proposed to capture and relocate the lizards to suitable habitat as close as practicable to the site, but outside the mining disturbance area.

5.7 Prior to the commencement of any stream diversion or streamworks activities, native freshwater fish present within affected watercourses or wetland habitats will be salvaged and relocated. Similar to any lizards found, salvaged fish will be relocated to suitable habitat as close as practicable to the site but outside the mining disturbance area.

5.8 Once wildlife (if any) has been appropriately managed, any vegetation useful for rehabilitation will be removed. Where it can be, vegetation will be transferred and used as part of the progressive rehabilitation in the planting around creek mouths, diverted creeks or the constructed wetland.

Topsoil and overburden stripping

5.9 Once vegetation has been removed, topsoil (to approximately 0.2 - 0.6m deep) and overburden will be removed 2 – 3 weeks prior to mining, using an 85-tonne excavator and 40 tonne articulated trucks. The area of topsoil and overburden stripping is shown in Figure 1 above.

5.10 Some of the removed material will be used to create small 1m high safety bunds (to prevent vehicles from driving into the mining void and provide stormwater control) along either side of the mining void. The mining void is the area comprising the dredge pond, the area behind the dredge pond for deposit of tailings after processing, and the area in front of the dredge pond from which run of mine material is being extracted. The remainder of the material will be used for rehabilitation. Initially, that material will be stockpiled for later use, but once mining commences fully, it will be trucked to the rear of the mining void to be used as part of the progressive rehabilitation. The safety bunds provide the separation between stormwater and mine water (mine water being water that is being discharged back into the mining void).

5.11 The total area stripped of topsoil and overburden in advance of mining will be approximately 100m x 100m.

Stream diversions/ removal of drains

5.1 Diversions to, and reconstruction of the existing creeks will be required to enable mining Drainage channels across the site will be diverted to enable mining, and will be reconstructed where required to maintain catchment drainage patterns.

5.12 The specific creeks requiring diversion are shown in **Plan G** and are:

(a) Northern Creek;
(b) Central Creek;
(c) Clarke Creek;
(d) Wasabi Creek; and

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(e) Southern Creek.

5.13 Productive farming practices have resulted in a network of drainage channels developed across the site. As mining progresses, these drains will be diverted to avoid the active mining area.

Little Granite Creek runs along the eastern boundary of the site before joining Granite Creek. These two creeks, Little Granite Creek and Granite Creek, will remain undisturbed and are not proposed to be diverted as part of the mining operation. Canoe Creek and Fagan Creek will also remain unaffected by the activity.

5.14 The diversion methodology differs for each creek or artificial drain depending on their orientation, sequence of mining activities and future purpose (in regards to artificial drains these may be retired or a new 'creek' constructed to manage drainage).

(a) North–south oriented creeks and drains will be diverted into a previously mined area before mining reaches the creek or drain (except where mining is adjacent to the coastal setback boundary). This may require adjustments (widening or narrowing) of the mine path to facilitate this. A permanent reconstructed channel will be built in advance as part of the rehabilitation of the mined land, and the flow will be redirected into it in a single 'livening' event. Refer **Figure 3** for further detail.

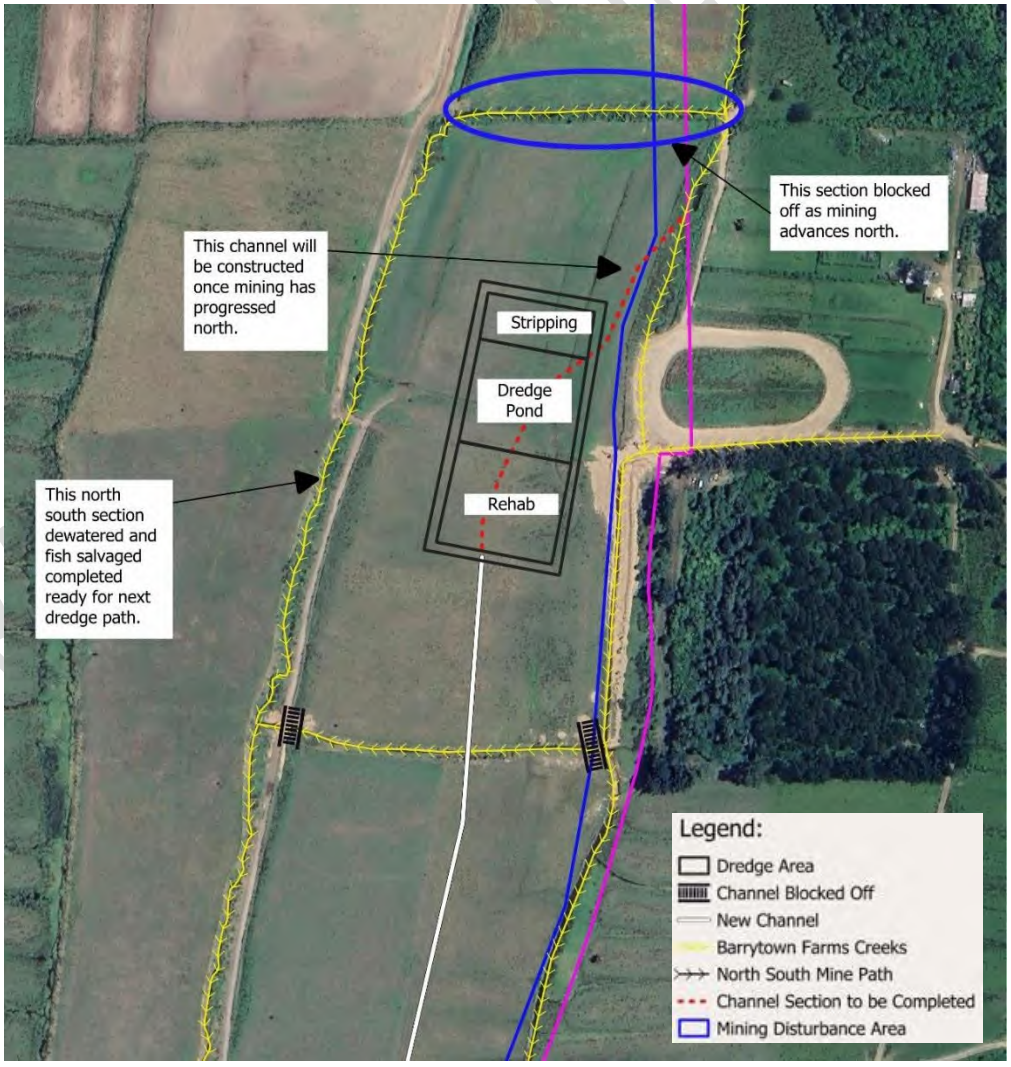
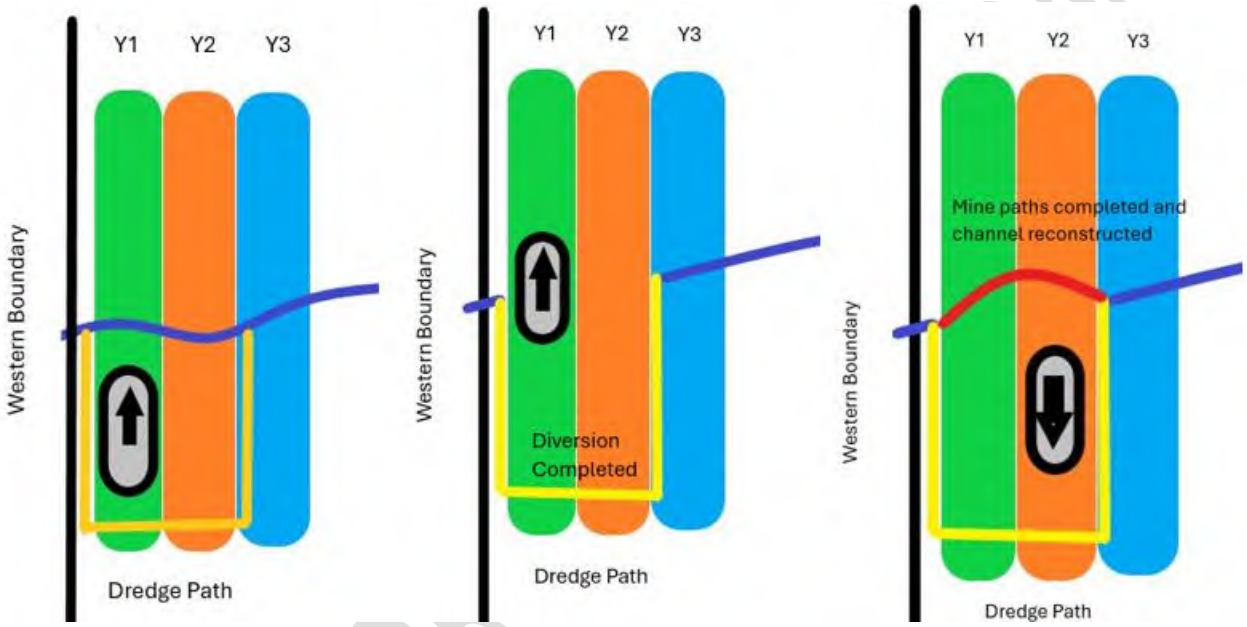


Figure 3: Diversion methodology for north south waterbodies

(b) East–west oriented creeks and drains will be diverted into previously mined areas (behind the mining void) and into the adjacent mine path (to the east as mining moves inland), prior to mining progressing through the creek or drain's existing alignment. This requires a temporary diversion of the creek or drain around the active mining area. Once mining has advanced beyond the alignment, a permanent reconstructed channel can be constructed and the creek, and where required drain, can be reinstated.

Creeks and drains will likely be disturbed several times, with temporary diversions occurring each time the active mining area intersects these waterbodies, potentially once per year for up to 3 months at a time per waterbody. Diverting the creek or drain around two sections of mine path at a time reduces the number of diversions required. Refer **Figure 4** for further detail.



As the dredge approaches the creek or drain, a temporary diversion (shown in yellow) is constructed behind the mining void.

The creek or drain is then diverted into this temporary channel, allowing the dredge to continue along its planned path.

Once the mining void has progressed beyond the proposed reconstructed alignment, the diversion is redirected into the newly rehabilitated channel (shown in red).

Figure 4: Diversion methodology for east west waterbodies

5.15 Fish relocation will be undertaken onsite as part of the diversion process as specified in 4.7.

5.16 The five creeks that will be diverted and mined are Northern Creek, Central Creek, Clarke Creek, Wasabi Creek and Southern Creek. Each of these creeks will be reinstated during progressive rehabilitation. **Table 1** identifies the creeks that are to be diverted, and their pre-mining and indicative post mining lengths. The diversion methodology to be applied has also been identified.

5.17 Some of the original artificial drainage channels may be reinstated, particularly if land contouring alone does not provide sufficient drainage. Creeks and drains will be connected to the constructed wetland area or re-established natural creek systems to support site hydrology and ecological function.

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Table 1: Creek extent pre and post mining

Creek	Length pre-mining (based on continually or intermittent flow extent)	Length post-mining (indicative but not less than the pre-ming length)	Diversion methodology to be applied
Northern Creek	1,088m	1,100m	East West
Central Creek	650m	700m	East West
Clarke Creek	680m	700m	North South
Wasabi Creek	727m	750m	North South / East West
Southern Creek	1,088m	1,100m	East West

Extraction of run of mine material

5.18 Following the removal of topsoil and overburden, the floating dredge can extract the run of mine material (**ROM**) from the newly stripped area from within the mine void without the use of other machinery.

5.19 The floating dredge will sit in a 1ha dredge pond, located in the mining void. The maximum depth of the mining void is 10m, which will maintain a natural water level approximating the ambient water table height. A picture of the type of floating dredge that will be used in the Project is shown in **Figure 5** below.

Figure 5: Floating dredge proposed to be used

5.20 The dredge has a suction cutter at the end of the dredge arm. The suction cutter will excavate the pit face by cutting into the bank and breaking down consolidated material. The loosened material will be drawn in through the suction head below water level, immediately mixed with water taken from the dredge pond to form a slurry and pumped to the field screening unit within the safety bund area.

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5.21 The dredge is capable of precise cutting and will cut slopes at approximately 1 vertical to 3 horizontal (1V:3H), which is consistent with industry standards for cutter suction dredging and provides for stable batters. The presence of water in the mining void provides sufficient pressure to ensure slope stability, as does the progressive tails deposition in the rear of the mining void. Safety bunds around the outside of the mining void will ensure that heavy machinery does not operate on the edge of the mining void, creating pressure on the slopes.

Initial screening of run of mine material and deposit of initial waste materials

5.22 The Field Screening Unit undertakes the initial screening of the ROM. Slurry passes through a trommel (a rotating cylindrical screen), which separates larger, coarser materials and debris (+2mm) from finer particles. Oversized material captured by the trommel is removed from the process stream to prevent damage or blockages in downstream equipment.

5.23 The slurry then enters the desliming circuit, which removes very fine silt and clay particles (referred to, when mixed with water, as "slimes"). By eliminating these particles, the desliming circuit improves the recovery of valuable heavy minerals and reduces the load on the WCP.

5.24 The large reject material from the trommel and the slimes will be returned to the rear of the mining void to be used in the progressive rehabilitation (see Section 7 for further discussion).

5.25 After screening and desliming, ROM is pumped as a slurry to the WCP for further processing.

6. Processing of run of mine material and transportation to market

6.1 Authorisations for further processing and transport are not being sought through this Fast-track application, as they have already been granted (or applications are being processed), as outlined in Sections 1.2 – 1.5. The resource consents and other permissions that have been obtained provide for a full mine to market process that results in finished product being exported to markets around the world. The following information is provided to explain the overall processing methodology and to place the proposed activities within the full operational context.

6.2 Following extraction, ROM will be processed in two stages. The first stage of processing will be undertaken on site at the WCP to extract Heavy Mineral Concentrate (HMC). The HMC will then be transported by truck to the MSP at Rapahoe to undergo the second stage of processing.

6.3 Consent for the MSP at Rapahoe was granted by the Grey District Council in October 2025.

6.4 Consent from the Grey District Council for the establishment, operation and maintenance of the WCP and access road is currently being processed and is expected to be granted prior to lodgment of this application. Consent for the earthworks component of this activity was granted by the West Coast Regional Council in February 2026.

Stage 1 processing - WCP

6.5 Mined ore will be pumped as a slurry from the mining void to the WCP, a fixed processing facility that receives material from mining activities across the resource area. At the WCP, valuable heavy minerals are separated from sand and silt using a water-based gravity

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separation process. This produces three material streams: HMC, middles and tails ('middles' and 'tails' are referred to generically as 'tailings' in this application).

6.6 Tailings are returned to the mining void as slurry, while clean water is managed and reused within the process. The HMC is dewatered to 10-15%, temporarily stored and transported off site by heavy vehicle for further processing at the MSP at Rapahoe.

Stage 2 processing - MSP

6.7 Processing at the MSP enables the extraction of concentrated garnet and ilmenite products.

6.8 The MSP has been strategically located at Rapahoe to ensure proximity to rail where product will be transported in containers to Lyttleton or Timaru Port for export to global markets. Waste material from the MSP (which has come from the SB) will be transported by heavy vehicle back to the WCP at the SB. That material will be deposited within a bunker at the WCP before it is pumped back to the mining void as a slurry to be used to backfill the mine pit for rehabilitation.

6.9 The MSP represents a critical component of the long-term viability and growth of the sand mining industry on the West Coast. The MSP provides significant value-add by enabling on-shore, and in-region, refinement of mineral products prior to export.

7. Management of processing water and stormwater

7.1 Water will be required for the processing of ROM at the WCP. Water used for processing, as well as stormwater captured on the WCP site, will be managed through a MWF located adjacent to the WCP.

7.2 The MWF will include lined treatment ponds and thickener tanks that enable sediment and fine particles to settle out of return water using biodegradable flocculants. Treated (clean) water will be recycled back into the processing system, while settled solids will be combined with tailings and returned to the mine pit as a slurry to support backfilling and rehabilitation.

7.3 The MWF is part of the ancillary infrastructure required to operate the WCP and will be authorised by the consent for the WCP.

Processing water

7.4 Processing water will be sourced from the existing water take location on the CB, unless further investigation identifies a practical alternative water source on the SB through future testing. Consent GDC-3154-23 / WCRC-2023-0046 authorises the abstraction of water for processing CB-mined material at the WCP for a 12 year duration. A new consent is being sought via this application to ensure the water take is available to the newly located WCP, and to support longer-term mining of the SB. It is proposed that the existing consent be surrendered as part of the grant of the new take. The approximate water take location on the CB is indicated on **Plan H**.

7.5 Water taken will be used to fill the ponds at the MWF, storing water for when it is required to be used for processing ROM at the WCP. The peak water take will occur when the WCP is restarted to process material from the SB or following maintenance or shutdowns. This is because the tanks and pipelines of the WCP must be filled with water prior to material being processed. During these periods, the full take of 63l/s will be required, likely over several days.

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7.6 Once processing is underway, water demand will significantly decrease. Water is recycled and reused throughout the plant, reducing the need for a continuous fresh supply. Only intermittent top-ups will be required to offset the water that remains in the HMC, and therefore lost from the site. It is estimated that approximately 10-15% of water drawn from the bore will be retained in HMC. This makes up the largest water loss within the system.

7.7 To compensate, make-up water will be drawn down at an average rate of 9.5l/s for the duration of processing. In practice, make-up water will be taken in short bursts of typically 15-20 minutes at a time, two to three times per day, at the peak rate of 63l/s.

7.8 Tailings will be mixed with water to form a slurry to be pumped back to the mine void. Tailings will be deposited at the rear of the pit by cyclone and the water will re-enter the mine void and rejoin the surrounding hydrological system.

7.9 The slurry circuit (the pumping of ROM to the WCP and tailings back to the mine void, all undertaken as a slurry) is considered to have a largely neutral effect on the water level in the mining void. The water that returns with the tailings help maintain, or even increase, water levels in the void, offsetting any lowering of the water table caused by the removal of the slurry from the mine void.

7.10 The MWF is designed to treat and temporarily hold process water before it is recycled for use in the WCP. After processing, excess water is treated via a thickener tank, which serves as the primary treatment stage. Fines and suspended sediment are separated from the water in the thickener tank. This water then flows into the forebay and ponds for further settling and storage. A flocculant may be added to enhance the settlement of fine particles. Fines and slimes collected in the thickener tank and forebay are pumped back to the mining void and mixed with coarse tailings for use in rehabilitation. Clean water is recycled back into the WCP for reuse in mineral separation processes or for transporting tailings as a slurry back to the mining void.

7.11 There is no discharge from the MWF treatment ponds to any surrounding water bodies. The only discharge is to the mining void.

7.12 If necessary to maintain capacity in the MWF excess water may be pumped back into the mining void to dissipate naturally.

7.13 It is possible that dissolved metals could be liberated and mobilised because of the mechanical processes of mineral separation and sand and slimes deposition during backfilling of the worked excavation. Lime augmentation (i.e. lime dosing) of tailings and slimes at the time of emplacement within the void, and the inclusion of lime boulders in creek reconstruction will mitigate these effects. Both groundwater and surface water quality and quantity monitoring will be undertaken across the site as set out in the Water Management, Monitoring and Mitigation Plan.

Stormwater

7.14 Stormwater captured within the mining disturbance area will be contained on site by the safety bunds constructed on either side of the mining void. It will either be allowed to infiltrate into the sandy subsoils, or directed to discharge into the mining void where there is sufficient capacity for the water to assimilate into the ground water.

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7.15 Stormwater generated in the WCP area, including runoff from roofs, hardstand areas, stockpiles, and processing surfaces, will be collected via a network of drains, bunds and sumps, and directed to the ponds at the MWF. To maintain operational capacity during high rainfall periods, treated stormwater may be pumped to the mining void to dissipate naturally.

8. Rehabilitation and mine closure

8.1 Rehabilitation of the SB will be undertaken in three stages:

(a) Mined land will be progressively rehabilitated as the mining void advances;

(b) Each section will be rehabilitated as it is completed and mining moves to the next section; and

(c) Final rehabilitation and mine closure will be undertaken once mining of the SB is fully completed.

Progressive rehabilitation of mining void

8.2 The total area of disturbed land is proposed to be limited to 16ha within the SB at any one time, for the purposes of mitigating potential effects relating to dust, landscape, visual and sedimentation/ water quality.

8.3 The 16ha limitation for the mining area means that the site will be progressively rehabilitated by filling the mining void with waste material as mining advances, replacing topsoil and re-grassing the mined area. The 16ha limitation is proposed to only apply to those disturbed areas with less than 80% vegetative cover and mined land will be removed from the disturbed area calculation once that level of vegetative cover has been reached. The disturbed area limits include contingency for any periods of slow growth that may occur (e.g. during winter or a cold wet spring).

8.4 Rehabilitation of the mining void will take place at the same time as mining occurs and is expected to be completed within 12 months of the conclusion of mining in that location. The waste material (known as "tailings") produced by the initial screening of raw material at the Field Screening Unit will be pumped back into the rear of the mining void immediately. Any tailings from the WCP will also be pumped back and deposited at the rear of the mining void. Waste material from the MSP that has been transported back to the SB will also be pumped from the WCP to the mining void and deposited with the tailings to assist with rehabilitating the landform.

8.5 The tailings will be deposited at the rear of the mining void using dewatering cyclones which assist in separating water from solids to create a more stable land surface suitable for rehabilitation. The water separated from the tailings as they are dispersed is discharged back into the mining void.

8.6 The material to be returned to the excavated area includes un-mineralised sand, clay slimes, and gravel and rock greater than 2mm. Tailings will be allowed to naturally beach (spread) out. The cyclone will be moved as required to distribute the tailings evenly across the area.

8.7 Tailings will then be levelled and contoured, as per a surveyed final landform design, with the use of excavators and bulldozers ready to receive the pre-stripped overburden and topsoil. This topsoil and overburden, as well as material from outside the mining disturbance area within the wider application area and the bunds as they are retired, will be spread out and used as a growing medium for rehabilitation of the site. Once overburden

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and topsoil are replaced, the land will be re-vegetated with grass and other vegetation that was removed prior to mining, where possible and appropriate.

8.8 Initial vegetative cover will be established as soon as practicable (potentially using hydroseeding) to minimise any erosion potential. This will be followed by the establishment of longer term, permanent pasture species.

Progressive rehabilitation of each section

8.9 As the mining of each section is completed, the section will be rehabilitated to its final landform which includes a proposed wetland of approximately 51.7ha on the eastern boundary of Sections 1 and 2, which will be constructed in stages (addressed in Section 7.17 below).

8.10 Approximately 5.6 million tonnes (equivalent to 2.6 million cubic metres at a bulk density of 2.2 g/cm^3) of HMC will be removed from the mining disturbance area over the life of the project for further processing and export., To achieve the proposed post-mining contours, material will be sourced from areas located outside the mining disturbance area, from the higher terrace, to be used as fill to reconstruct the final landform. When balanced against the available redistribution material, the final change in landform equates to an average reduction in land height of approximately 0.63m across the entire 408ha consent area.

8.11 The western boundary will be returned to its current ground level to minimise any effects from coastal hazards. Restoring this area to its natural elevation maintains the existing buffer between the active coastal environment and the inland mined area and future farmland. This helps to ensure that the rehabilitated land is not at increased risk from coastal hazards such as erosion or ponding from storm surge events.

8.12 The site is naturally wet and exhibits poor drainage, despite the presence of a humped and hollowed landform and an established network of creeks and drains throughout the area. Following mining activities, the site will be rehabilitated to improve drainage and soil conditions, enabling its return to more productive farmland use.

8.13 The final landform will be contoured to slope towards reestablished creeks to improve drainage and ensure the future productive use of the site. The five diverted creeks (Northern Creek, Central Creek, Clarke Creek, Wasabi Creek and Southern Creek – refer section 4.16 – 4.17) will be reconstructed along more natural, meandering paths, as opposed to their straight and rectified channels, to enhance ecological and hydrological values while maintaining current catchment drainage patterns. Post mining creek extent will ensure no loss of extent or value. Some existing drains may be reinstated if contouring alone is insufficient. Some modified humping and hollowing will be incorporated, though it is intended to be less pronounced than the existing humping and hollowing, and will include the raising of the low areas (hollows) above the water table to reduce sediment and nutrient runoff from future farming activity providing long-term ecological benefits and improved drainage across the site.

8.14 Fences, internal farm roads, bridges and culverts will be reinstated as required.

8.15 The anticipated final land contour is illustrated in **Plan I**.

8.16 A Work Programme will be submitted to the Grey District Council and West Coast Regional Council annually, which will specify rehabilitation works to be undertaken in each 12-month

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period. This will include a summary of the rehabilitation completed during the previous 12 months. This is standard practice for mining activities on the West Coast.

Proposed wetland

8.17 The proposed wetland will be constructed in two stages as follows:

(a) The first stage of the wetland will be constructed on Section 1: Granite Creek North, north of Granite Creek and south of the WCP, following completion of Section 1;

(b) The second stage of the wetland will be constructed on Section 2: Granite Creek South, north of Cargill Road and south of Granite Creek, following completion of Section 2.

8.18 The new wetland will be established along the eastern boundary, planted in native species and fenced from stock.

8.19 There will be an increase in the extent and integrity of wetland across the site due to the construction of the new wetland area. Indigenous biodiversity values are expected to increase at the site, including a net gain in wetland area and indigenous vegetation cover.

8.20 The proposed wetland is shown in **Plan J**.

Proposed planting

8.21 The Applicant has engaged Glasson Huxtable Landscape Architects to assess the potential landscape and visual amenity effects of the proposal. The Landscape Assessment identifies areas where current vegetation should be retained and additional planting, associated with the restoration of creeks and construction of the wetland area, is to be undertaken. These plantings have been designed both for ecological and landscape mitigation for the project and will have long term ecological benefits in terms of stream health and habitat for indigenous species.

8.22 Due to the distance of the mining activity from public viewpoints for the majority of its operation, bunding and planting works are restricted to managing the effects of noise. There are four noise bunds also proposed as set out in Section 7.23. Bunds will have an inward facing grassed slope with dense planting on the crest and outward facing slope.

8.23 Planting and bunding includes:

(a) Lot 2 DP2178 bund - 3m high with a 4.8m wide crest (24m width) approximately 500m long;

(b) Warren Road bund – 3m high with a 4.8m wide crest (24m width) approximately 900m long ;

(c) Cargill Road bund - at the eastern edge of the site stretching north – 3m high with a 4.8m crest (24m width) approximately 460m long;

(d) 101 Cargill Road bund – on the western boundary - 3m high with a 4.8m wide crest (24m width) approximately 440m long.

8.24 Retention of key vegetation has been identified at:

(a) Planting clusters near the WCP;

(b) Planting clusters along the eastern application area boundary north of Cargill Road;

(c) Planting patch adjacent to 101 Cargill Road; and

(d) Riparian vegetation adjacent to Granite Creek;

Closure sequence

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8.25 Final rehabilitation of Section 3 (Cargill Road) will occur following the completion of mining activities in this area.

8.26 As progressive rehabilitation will be undertaken across the SB there will be limited final contouring and blending required once mining is complete. Any final contouring/blending at the southern end of the mining disturbance area will use material from within the wider application area as required.

9. Plant and machinery

9.1 The following machinery listed in **Table 2** is likely to be required to undertake mining, pumping and rehabilitation of the site (although specific models may differ).

Table 2: Mining machinery list

Type	Supplier	Model	Number
Bucketwheel Cutter Suction Dredge	Neumann Contractors	Series 350	1
Dozer	Komatsu	D71PX-24	2
Grader	Komatsu	GD655-7	1
Integrated Tool Carrier	Hitachi	ZW220-5	3
Artic 6wd 45 Truck	Hitachi	B45E	3
Excavator (Long stick)	Hitachi	ZX890LCH	2
Excavator (30 or 40 tonne)	Hitachi	ZX345USLC	2
Field Screening Unit (trommel)	Bespoke		1

9.2 Additional mining equipment and vehicles will be used on site, including a variety of pumps (including land-based, floating and submersible) and light 4-wheel drive vehicles for the transport of mining personnel.

10. Site operation

10.1 This section describes how the site will be operated, in terms of hours of operation, site configuration, transport, lighting, dust management and hazardous substances use.

Hours of operation

10.2 Mining activities associated with the extraction of material will be undertaken during daylight hours only, consistent with the existing consent granted for the CB.

10.3 Hours of daylight are between 30 minutes before sunrise to 30 minutes after sunset[1].

10.4 Mining shall not occur between the hours of 0600 and 0700 within 500m of the dwellings located at:

(a) Lot 2 DP2178;
(b) 37, 41, 43 and 50 Warren Road;
(c) 64, 86 and 101 Cargill Road.

10.5 There will be no mining on Sundays.

[1] *Sunrise and sunset times can be found at* https://www.sunrise-and-sunset.com/en/sun/new-zealand/westport/2023/june

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Site configuration

10.6 Access tracks will be required within the mining area. These will be formed to provide light vehicle and machinery access for the preparation, mining and rehabilitation of various areas as mining progresses. These access tracks will move as mining progresses.

10.7 It is proposed to retain the existing access points for farming activities for the duration of the mining activity, to ensure that any ongoing farming traffic is kept separate from the mine traffic.

Vehicle movements

10.8 There are 57 full time staff proposed to be employed across the WCP and wider mine site at the SB. This includes 18 staff to be employed specifically for the mining activity.

10.9 Vehicle movements associated with mining activities are largely generated by the existence of the WCP adjacent to the SB. They will therefore be authorised by the WCP consent.

Lighting

10.10 Due to activities taking place during daylight hours only, only minimal lighting will be required on the mine site and at the mining void.

10.11 There will be limited fixed lighting in the mine area, which may include lighting around the pump to allow for the pump circuit to be checked overnight. Any fixed lighting in the mine area will be shrouded and adhere to the principles outlined below.

10.12 Lighting will not exceed 2.0 lux spill (horizontal and vertical) onto any adjoining property, measured at any point more than 2m inside the boundary of the adjoining property or the closest window on the adjoining property (whichever is the closest).

10.13 All lighting on site will adhere to the Australian Government's National Light Pollution Guidelines for Wildlife January 2023 (or subsequent revision), including but not limited to:

(a) Utilising the Seabird Light Mitigation Toolbox in Appendix G – Seabirds (Schedule 4);
(b) All fixed lighting shall be pointed downward and shielded to avoid light spill, with a lighting temperature of no more than 2000K, and be filtered to reduce blue and violet wavelengths;
(c) Lights shall only illuminate the object or area intended;
(d) Fixed lights shall be mounted as close to the ground as practicable;
(e) External lighting shall use the lowest intensity lighting as possible, while ensuring compliance with workplace health and safety requirements;
(f) External lighting shall be equipped with light minimising technology, including motion sensors or timers;
(g) Mobile lighting within the mine site will adhere to the above principles, including the dipping of headlights of vehicles operating on site.

10.14 Adherence to the above standards will minimise light spill, thereby preserving the natural character and dark night sky of the coastal environment. The measures proposed will also assist in avoiding the risk of adverse effects on the Westland Petrel Colony located approximately 5.5km north of the WCP location. These standards are consistent with the conditions of consent granted for the CB.

Noise

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10.15 Noise will be generated from the activities at the mining void including excavators and front end loaders to strip top soil and overburden, trucks to move material to the rear of the site, the dredge and field screening unit and the spreading of tails from the cyclone.

10.16 Noise generation has been taken into account in the design of the project. Hours of operation control the activity each day. Earthworks near dwellings will be minimised, and noise mitigation bunds will be constructed at four locations as outlined in Section 7.23.

10.17 The site will operate in accordance with a Noise Management Plan, which sets out the management techniques to be applied to ensure that the site operates in accordance with best practice and unnecessary noise generation is minimised by:

(a) Exhaust silencers fitted to all mobile plant;
(b) Power from the grid used in preference to diesel generators where possible;
(c) Vehicles and equipment maintained to avoid unnecessary noise and vibration;
(d) Trucking contractor behaviour expectations including following speed limit; restrictions, no unnecessary sounding of horns or revving of engines, avoidance of engine braking, vehicles to be properly maintained;
(e) Metal to metal contact avoided during the loading of trucks;
(f) No tonal reversing alarms;
(g) Site vehicles to follow speed limits and drive in consistent manner, no amplified music permitted inside vehicle cabs, horns to be used in emergency only;
(h) Access road and working surface maintained free from potholes and corrugations.

10.18 The following noise limits are proposed to apply at or within the notional boundary of any dwelling existing at the date consent is granted on any other site, except in relation to the four dwellings on Warren Road, three dwellings on Cargill Road and at Lot 2 DP2178:

(a) Daytime (0700-2200): 55 dB LAeq (15 min)
(b) Night-time (2200-0700): 45 dB LAeq (15 min) and 75 dB LAFmax
(c) when measured and assessed in accordance with the latest New Zealand noise standards: NZS 6801:2008 “Acoustics – Measurement of environmental sound” and NZS 6802:2008 “Acoustics -Environmental Noise”.

10.19 At some locations, extraction of ore can proceed between 0600 and 0700hrs (classified as night-time under the District Plan) while still complying with the 45 dB L_{Aeq} noise limit.

Dust Management

10.20 Some activities proposed to be undertaken have the potential to generate dust emissions. While the application site is within a high rainfall area, there are periods of dry weather.

10.21 As the mining activity is a wet process dust generating activities will be limited to times of overburden removal and rehabilitation and vehicle movements on site. These activities are intermittent (not always continuous) and can be managed with techniques outlined in the Dust Management Plan. Dust will be managed via visual inspections, use of water carts and other dust suppression techniques as required.

10.22 The Applicant has installed dust monitors on the perimeter of the mine site. These monitoring stations will remain in place for the duration of mining activities on site.

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Hazardous substances use, storage and management

10.23 The refuelling of machinery will be undertaken on site using a mobile fuel tanker with a centralised fuel store located at the WCP (40,000 litres). The proposed above ground tank will be authorised by the WCP consent.

10.24 Re-fuelling will be completed under direct supervision of the machine operator to minimise the risk of spills occurring. Refuelling will occur at least 20m away from waterbodies.

10.25 Mechanical repairs and servicing will occur at the WCP area. In the event of major mechanical break-down, machines may be taken to an off-site workshop. Spill kits and procedures will be available on site in the event of a fuel or oil spill occurring.

10.26 All waste oil and fuel containers will be removed from the site promptly.

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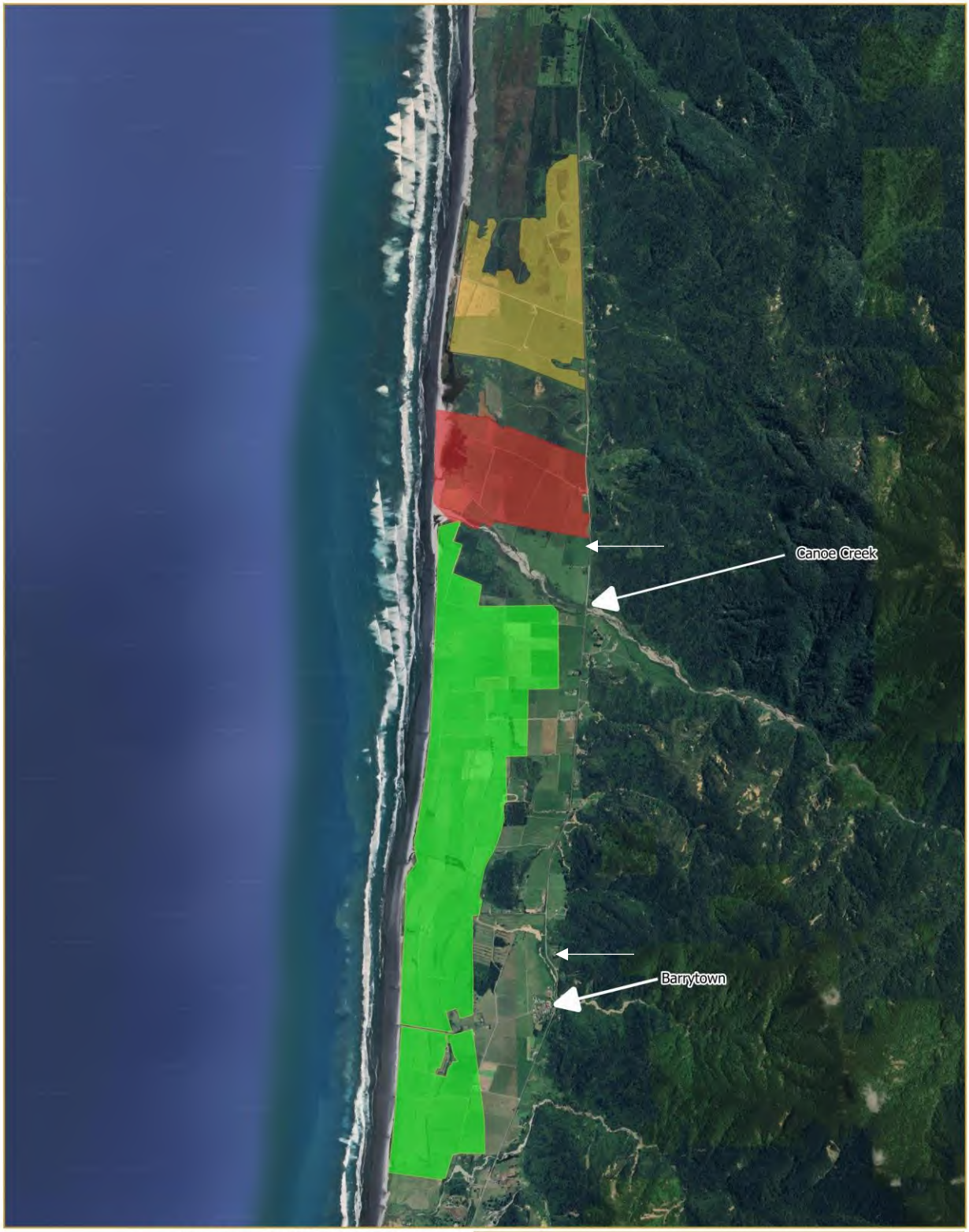
Plan A: Barrytown Critical Minerals Project – Resource Blocks



Plan A - Barrytown Critical Minerals Project - Resource Blocks

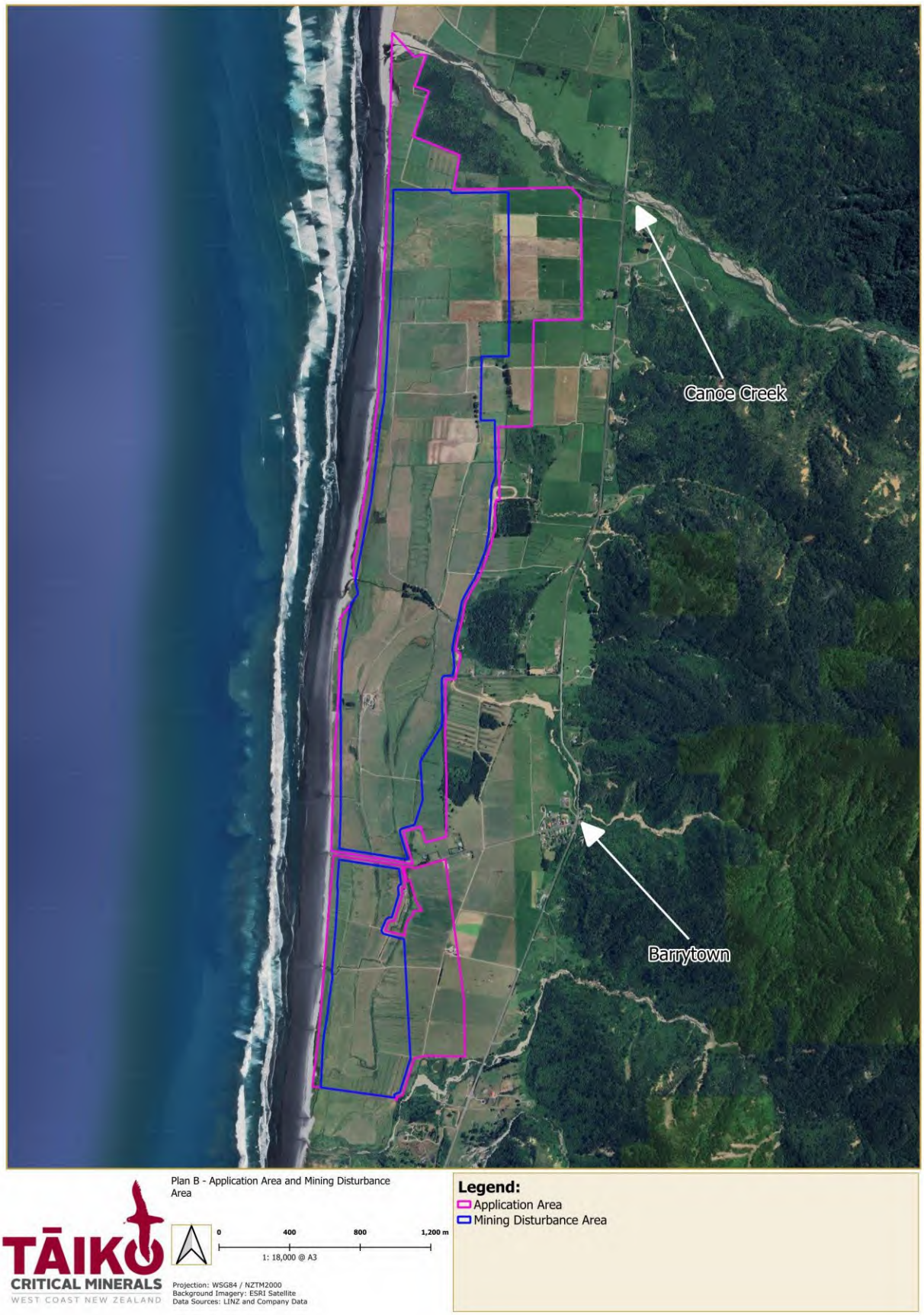
0 400 800 1,200 m

1:30,000 @ A3

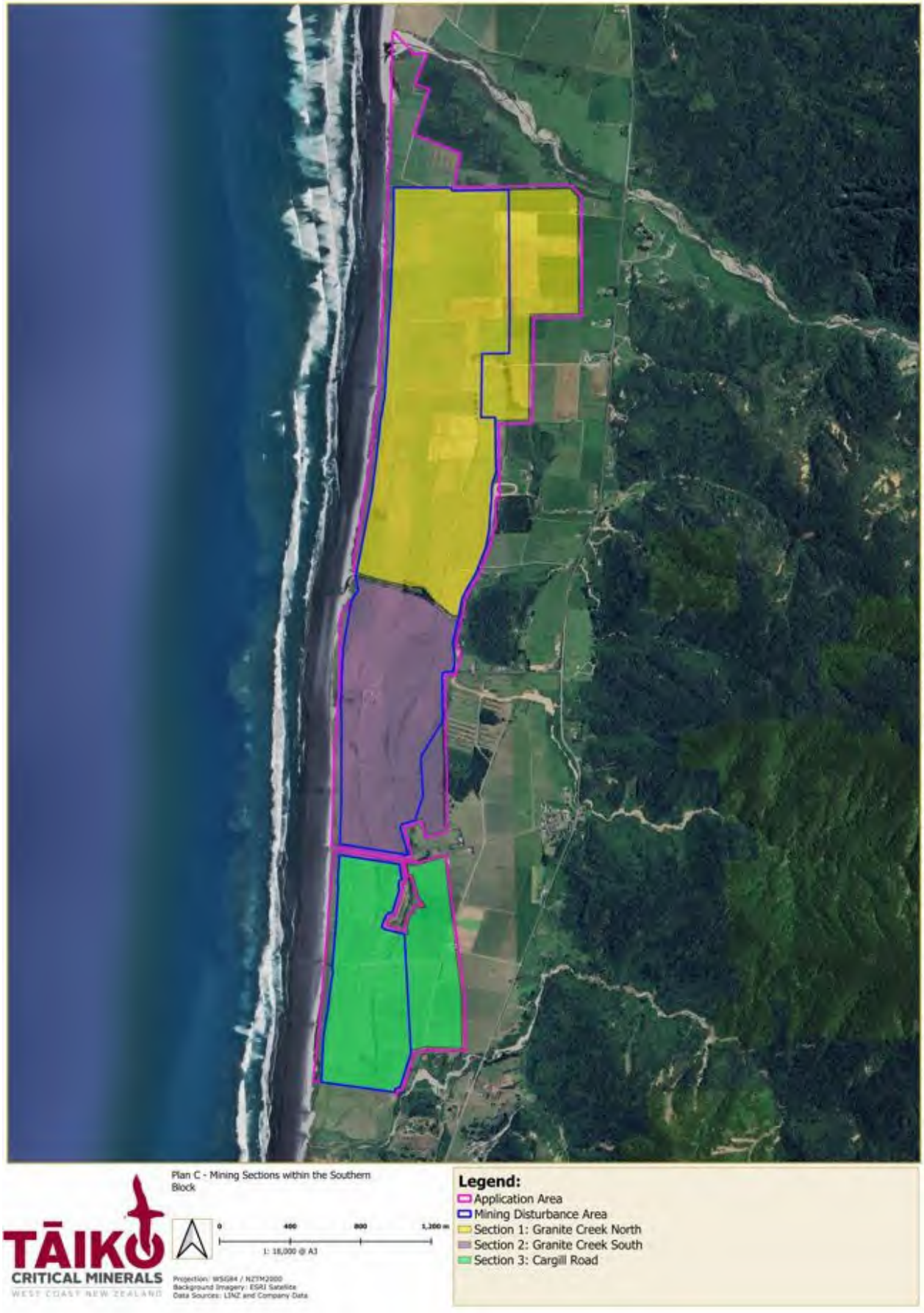
Projection: WSG84 / NZTM2000
Background Imagery: ESRI Satellite
Data Sources: LINZ, Client and/or TPRL Data

Legend:
- Northern Resource Block
- Central Resource Block
- Southern Resource Block

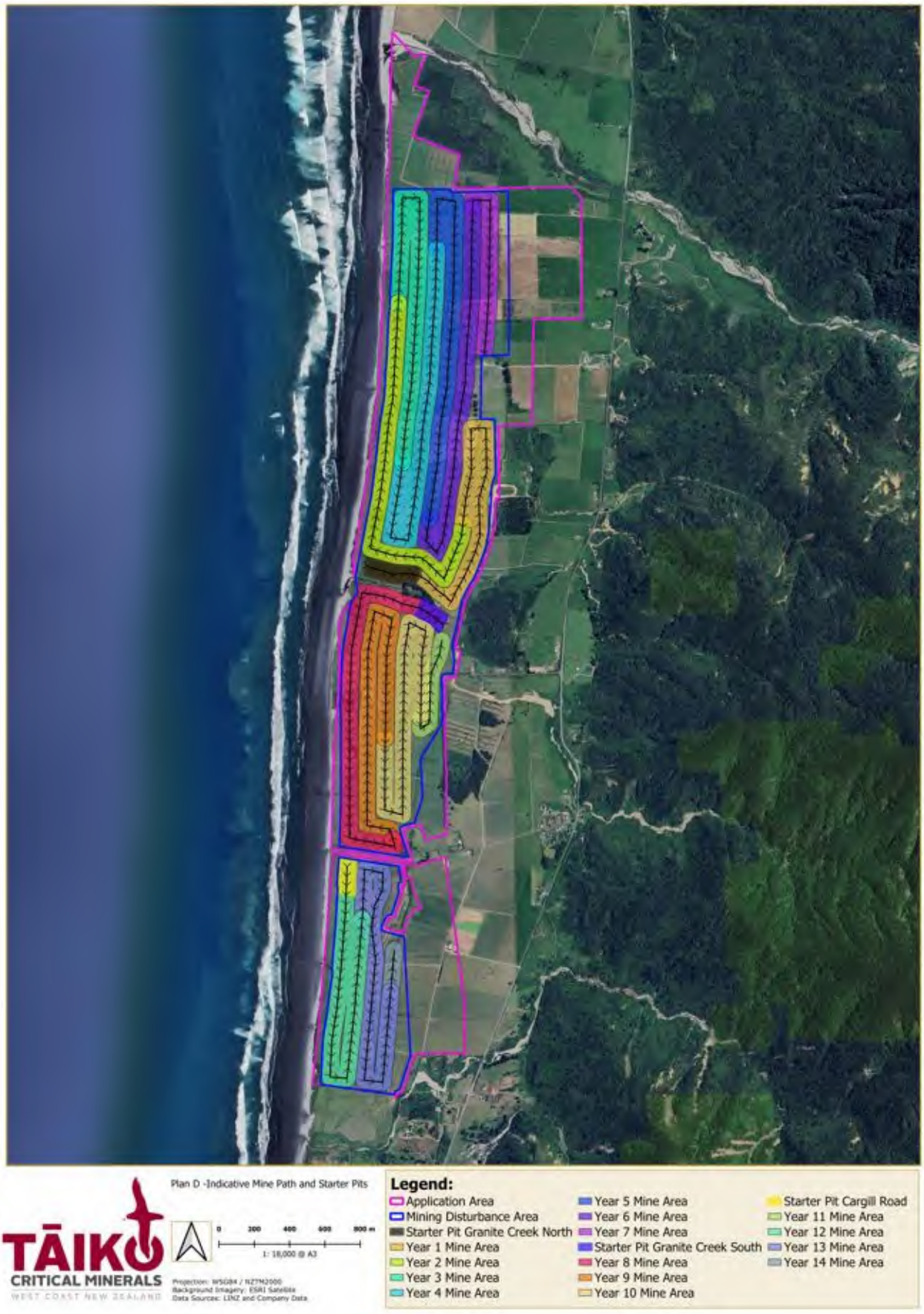
Plan B: Southern Block Application Area and Proposed Mining Disturbance Area



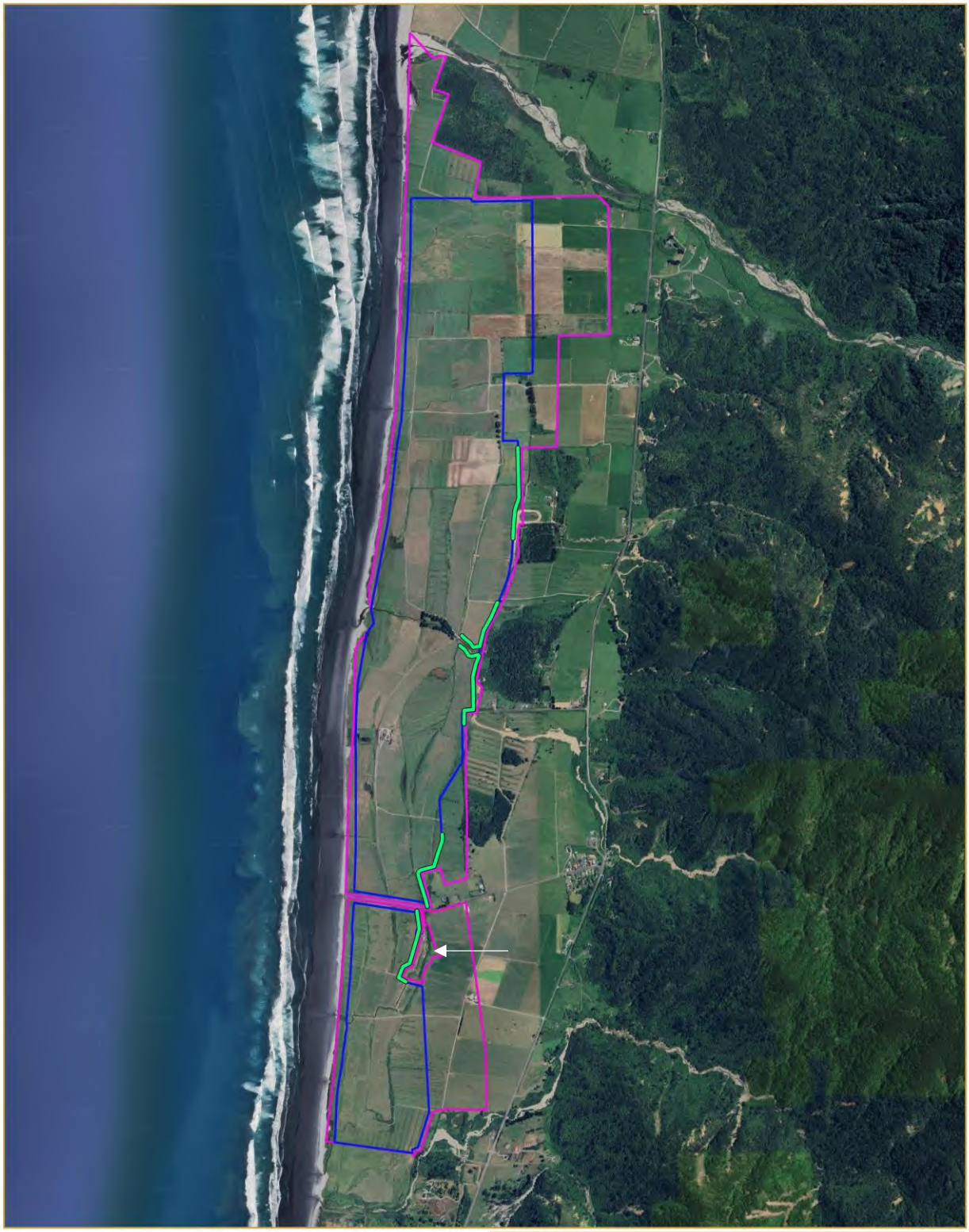
Plan C: Mining Sections within the Southern Block



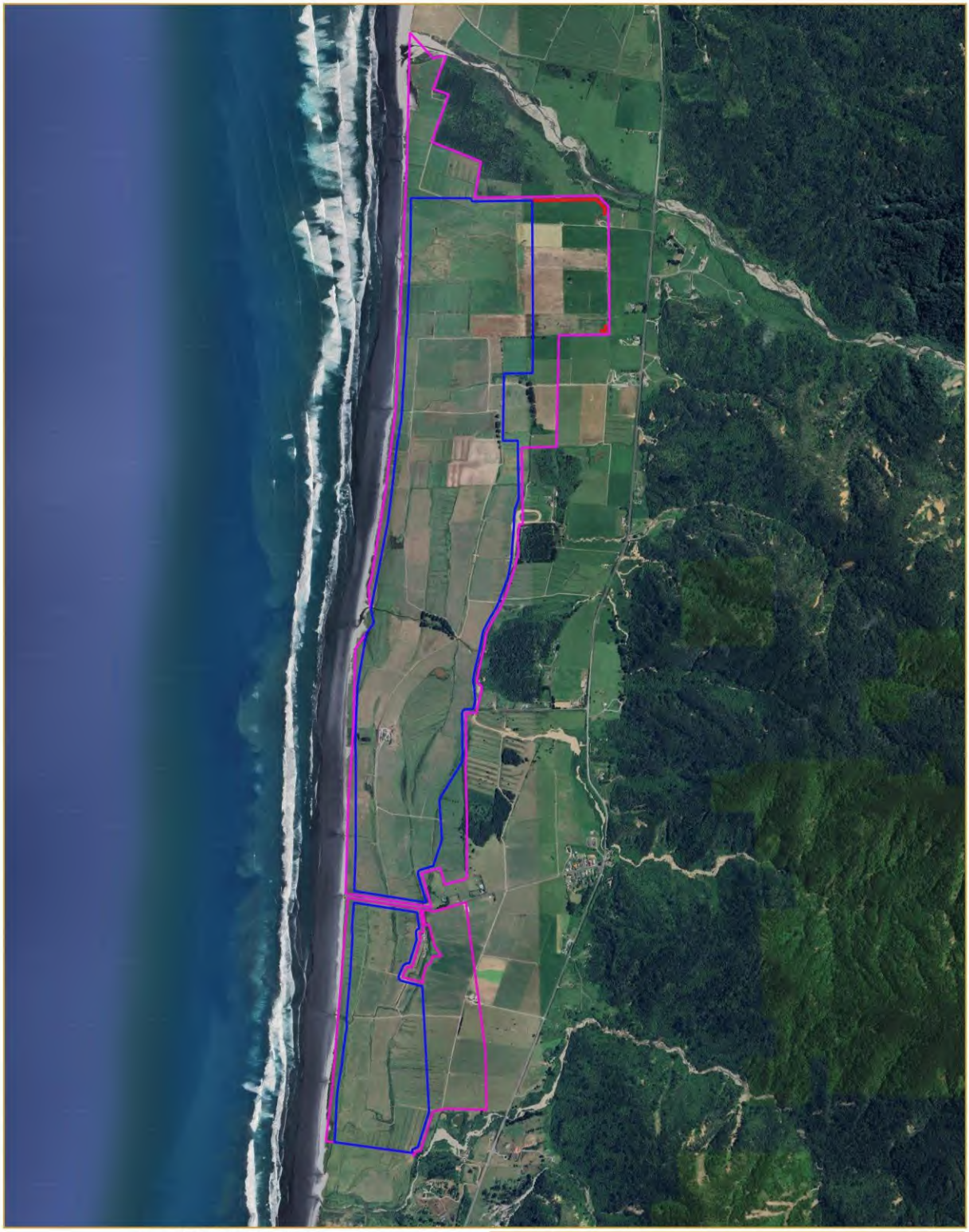
Plan D: Indicative Mine Path Including Mine Starter Pits



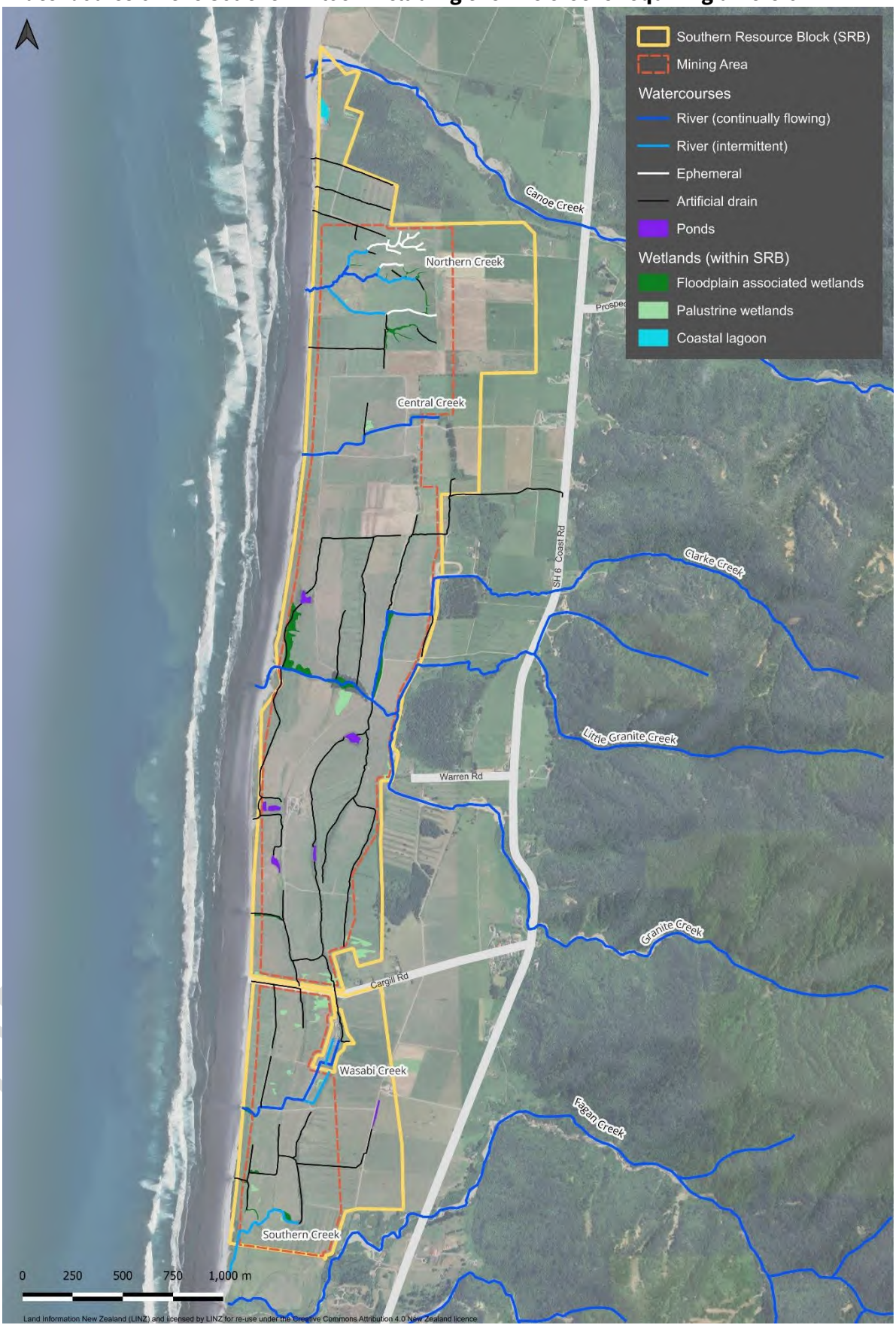
Plan E: Noise Bunds



Plan F: Setbacks From Key Environmental Features

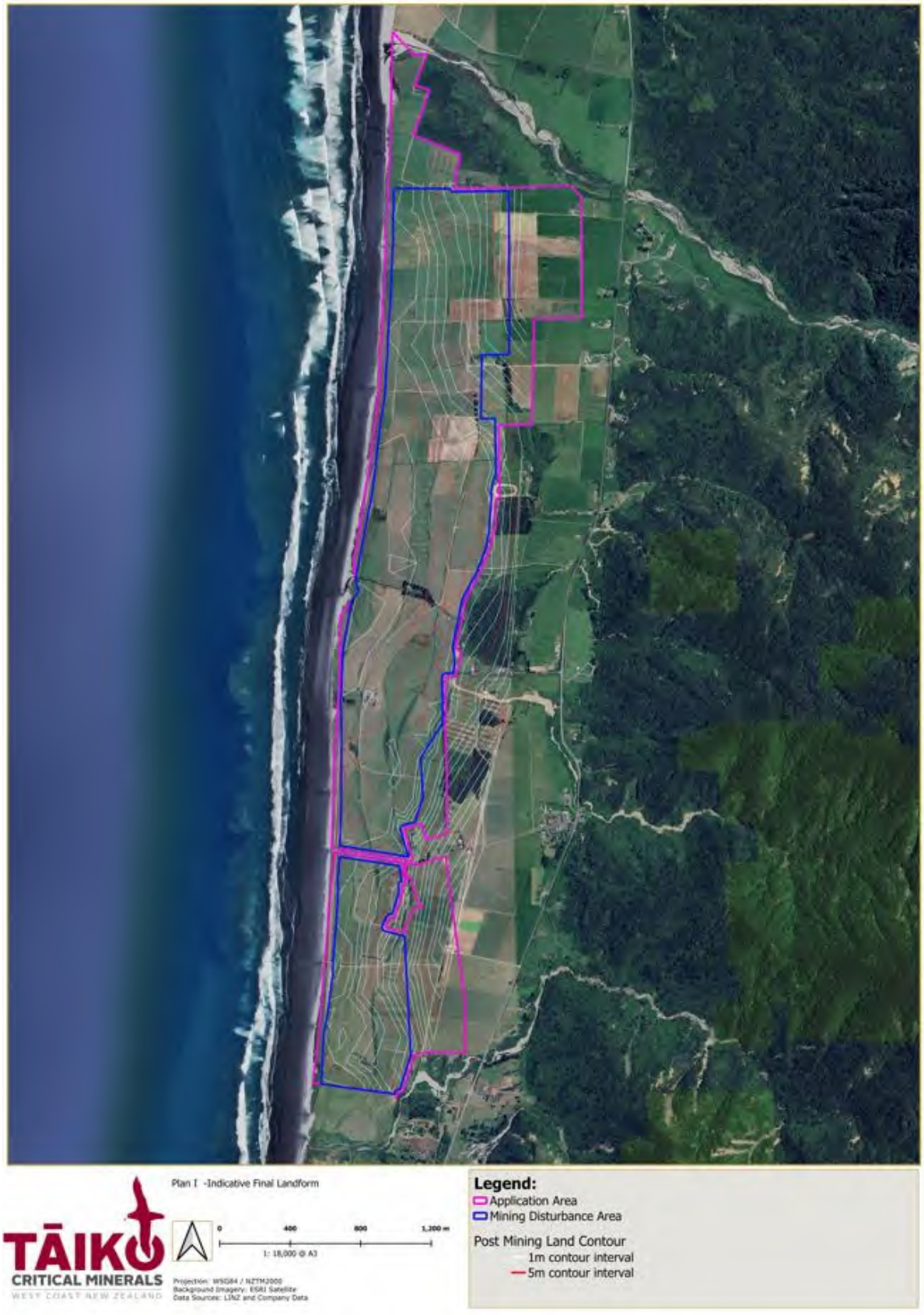


Plan G: Waterbodies on the Southern Block including the five creeks requiring diversion

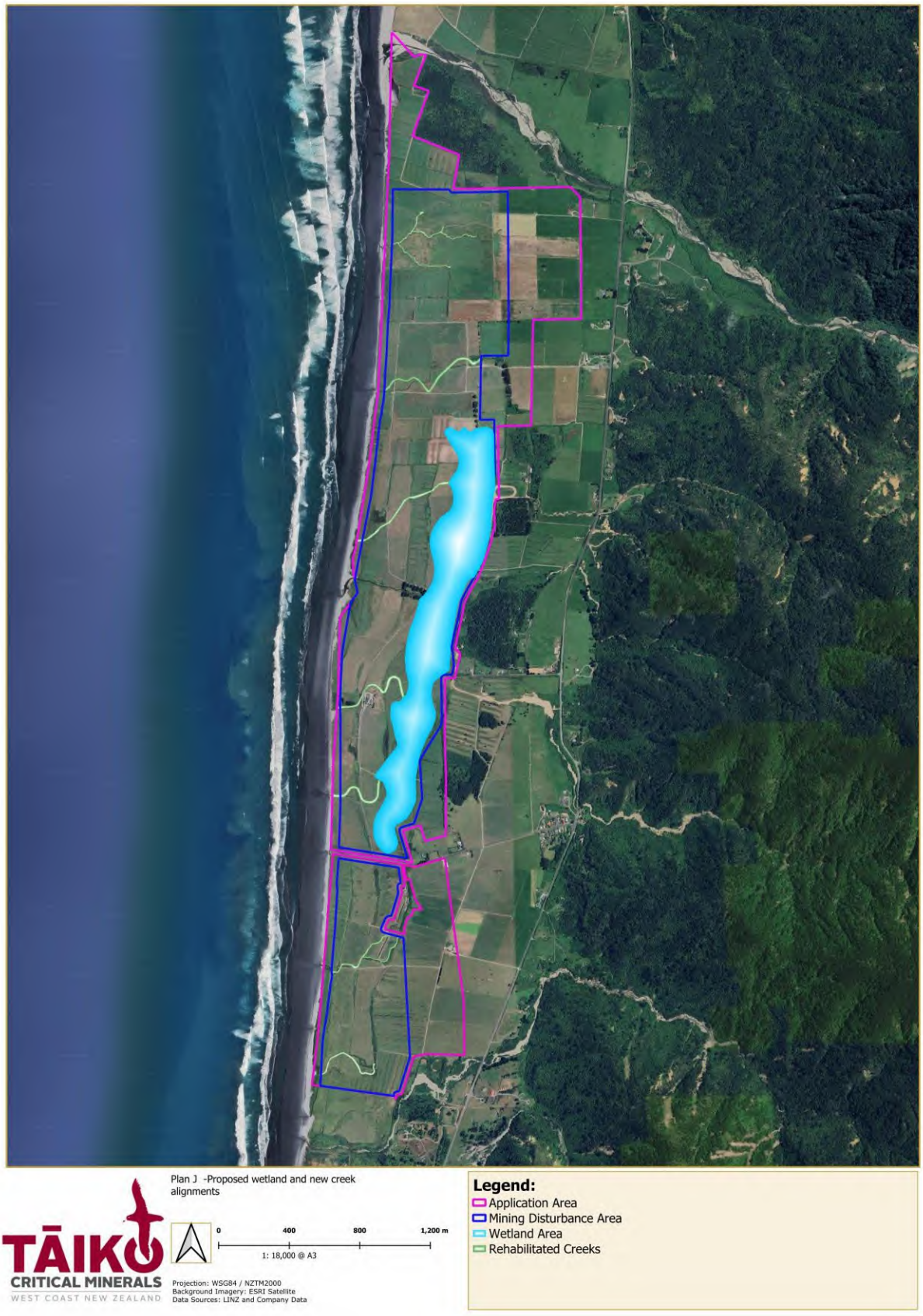


Plan H: Location of Water Take

Plan I: Indicative Final Land Contour



Plan J: Proposed Post-Mining Wetland and Watercourse Rehabilitation Layout



Appendix B

Archaeological report

New Zealand
Heritage Properties Ltd
Investing In Our Heritage

Barrytown Mineral Sands Project – Southern Resources Block

An Archaeological Assessment for the Southern Resource Block (SRB)

Report Prepared for TiGa Minerals and Metals Ltd
c/-Tai Poutini Resources Ltd
Author: Bree Wooller
Reviewed by: Dr Naomi Woods

Barrytown Mineral Sands Project – Southern Resources Block

An Archaeological Assessment for the Southern Resource Block (SRB)

Prepared by New Zealand Heritage Properties Ltd
Dunedin | Invercargill | Christchurch & Wellington (trading as Underground Overground Archaeology Ltd)
+643 477 3933 | www.heritageproperties.co.nz

Project Details

Archaeological Site No.	K31/11, K31/12
Site Address	Mining disturbance area within the Southern Resource Block, Barrytown, Greymouth. Encompassing 20 land parcels: Section 7, Block V, Waiwhero SD Part Section 5 Block IX Waiwhero SD Lot 1 DP 406050 Part RS 2634 Part RS 2635 Part RS 2639 Part RS 2928 RS 2929 RS 2930 RS 2931 RS 2932 RS 2933 RS 4033 RS 3316, Lot 1 DP 3548 Lot 1 DP 2719 Road reserve parcel ID 3700202 Road reserve parcel ID3702892 Road reserve parcel ID 3699494 RS 2927
Client	TiGa Minerals and Metals Ltd c/- Tai Poutini Resources Ltd
Client Contact	Luke McNeish, Tai Poutini Resources Ltd
Client Address	100 Mackay Street, Greymouth 7805
Report Authors	Bree Wooller
Reviewed By	Dr Naomi Woods, Megan Lawrence, Victoria Ross
Nominated s45 Approved Person	Bree Wooller
Report Submitted To	TiGa Minerals and Metals Ltd c/- Tai Poutini Resources Ltd, Grey District Council, and Heritage New Zealand Pouhere Taonga
Document Control ID	J012014_AA_REV D

Document Control

Revision No.	Date Submitted	Description	Prepared By	Reviewed By
A	20/01/2025	Issued to client, client forwarded on to Ngāti Waewae.	BW	NW, ML
B	27/02/2025	Minor edits from the client, updating text and figures to reflect change in consent area	BW	NW, VR
C	16/06/2025	Minor edits following HNZPT pre-application meeting	BW	NW
D	13/02/2026	Edits after client legal review and refinement of project scope for FH application	BW	NW, DC

Ownership and Disclaimer

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legal advice and are only current for the proposed work as described in Section 1.2. This report does not represent the views or cultural values of tangata whenua.

Cover Photo: Looking west down Cargill Road, towards the project area before dredging. West Coast Recollect (1930) 'Barrytown Hotel 1930s'. Available at: https://westcoast.recollect.co.nz/nodes/view/20884?type=all.

Executive Summary

TiGa Minerals and Metals Ltd are proposing to undertake mineral sand mining activities across 411.69ha at Barrytown, Grey District, West Coast. New Zealand Heritage Properties Ltd (NZHP) has been commissioned by Luke McNeish of Tai Poutini Resources Ltd on behalf of the clients to undertake an archaeological assessment of the mining disturbance zone within the Southern Resource Block (SRB), Barrytown, Greymouth (encompassing 20 land parcels, see project detail table above) for an archaeological authority application and resource consent application. The area outside of the mining disturbance zone is not covered by this assessment. This assessment considers the impact that the proposed works will have on any archaeological sites that are present within the project area.

This assessment identified that the project area was traversed by an ara tawhito, with manawhenua travelling through the area. The wetland areas in the east of the project area likely provided sources of mahinga toi and kai, while the dune systems along the western perimeter may have provided nohoanga. The two archaeological sites in the project area (K31/11, K31/12) were both find spots possibly relating to wetland artefact caching behaviours. The site survey found no evidence to suggest either find spot was related to other archaeological features in the vicinity of the recorded site, and therefore neither site will be affected by the proposed works. The site survey identified an area of raised dunes on the western perimeter of the site which might have been a suitable spot for a nohoanga. The coastal margin of the site may contain midden/oven sites, while other findspots may be encountered across the project area including in areas previously disturbed by dredging activity and hump and hollowing.

Later nineteenth century occupation of the project area centred on miners' blacksanding along the foreshore and squatting nearby. The historical record identified several mining claims and hut sites along the foreshore as well as the first Barrytown School. The first school site is in the dredge zone so no archaeology will remain in situ. There is reasonable cause to suspect that unrecorded gold-mining and historic-domestic sites will be encountered along the coastal margin. The location of these sites cannot be identified with certainty due to nature of early transient occupation in the area.

Although the project area has undergone a large amount of surface modification, the dredged areas may contain redeposited archaeological material not in situ. Hump and hollowed areas may have intact archaeology under the humps. As the history of the area records largely transient and ephemeral occupation across the project area, archaeology could be encountered anywhere across the site. NZHP has identified areas where there is a higher potential for archaeological remains to be encountered. Due to the scale of the mining operation, there is no scope for earthworks within the mining disturbance area to avoid archaeology.

This archaeological assessment has identified that there is reasonable cause to suspect that unrecorded artefact find spots, midden/oven sites, mining-gold and historic-domestic sites are present within the project area and will be affected by the proposed mineral sand mining. The unrecorded sites are considered to have **medium** archaeological value. Due to the nature of the proposed works the overall impact of the works on the archaeological values of unrecorded sites will be moderate to major.

For the purposes of the FTAA, NZHP has also considered the significance of any adverse impact of the proposed works on the archaeological landscape more broadly. Given the archaeological monitoring of high-potential areas, recording, analysis and reporting on any archaeological or heritage features modified by the proposed works (as set out in more detail below) NZHP supports approvals being granted under the FTAA, including a resource consent application and archaeological authority to modify the sites and considers in the wider context of the sites (i.e. private farmland) that the adverse impacts will be **low in significance.**

On the basis of this assessment, NZHP supports this application with the following recommendations:

1. **Authority Application:** As the proposed works described in Section 1.2 could affect unrecorded archaeological sites, an archaeological authority under Section 44 of the HNZPTA 2014 must be obtained from HNZPT prior to any modification of the site.
    a. The previously recorded sites (K31/11, K31/12) are destroyed so will not be impacted.
    b. If development plans are altered from those reviewed for this assessment, then HNZPT and NZHP must be alerted, as any changes may alter the assessment of effects or invalidate the authority.

2. **Protection of sites/features:** As a first principle, every practical effort must be made to avoid damage to any archaeological site, whether known, or discovered during any redevelopment of the site.
    a. **Drystone structure under Cargills Road -** To avoid damaging the structure the Cargill Road bund should not be built up against this structure. The use of heavy machinery should by limited or monitored in proximity to the structure, to limit the potential damage from vibrations. Dust and vibration plans, when finalised by the client, should be provided to NZHP to inform future protections for the structure as necessary.

3. **Site Instruction:** All works must be carried out in accordance with a site instruction. Any amendments to the site instruction will require prior written approval from HNZPT. The site instruction will include the points outlined in Section 10.2.2.

4. **Contractor Briefing:** All contractors working on the project must be briefed by the s45 approved person (or person nominated on their behalf) on the possibility of encountering archaeological evidence, how to identify possible archaeological sites/features during works, the archaeological work required by the conditions of the authority, and contractors' responsibilities with regard to notification of the discovery of archaeological evidence to ensure that the authority conditions are complied with. NZHP recommends that the briefing be undertaken in an office space to best enable the briefing to be presented digitally, thus maximising engagement.

5. **Archaeological Monitoring:** All earthworks that may affect an archaeological site must be monitored by the s45 approved person (or person nominated on their behalf) in accordance with the site instruction.
    a. Any archaeological features and material encountered shall be recorded, analysed, and interpreted in accordance with current archaeological practice and as outlined in the site instruction.

6. **Archaeology of Māori origin:** If archaeological material of Māori origin is discovered at any stage, all work must stop within 20m of the find. NZHP will assist the authority holder in contacting all relevant parties including tangata whenua via Ngāti Waewae and HNZPT in accordance with the site instruction.
    a. Any taonga tūturu are *prima facie* the property of the Crown who will be notified of the find. Taonga tūturu will be registered with the Ministry for Culture and Heritage. NZHP, in collaboration with manawhenua, shall notify the Ministry of Culture and Heritage and establish the most appropriate temporary storage, management and care for taonga tūturu, until such time as traditional or actual ownership is determined, with an appropriate institution or kaitiaki.

7. **Kōiwi (human remains):** Should kōiwi be encountered, all work must stop within 30m of the find. NZHP will assist the authority holder in contacting all affected parties as soon as practicable, including tangata whenua via Ngāti Waewae, HNZPT, and the police. The Ngāi Tahu policy for kōiwi tangata shall also be followed (Te Rūnanga o Ngāi Tahu, 2019).

8. **Reporting:**
    a. Within 20 working days of the completion of on-site archaeological work, the site record forms must be updated or submitted to ArchSite.

b. Within 12 months of the completion of on-site archaeological work, a final report on any archaeological material that is found must be prepared in accordance with *ASG12 Archaeological Report Guideline* (HNZPT, 2023) and submitted to HNZPT for inclusion in the digital library, Ngāti Waewae and to the Grey District Council.

Abbreviations

Abbreviation	Definition
HNZPT	Heritage New Zealand Pouhere Taonga
HNZPTA 2014	Heritage New Zealand Pouhere Taonga Act 2014
NZAA	New Zealand Archaeological Association
NZHP	New Zealand Heritage Properties Limited
RMA 1991	Resource Management Act 1991
SRB	Southern Resource Block

Glossary

The following terms were sourced from the Kāi Tahu Ki Otago Natural Resources Management Plan (Kāi Tahu Ki Otago, 2005) and Heritage New Zealand Pouhere Taonga (HNZPT, 2014).

Te Reo Māori	English
Hapū	Sub-tribe, extended whānau
Iwi	Tribe
Ngāi Tahu ki Otago	The four Papatipu Rūnaka and associated whānau and rōpū of the Otago Region
Kāika/Kaik/Kāinga	Settlement, place of residence
Karakia	Prayer, incantation
Kaumatua	Respected elder
Kōiwi / kōiwi	Human remains
Mahika kai/ Mahinga kai	Places where food is produced or procured
Mahika toi/ Mahinga toi	Places where non-food resources were gathered
Manawhenua	Those who exercise customary authority or rakātirataka
Papatipu	Original/traditional Māori land
Rakātira/Rangatira	Chief
Rakātirataka/Rangatiratanga	Chieftainship, decision-making rights
Rohe	Boundary
Rōpū	Group
Rūnaka/Rūnanga	Local representative group or community system of representation
Takata whenua/Tangata whenua	The iwi or hapū that holds mana whenua in a particular place
Takiwā	Area, region, district
Taoka/Taonga	Treasured object
Tapu	Sacred
Te Tai o Poutini	West Coast
Tikaka/Tikanga	Lore, customary values and practices
Tūpuna/Tīpuna	Ancestor
Umu	Earth oven
Umu-tī	Earth oven used for cooking cabbage tree (tī)
Urupā	Burial place
Wāhi Tapu	Places sacred to takata whenua
Whakapapa	Genealogy
Whānau	Family

Acknowledgements

New Zealand Heritage Properties acknowledges and thanks the following individuals who assisted in this project:

- Luke McNeish, Nichola Costley, Mike Meehan Tai Poutini Resources Ltd
- All the landowners who assisted with the survey
- Leah Harding (survey), John Parker (maps), Naomi Woods (project management), Victoria Ross (QC) from NZHP

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1 Introduction

TiGa Minerals and Metals Ltd are proposing to undertake mineral sand mining activities across 411.69 ha at Barrytown, Grey District, West Coast (Figure 1-1). New Zealand Heritage Properties Ltd (NZHP) has been commissioned by Luke McNeish of Tai Poutini Resources Ltd on behalf of TiGa Minerals and Metals Ltd to undertake an archaeological assessment of the mining disturbance area in the Southern Resource Block at Lot 1 DP 406050 SEC 1 4 4034 PT SEC 5 BLK IX Waiwhero SD, located on Cargill Road, Barrytown, Greymouth. This archaeological assessment has been prepared to assess the archaeological potential of the project area and to consider the impact that the proposed works will have on any archaeological sites. Archaeological sites are areas that witnessed human occupation prior to the year 1900 and can provide information on the history of New Zealand through archaeological investigation; archaeological sites are protected under the Heritage New Zealand Pouhere Taonga Act 2014 (HNZPTA 2014).

1.1 Project Area

The project area is defined as the mining disturbance area located in the Southern Resource Block, Cargill Road, Barrytown, Greymouth, encompassing 20 land parcels, including three road reserves. The area of the Southern Resource Block outside of the mining disturbance zone is not covered by this assessment. A summary of the project area is provided in Table 1-1 and the location of each land parcel is shown in Appendix A. There have been two archaeological sites previously recorded in the project area and the entire project area is in the Pounamu Management Area overlay under the proposed Te Tai o Poutini Plan (TTPP).

Table 1-1. Summary of project area.

Legal Description	Southern Resource Block, Barrytown, Greymouth. Encompassing 20 land parcels: **S**ection 7, Block V, Waiwhero SD Part Section 5 Block IX Waiwhero SD Lot 1 DP 406050 Part RS 2634 Part RS 2635 Part RS 2639 Part RS 2928 RS 2929 RS 2930 RS 2931 RS 2932 RS 2933 RS 4033 RS 3316, Lot 1 DP 3548 Lot 1 DP 2719 Road reserve parcel ID 3700202 Road reserve parcel ID3702892 Road reserve parcel ID 3699494 RS 2927
Landowner	Newall Brothers Limited, Cargill Rd Barrytown Limited, Nikau Deer Farm Limited, Barrytown Farms Limited, Charles Nelan Cabraal, Kim Denise Burnett, Stephen Rex Burnett, Land Information New Zealand, Grey District Council.
Territorial Authority	Grey District Council
Archaeological Site No.	K31/11, K31/12
Previous Archaeological Authorities	NA
New Zealand Heritage List/Rārangi Kōrero	NA
Covenant or Heritage Order	NA
Scheduled on District Plan	Pounamu Management Area overlay under the proposed TTPP
Reserve Status	NA
Statutory Acknowledgement Area	NA
Customary Marine Title	NA

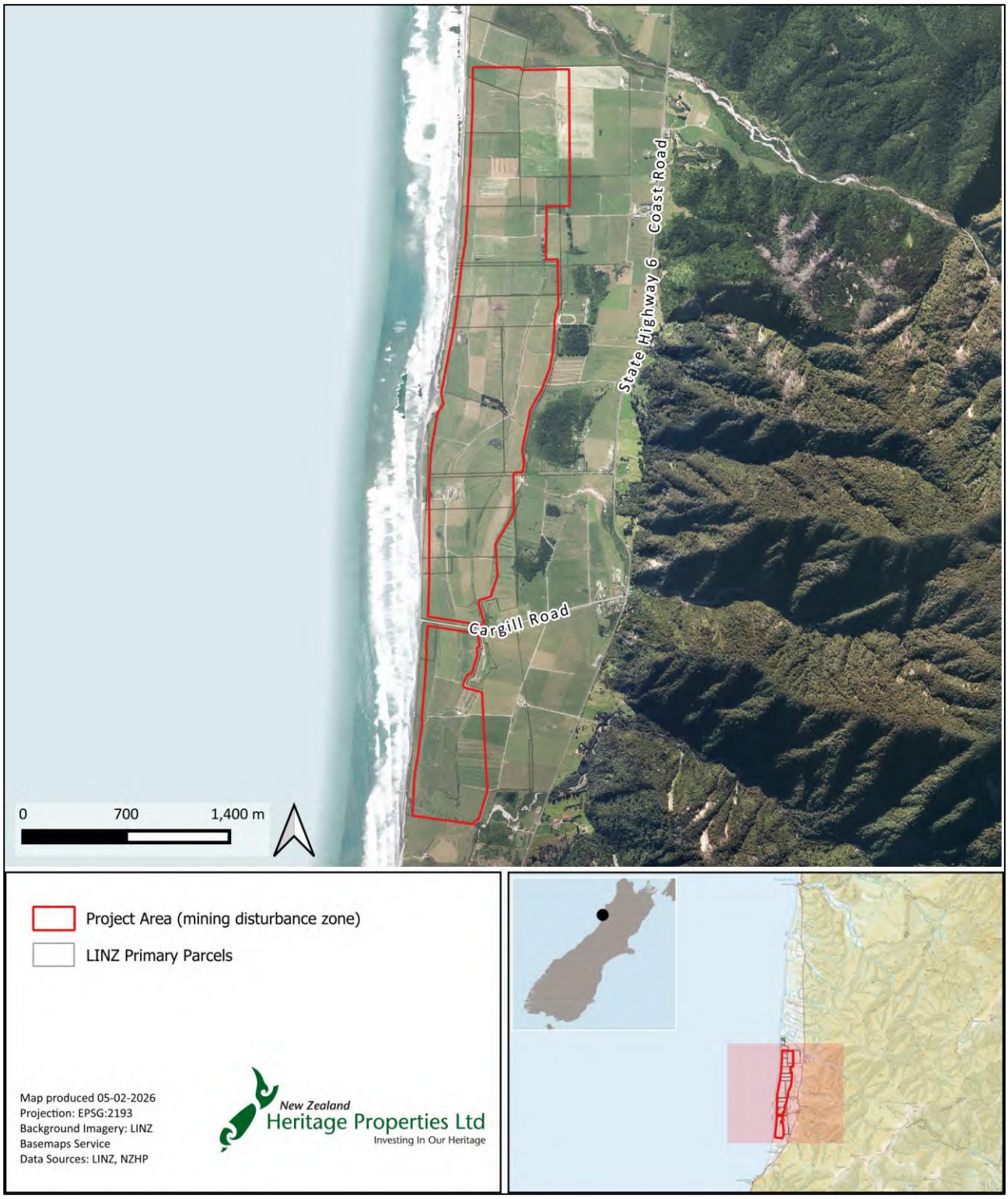

Figure 1-1. Project area in Barrytown, Greymouth.

1.2 Proposed Activities

TiGa Minerals and Metals Ltd are proposing to undertake mineral sand mining on the Barrytown Flats. The project will seek to mine both previously mined and unmined areas across the consent area. The sand mining and processing aims to obtain ilmenite, garnet, and other minerals. The proposed plans for the project are provided in the Project Description of the Application with the location of the project area as shown in Figure 1-1. The following proposed activities have the potential to affect archaeology:

Pre-mining activities

- The excavation of the starter pit area (100m x 100m)

- The excavation of the mine settling pond and water management infrastructure (Mine Water Facility) (**MWF**)
- Removal of topsoil on the site of the Wet Concentrator Plant (WCP)

Mining activities

- Removal of vegetation and topsoil within the mining areas. Earthworks to remove the vegetation and topsoil across the project area will be required to a depth of approximately 0.2 – 0.6m below surface.
- Initiation of mining across approximately 280ha area. Earthworks will be required to a depth of up to 10m below surface to extract the sand ore.
- The removed materials will be either returned to the mined areas or used to build bunding.

2 Statutory Requirements

The legislative requirements relating to archaeological sites and artefacts are detailed in the following sections. While this application is being made under the Fast Track Approvals Act 2024, the two main pieces of legislation that provide protection for archaeological sites are the Heritage New Zealand Pouhere Taonga Act 2014 (HNZPTA 2014) and the Resource Management Act 1991 (RMA 1991). Artefacts are further protected by the Protected Objects Act 1975.

2.1 Heritage New Zealand Pouhere Taonga Act 2014

HNZPT administers the HNZPTA 2014, and the purpose of this Act is to promote identification, protection, preservation, and conservation of New Zealand's historical and cultural heritage. The HNZPT Act outlines the archaeological authority process for any work affecting archaeological sites, where an archaeological site is defined as

(a) any place in New Zealand, including any building or structure (or part of a building or structure), that--:
  (i) was associated with human activity that occurred before 1900 or is the site of the wreck of any vessel where the wreck occurred before 1900; and
  (ii) provides or may provide, through investigation by archaeological methods, evidence relating to the history of New Zealand; and
(b) includes a site for which a declaration is made under section 43(1)

Additionally, HNZPT has the authority (under section 43(1)) to declare any place to be an archaeological site if the place

(a) was associated with human activity in or after 1900 or is the site of the wreck of any vessel where that wreck occurred in or after 1900; and
(b) provides, or may be able to provide, through investigation by archaeological methods, significant evidence relating to the historical and cultural heritage of New Zealand.

Any person who intends carrying out work that may damage, modify or destroy an archaeological site, or to investigate a site using invasive archaeological techniques, must first obtain an archaeological authority from Heritage HNZPT. The process applies to sites on land of all tenure including public, private and designated land. The Act contains penalties for unauthorised site damage or destruction.

The archaeological authority process applies to all sites that fit the HNZPTA definition, regardless of whether

- the site is recorded in the New Zealand Archaeological Association (NZAA) Site Recording Scheme (ArchSite), listed by HNZPT, or scheduled under a district plan;
- the site only becomes known about as a result of ground disturbance, and/ or;
- the activity is permitted under a district or regional plan, or a resource or building consent has been granted.

HNZPTA also maintains the New Zealand Heritage List/ Rārangi Kōrero (the List) of Historic Places, Historic Areas, Wāhi Tapu, and Wāhi Tapu Areas. The List includes some significant archaeological sites. The purpose of the List is to inform members of the public about such places and to assist with their protection under the Resource Management Act 1991 (RMA).

2.2 Resource Management Act 1991

The RMA 1991 defines historic heritage as those natural and physical resources that contribute to an understanding and appreciation of New Zealand's history and cultures, derived from archaeological, architectural, cultural, historic, scientific, or technological qualities. Historic heritage includes historic sites historic sites, structures, places, and areas; archaeological sites; and sites of significance to Māori (including wahi tapu); and surroundings associated with the natural and physical resources. These categories are not mutually exclusive, and some archaeological sites

may include above ground structures or may also be places that are of significance to Māori. It should be noted that this definition does not include the 1900 cut-off date for protected archaeological sites as defined by the HNZPTA 2014. Any historic feature that can be shown to have significant values must be considered in any resource consent application.

The RMA requires city, district, and regional councils to manage the use, development, and protection of natural and physical resources in a way that provides for the well-being of today's communities while safeguarding the options of future generations. The protection of historic heritage from inappropriate subdivision, use, and development is identified as a matter of national importance (section 6f).

The RMA 1991 requires local authorities to develop and operate under a district plan. Te Tai o Poutini Plan is a proposed combined district plan for the West Coast. The proposed plan identifies important heritage buildings and sites, and important trees and sites of significance to Poutini Ngāi Tahu. Part 2 of the Proposed Te Tai o Poutini Plan encompasses Historical and Cultural Values, Ngā Uara ā-Ahurea, ā-Hītori Hoki.

Iwi/hapu management plans are planning documents that are recognised by an iwi authority, relevant to the resource management issues, including heritage, of a place and lodged with the relevant local authority. They have statutory recognition under the RMA 1991. Iwi management plans set baseline standards for the management of Māori heritage and are beneficial for providing frameworks for streamlining management processes and codifying Māori values. Iwi management plans can be prepared for a rohe, heritage inventories, a specific resource or issue or general management or conservation plans (NZHPT, 2012).

The hapū who hold mana whenua in Te Tai o Poutini are Ngāti Waewae. Under section 74(2A) of the RMA, territorial authorities, in preparing or changing a district plan, must take into account planning documents recognised by iwi. Ngāti Waewae have been involved in the preparation of Pounamu Management Plans which have been recognised by Te Rūnanga o Ngāi Tahu as planning documents. These iwi management plans have been taken into account in the Te Tai o Poutini Plan through participation of Poutini Ngāi Tahu representatives during development of the plan.

2.3 Protected Objects Act 1975

The Protected Objects Act 1975 was established to provide protection of certain objects, including protected New Zealand objects that form part of the movable cultural heritage of New Zealand. Protected New Zealand objects are defined by Schedule 4 of the act and includes archaeological objects and taonga tūturu. Under Section 11 of the Protected Objects Act 1975, any newly found Māori cultural objects (taonga tūturu) are automatically the property of the Crown if they are older than fifty years and can only be transferred from the Crown to an individual or group of individuals through the Māori Land Court. Anyone who finds a complete or partial taonga tūturu, accidentally or intentionally is required to notify the Ministry of Culture and Heritage within:

(a) 28 days of finding the taonga tuturu; or

(b) 28 days of completing field work undertaken in connection with an archaeological investigation authorised by HNZPT.

3 Methodology

This archaeological assessment has been prepared in accordance with HNZPT's (2019) guideline on preparing an archaeological assessment. Presented below are the methods used to gather information to identify the archaeological potential of the project area, determine the archaeological significance, and assess the effects of the proposed work on archaeological values.

3.1 Research to Identify Archaeology and Inform Archaeological Values

The first half of this report provides the information gathered to inform on the archaeological values of the project area, including the setting, historical background, archaeological context, and the site visit. Documentary research was undertaken to inform the background research sections of this assessment. The physical environment section documents the setting of the project area, its land use, and considers environmental factors that may influence how the site was occupied through time. The historical background first provides an overview of human history for the wider area before narrowing down on evidence that is specific to the project area itself to determine the nature and significance of the archaeology. Previous archaeological research and investigation for the project area provide an understanding of research results, areas of modification, and informs on the potential for the proposed works to affect archaeology. This section also considers the wider archaeological context, including the consideration of sites recorded near the project area and how artefact find spots, midden/oven sites, gold mining sites, and historic-domestic sites are represented in the archaeological record at the local, regional, and national level. Sources utilised for this research include:

- Published primary and secondary sources for the West Coast and gold mining,
- Kā Huru Manu,
- Historic newspaper articles through PapersPast,
- Historic photographs on West Coast Recollect
- Historic maps accessed via Prover and from Archives New Zealand,
- ArchSite,
- The HNZPT archaeological reports digital library,
- New Zealand Heritage List/Rārangi Kōrero,
- Retrolens aerials
- LINZ LiDAR imagery

3.2 Survey Methodology

Three key sources of information were compiled and analysed as part of the archaeological surveys. These included aerial imagery, LiDAR and a physical survey of the survey area. Where sites could not be identified or accessed due to health and safety constraints, vegetation, or topography, during the pedestrian survey, the recent LiDAR and historical imagery, alongside information from previous archaeological investigations, were used to inform an understanding of site location and spatial extent.

3.2.1 Aerial Imagery

Historic aerial imagery, dating to the 1950s and 1980s of the survey area was accessed via Retrolens. The aerial imagery was compared with features identified during the physical survey, the 2020-2022 LiDAR data, and the drone photos supplied by Tai Poutini Resources. By comparing the historical images with more recent data, it was possible to recognise archaeological potential, and identify features established in the 1950s or onwards and the extent to which mining from the 1950s onwards has impacted archaeological sites throughout the survey area.

3.2.2 LiDAR

LiDAR is a useful in identifying points of interest (POI), establishing site extents and spatial relationships of sites and features that are not identifiable or obvious when on the ground. In recording and heritage management of

archaeological sites Jones & Bickler (2018) have identified that while New Zealand archaeologists are proficient and better at detecting individual sites at a local level, "visual manual detection at larger scaler is both time consuming and costly" (Jones & Bickler, 2018). In contrast LiDAR data can generate terrain models for larger areas covered in heavy and dense vegetation, as well as areas of rough terrain that are difficult to physically survey. Not only does LiDAR offer the ability to identify previously unrecorded sites in such areas, it also helps to map previously recorded sites as well as refine data collected prior to GIS and GPS. Even where archaeological sites have in the past been well drawn and mapped these are predominantly not georeferenced and frequently not to scale. LiDAR can be used to refine site extents and boundaries with geographical precision (Jones & Bickler, 2017).

LiDAR data from 2020-2022 was accessed via LINZ. Visual inspection of the LiDAR data provided included examination of raster-derived surfaces (i.e. hillshade) and high-resolution contours in order to identify unrecorded archaeological sites and define recorded archaeological sites. Details attained from the LiDAR data included location, extent and types of possible archaeological sites, which contributed to interpretation of individual sites as well as wider archaeological landscapes throughout the survey area. The LiDAR data also displayed distinguishable evidence of twentieth century dredging, ploughing, and hump and hollowing and its potential impact on archaeological sites.

3.2.3 Pedestrian Surveys

A survey of the project area was undertaken in December 2024 by NZHP archaeologists Bree Wooller and Leah Harding.

A GPS unit loaded with previously recorded sites was carried and the survey paused when previously recorded or unrecorded features were encountered to allow for closer inspection. The locations of previously recorded sites were inspected and photographed noting any evidence of in situ archaeology as well as the potential condition of any subsurface material, while features that may be indicative of an unrecorded archaeological site were recorded in detail and plotted on the GPS.

All areas of known pre-1900 activity and areas without extensive twentieth century modification were surveyed by paddock in 20m transects (Figure 7-1). The boggy terrain and non-traversable waterways of the area did not allow for standardised transects to be adhered to in some paddocks. Fields which had been humped and hollowed were surveyed along the humps as the hollows were generally filled with water and foliage. Due to the extent of modern surface modification, after no evidence of archaeology was encountered in fourteen heavily modified paddocks (i.e. humped and hollowed areas), no further modified paddocks were transected. Instead, these were viewed from the perimeter only. Extensive stretches of the project area were dredged in the twentieth century. Eight dredged paddocks were surveyed to determine the extent of the modification and sections of the coastal margin of the dredge zone were transect surveyed to determine the condition of the edge of the project area. Additionally, fields with livestock or without safe access points were not transacted but viewed from the perimeter. Areas that could not be accessed or viewed were studied through the LiDAR imagery and aerial photographs, which went some way to offset these limitations.

3.3 Assessment of Archaeological Values

Section 46 of the HNZPTA 2014 requires an assessment of archaeological values as well as Māori and other relevant values to the archaeological site. The assessment of archaeological and other values is based on criteria established by HNZPT (2019):

- The **condition** of the site(s).
- Is the site(s) unusual, **rare or unique**, or notable in any other way in comparison to other sites of its kind?
- Does the site(s) possess **contextual value**? Context or group value arises when the site is part of a group of sites which taken together as a whole, contribute to the wider values of the group or archaeological, historic or cultural landscape. There are potentially two aspects to the assessment of

contextual values; the relationship between features within a site, and the wider context of the surroundings.

- **Information potential**. What current research questions or areas of interest could be addressed with information from the site(s)? Archaeological evaluations should take into account current national and international research interests, not just those of the author.
- **Amenity value** (e.g. educational, visual, landscape). Does the site(s) have potential for public interpretation and education?
- Does the site(s) have any special **cultural associations** for any particular communities or groups (e.g., Māori, European, Chinese.)

The criteria outlined above help to build an overall assessment of significance of a site, and NZHP have adopted the following levels of overall archaeological value (Table 3-1). These levels of significance follow the recommendations proposed by Department for Transport (2008); although, this steers away from the use of local, regional, and local importance, which Kerr (2013) argues is irrelevant to the assessment process. It is important to note that it is not possible to fully understand the archaeological significance of subsurface sites, and that the significance of a site may change on the basis of what is found during the work programme.

Table 3-1. Levels of overall archaeological value (adapted from DoT, 2008).

Level of Significance	Criteria
Very High	• World Heritage Sites (and proposed sites) • An archaeological site of acknowledged international importance
High	• Listed archaeological sites, including those of listing quality and importance o Category 1: places of special or outstanding historical or cultural heritage significance or value; o Category 2: places of historical or cultural heritage significance or value; and • Scheduled archaeological sites, including those of scheduling quality and importance • Archaeological sites with exceptional values
Medium	• Archaeological sites that can be shown to have moderate values
Low	• Archaeological sites with limited value, including those that are highly represented, have low information potential, have poor preservation, and/or poor survival of contextual association
Negligible	• Sites with very little surviving archaeological interest
Unknown	• The importance of the site is not yet known

3.4 Assessment of Effects

After determining that there is evidence that archaeology is present within the project area and evaluating its archaeological value, an assessment of the effects of the proposed work on those values was completed. Specifically, consideration was given to the following matters as outlined by HNZPT (2019):

- How much of the site(s) will be affected, and to what degree, and what effects this will have on the values of the site(s).
- Whether the proposed work may increase the risk of damage to the site(s) in future. For example, change from farming to residential use may make sites vulnerable to increased pedestrian and vehicular activity.
- Whether a re-design may avoid adverse effects on the site(s). It is recognised that detailed evaluation of alternatives may be beyond the scope of the archaeological assessment, however, some consideration of alternatives should be considered where possible.
- Possible methods to protect sites, and avoid, minimise or mitigate adverse effects should be discussed. These will form the basis of any recommendations in the final section.

The magnitude of impact on archaeology is defined below with a scale ranging from no impact to major impact. In most instances these impacts are adverse; however, there may also be positive impacts on the site.

- **Major** - impact to the archaeological site, such that the site is totally altered (*e.g.*, a site is totally destroyed).
- **Moderate** - impact to the archaeological site, such as the asset is significantly modified (*e.g.*, at least half of a site is affected)

- **Minor** - impact to the archaeological site, such that the asset is slightly different (*e.g.*, a small portion of the site is affected).
- **Negligible** - slight changes to archaeological site that hardly affect it.
- **No impact** - the works will not affect the site.

4 Physical Environment and Setting

The project area is located in Barrytown, Grey District on the West Coast of the South Island (Figure 4-1). Barrytown is a small farming settlement approximately 25km by road north of Greymouth. Barrytown flats is situated on a narrow strip of land to the west of the Paparoa Range. The project area is bounded by Pakiroa Beach (17 Mile Beach) on the western side and the Canoe Creek Scenic Reserve to the north. State Highway 6 runs to the east, albeit not adjacent, of the project area.

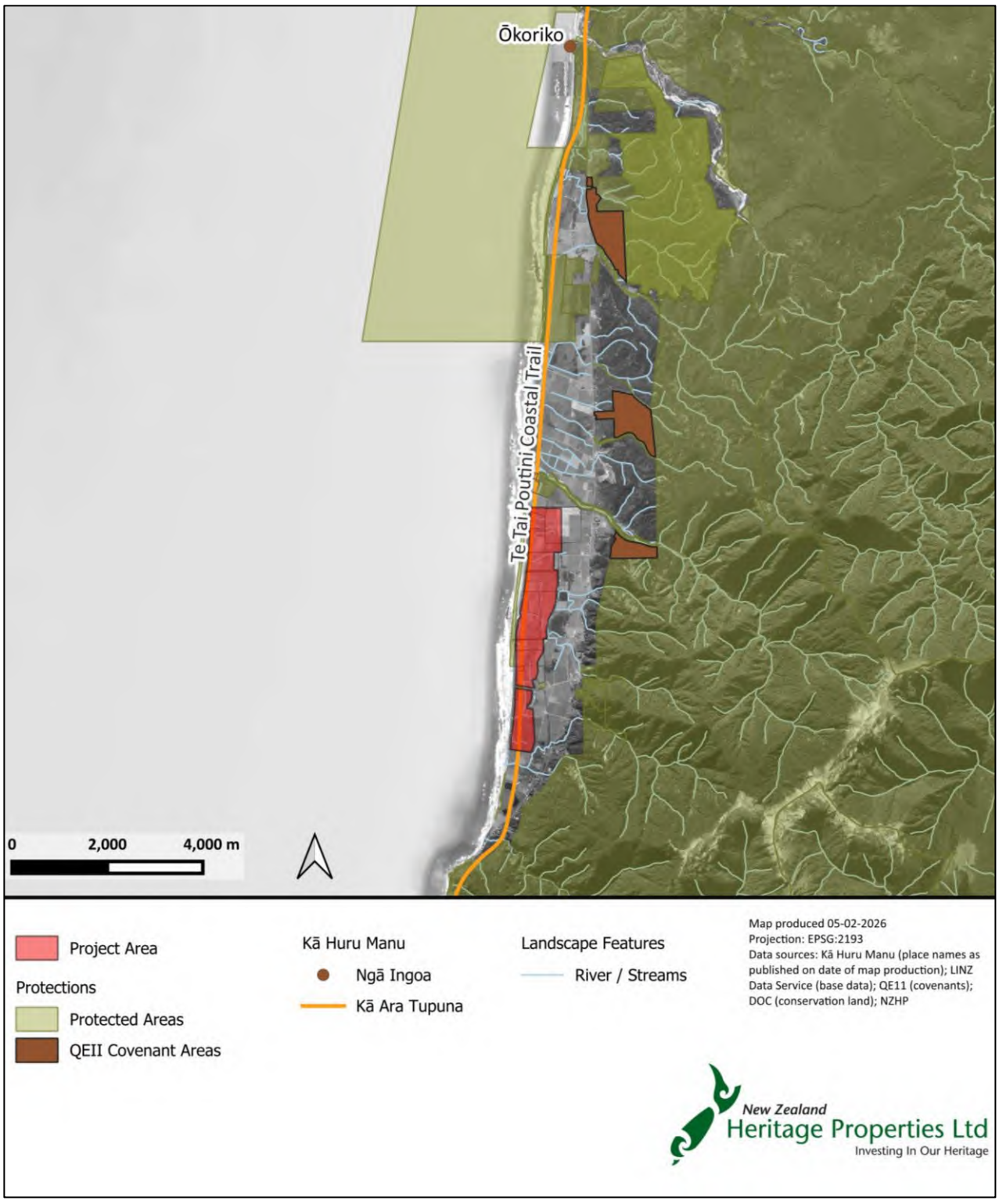

Figure 4-1. The broader geographical setting of the Barrytown Flats.

4.1 Geomorphology

Te Tai o Poutini, the West Coast of Te Waipounamu, lies along the boundary between the Pacific and Australian tectonic plates, with the plate boundary being clearly marked by the Alpine Fault, forming the western edge of the Southern Alps. To the east of the Alpine Fault, the most commonly found type of rock is greywacke, a hard, grey muddy sandstone that contains bands of shale. Closer to the Alpine Fault, the deeply buried greywacke has metamorphosed into schist, while pounamu can be sourced from small areas of schist north-east of Hokitika. The project area is within the Pounamu Management Area overlay under the proposed Te Tai o Poutini Plan (TTPP). To the west of the Alpine fault, the rocks are more varied, with the oldest rock type being greywacke, containing intrusions of several types of granite. These are overlaid by layers of softer sedimentary rocks, including mudstone, sandstone, conglomerate, and limestone. Coal-bearing rocks are widespread, with coal having been mined at a number of locations (Nathan, 2012). Mesothermal gold is contained within the greywacke, which is predominant on Te Tai o Poutini, and is incorporated into the faulted areas of the hard rock source, known as shear zones. When the hard rock sources, such as the West Coast greywacke, are eroded away, it becomes auriferous gravels (Karoro Formation). Alluvial gold is the result of rivers or glaciers having flowed over auriferous gravels, washing, and sorting the gold, which then allows for the formation of concentrations of heavy gold deposits in certain layers. This often meant that alluvial gold deposits were much richer than their hard-rock sources (Walrond, 2012). The majority of gold deposits within the Grey District are alluvial, consequently, the area hosts a dynamic timeline of mining activities throughout recent history which have left irreversible scars across the landscape.

The wider landscape surrounding Barrytown Flat is largely public conservation land with forest and scrub coverage, with three QEII Covenant Areas to the northeast of the project area (Figure 4-1). The native bush is a mix of coastal podocarp, broadleaf, and lowland hardwoods. An area of significant indigenous biodiversity (PUN-49), situated to the west of the boundary of the site is identified as a potential Significant Natural Area (SNA) under the proposed Te Tai o Poutini Plan (TTPP). To the north of the project area, Ōkoriko (Razorback Point) is situated at the outlet of the Punakaiki River (Te Rūnanga o Ngāi Tahu, 2025). To the south, the Motukiekie Rocks are located off the coastline near Waiāniwaniwa (Ten Mile Creek). The island was likely utilised for resource procurement, as kiekie (Freycinetia banksii) was highly valued for weaving (Te Rūnanga o Ngāi Tahu, 2025). The Te Tai Poutini Coastal Trail runs through the project area (Figure 4-1).

The project area is crossed by a series of little creeks that originate from the Paparoa Ranges and drain into Tasman Sea (Figure 4-1). Granite Creek and Little Granite Creek flow through the project area, as well as lots of smaller tributaries particularly along the westerns coastal margin. The coastal margins would have originally consisted of sandy loam dune formations; however, these have largely been eroded or modified by twentieth century activities. The terrain is very waterlogged, with peaty sediments noted in the tributaries. The project area is all in pasture with the exception of areas of wetland planting along the margins and in the waterlogged areas. The nature of the pasture varied by paddock with some areas having short grass coverage with a large amount of stock trampling, through to other fields with long, reedy growth, obscuring the ground surface.

4.2 Landscape Transformations

A vast amount of the project area has previously been modified with extensive dredging and hump and hollowing taking place in the twentieth and twenty-first centuries. The waterways running through the site have been modified for drainage and stock supply with most having been straightened to align with the farm layouts. Over the last 50 years some vegetation clearance has been undertaken, primarily gorse removal for farming purposes. The project area is currently being utilised for dairy farming.

5 Historical Background

The following sections give an overview of Māori and Pākehā settlement in Te Tai o Poutini and the Grey District to provide context to understand the history of the area. Through this research it is possible to begin to identify what type of physical, cultural, and social processes have shaped the form and distribution of archaeological material. This chapter then moves on to outline the history of the project area, situated in Barrytown.

5.1 Māori Occupation of Te Tai o Poutini

From the snowy maunga to the sea waters of the taniwha Poutini, Te Tai o Poutini is of immense significance to Poutini Ngāi Tahu. From the earliest times, pounamu was the main reason for settlement on Te Tai o Poutini, with the central region near the project area being at the heart of Poutini Ngāi Tahu legends, customs, and traditions. Te Tai o Poutini lies within the traditional boundaries of Ngāi Tahu, who are the largest iwi in Te Waipounamu (the South Island), comprised of people descended from the tribe's five primary hapū (Ngāti Kurī, Ngāti Irakehu, Ngāti Huirapa, Ngāi Tūāhuriri and Ngāi Te Ruahikihiki) along with earlier Rapuwai, Hawea, Waitaha, and Ngāti Mamoe ancestors. The hapū who hold mana whenua in Tai o Poutini are Ngāti Mahaki o Makaawhio and Ngāti Waewae; together they are known as Poutini Ngāi Tahu. The rohe of Poutini Ngāi Tahu extends over the entire West Coast Region from Kahurangi Point to Piopiotahu (Milford Sound) and inland to Ngā Tiritiri o te Moana (the Southern Alps).

In the eighteenth century, Raureka, a Ngāti Wairangi rangatira was the first person to find a way across Ngā Tiritiri-o-Te-Moana, the Southern Alps. Raureka, who was born at Lake Kaniere to the south of the project area, arrived in the Arowhenua region and was taken in by a party of Ngāi Tūhaitara, who were amazed by her pounamu toki. Word of Raureka's journey, and the pounamu that could be gathered *en route*, soon spread (Madgwick, 2024; Te Rūnanga o Ngāi Tahu, 2022; Te Rūnanga o Ngāi Tahu, Te Rūnanga o Ngāti Waewae, & Te Rūnanga o Makaawhio, 2018).

5.1.1 Pā and Kāinga

A lot of what is known of the settlement of Te Tai o Poutini comes from traditional oral histories and later nineteenth century ethnographic accounts recorded by Pākehā. By the nineteenth century, kāinga (villages) were largely permanently occupied and were situated near the mouths of the major rivers. However, during summer, kāinga could often be sparsely populated as groups dispersed to undertake a range of seasonal activities. When Pākehā arrived in Te Tai o Poutini, Māori settlements were concentrated along the central coastline, although, archaeological evidence also suggests that kāinga and nohoanga (seasonal camps) stretched along the western seaboard (Anderson, 1982). Later Pākehā noted the presence of small, isolated settlements in these areas, where Māori communities stayed while procuring pounamu (Anderson & Prickett, 1982; Ngāi Tahu, 2021). To the south of the project area the closest kāinga was Kararoa, which had been occupied by Ngāti Rārua and Te Āti Awa who had married into Poutini Ngāi Tahu (Madgwick, 2024). To the north, a small seasonal pa, Kawatiri, was occupied near modern day Westport (Madgwick, 2024).

5.1.2 Mahinga Toi

Mahinga toi refer to places where non-food resources were gathered. Pounamu (greenstone) is of particular importance to Māori, with the stone manufactured into tools such as adzes, chisels, and knives, as well as items of ornamentation such as hei tiki (pendant) (Te Rūnanga o Ngāi Tahu, 2022). The major sources for pounamu along Te Tai o Poutini are along the Arahura and Taramakau Rivers (Figure 5-1). Raw pounamu was also traded for other resources, and spread throughout both Te Waipounamu and Te Ika-a-Māui (the North Island) (Jacomb *et al* 2010). There were a number of ara tawhito (traditional routes) that were used to transport pounamu, and those seeking it, over Kā Tiritiri-o-te-moana (the Southern Alps), with the major routes crossing the Haast and Harper's Pass (Figure 5-1). The project area is within the Pounamu Management Area overlay under the proposed Te Tai o Poutini Plan (TTPP).

There are plentiful legends associated with the central region of Te Tai o Poutini, from the hills of Ōhonu (Hohonu Range) to Turiwhate, the entire Arahura and environs, including Kawhaka, Tuhua, Timuaki, Raparapahoe, Mt Tara o Tama (the great mountain of the pounamu explorer Tama Ahua) and as far as Mt Kaniere (Mt Harman), named for sawing the pounamu. Historic sources (West Coast Times, 1903) note a large amount of harakeke (flax) growing across the project area prior to it being cleared. Harakeke was a valued resource to Poutini Ngāi Tahu with it being recognised as a taonga species in the Ngāi Tahu Claims Settlement Act 1988 (Tumahai, 2010).

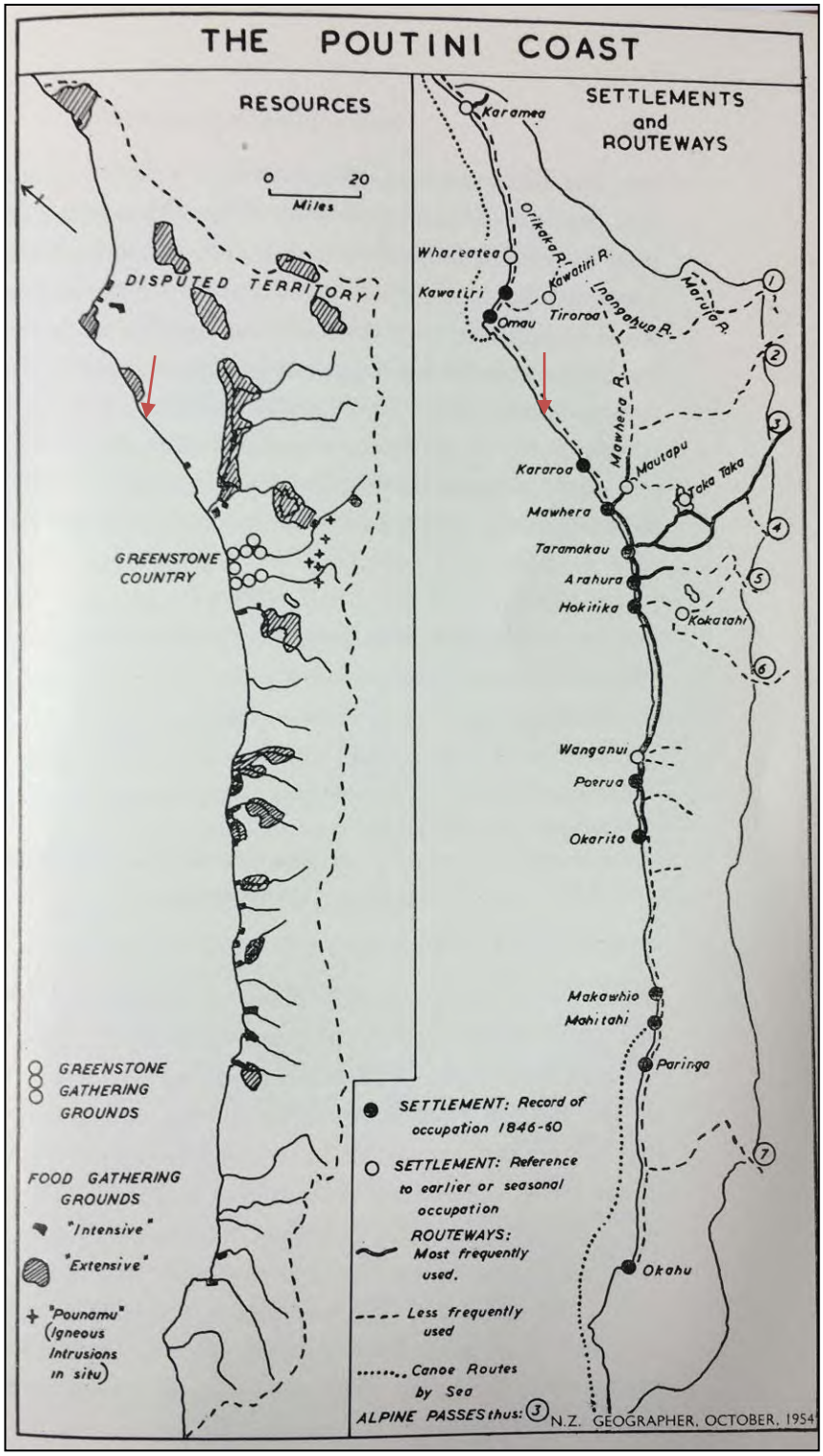

Figure 5-1. Map showing kāinga, mahinga toi and kai areas, and ara tawhito in Te Tai o Poutini at the time of Pākehā contact (1840s). Note: the project area is indicated by the red arrows (McCaskill, 1954).

5.1.3 Mahinga Kai

Te Tai o Poutini was also associated with mahinga kai (food gathering places) utilised by people living in the region, as well as travelling parties. Freshwater sources were fished for tuna (eel), grayling, and īnanga (whitebait), while forested areas were fowled for kiw, weka, kākāpō, kākā, kōkō (tūī) and kūkupu (kererū) (Madgwick, 2024). In the vicinity of the project area, tītī were lured into Pakiroa (Barrytown) and disorientated by the lighting of large fires at dusk, before being caught and clubbed (Madgwick, 2024). Berries and vegetables, such as tree fern pith, kōareare (the edible rhizome of raupō), mamaku, podocarp berries, and rarely, bracken fern root and nikau palm, were also gathered. Historic sources note copious amounts of harakeke and raupō in the area during the nineteenth century (SO 7873, SO 7948), which are both valued mahinga kai plant sources to Poutini Ngāi Tahu (Tumahai, 2010). Kokopu, koura, and tuna would have been gathered from the streams in the project area, with bird species such as putakitaki and weka found grazing in the wetlands within the project area (Tumahai, 2010).

Kūmara and Taro were reported to have been grown by Poutini Ngāi Tahu throughout the Poutini coastline, with the temperate climate and less severe winters than the eastern regions allowing for horticulture (Madgwick, 2024). Ethnographic accounts record the use of rocks to keep the crops warm and the tubers were wintered in rua (Madgwick, 2024).

5.1.4 Ara Tawhito and Nohoanga

Ara tawhito are traditional travel routes, and these criss-crossed Te Tai o Poutini, connecting the pā of Arahura, Taramakau, and Māwhera with the great Ngāi Tahu trading centre of Kaiapoi Pā. The Te Tai Poutini Coastal Trail traverses the coastline from Māwhera (Greymouth) to Mohua (Golden Bay), including through the western extent of the project area. Madgwick (2024), notes that the section of the ara tawhito which ran along the long smooth beach of pakiroa adjacent to the project area was a stark contrast to the particularly treacherous steep cliffs to the north. As noted, the nearby Taramakau was a major ara tawhito, which was often difficult to traverse, but which did provide a route over Kā Tiritiri o te Moana (Southern Alps) through Nōti Taramakau (Harper Pass). This route, one of the lowest and easiest to traverse, was valued as part of the wider lifeways cycle for access to pounamu.

Nohoanga, literally meaning 'a place to sit', traditionally refers to seasonally occupied sites. Nohoanga were an integral part of the mobile lifestyle of tīpuna (ancestors) as they moved around Te Waipounamu undertaking various seasonal expeditions for resource procurement, trade and maintaining social relationships. No inland settlement sites or nohoanga have been investigated in Te Tai o Poutini, although secondary information inferred from artefact findspots suggests that nohoanga would have been close to inland rivers or streams (Department of Conservation, 2010). A cave site in the Razorback Ridge, to the north of the project area, was noted in Nicholl's 1990 survey of Barrytown Flat (Nichol, 1990) and might have been evidence of a nohoanga.

Figure 5-2. Beachcombing black sand for gold (West Coast New Zealand History, 2014)

5.2 Contact and Post-Contact Period Occupation of Te Tai o Poutini

The settlement of Barrytown begun with the Canoe Creek gold rush in 1867 with miners digging on the beach and in the stream for gold (May, 1962). Canoe Creek is just to the north of the project area, with early mining claims extending into the proposed mining disturbance zone (SO 3682, SO 3687). The first gold seekers moved into the Seventeen Mile beach area to work the black sands of the foreshore; an activity known as "blacksanding" (Mines Department, 1906). Sand was put through a sluice boxes and gold collected (Figure 5-2). Beach mining came to be practised extensively at Barrytown, Brighton, and Charleston (between Cobden and Cape Foulwind), but while several rich pockets were found, the deposits proved exceedingly patchy (Westport Times, 1879). Miners extended their searches to gold to the terraces to the east of the beach flat with mining undertaken in the foothills well into the twentieth century (Harris, 1916). The settlement came into being at the height of the rush in 1879, which at the time there was 2000 residents in the area (Cyclopedia Company Ltd, 1906). The settlement was initially named Barryville after a particularly respectable miner who was among the party that first discovered gold in the area (Grey River Argus, 1880d). Later contention arose when officials tried to rename the settlement Fosberry, resulting in a petition from the locals to retain its original name in 1880 (Grey River Argus, 1880c). The settlement became known as Barrytown from December that year (Grey River Argus, 1880a). By the beginning of the twentieth century there were 64 permanent residents in the township with 60 more in the wider vicinity, with the town containing a hotel, school, post office, and church (Cyclopedia Company Ltd, 1906) (Figure 5-3).

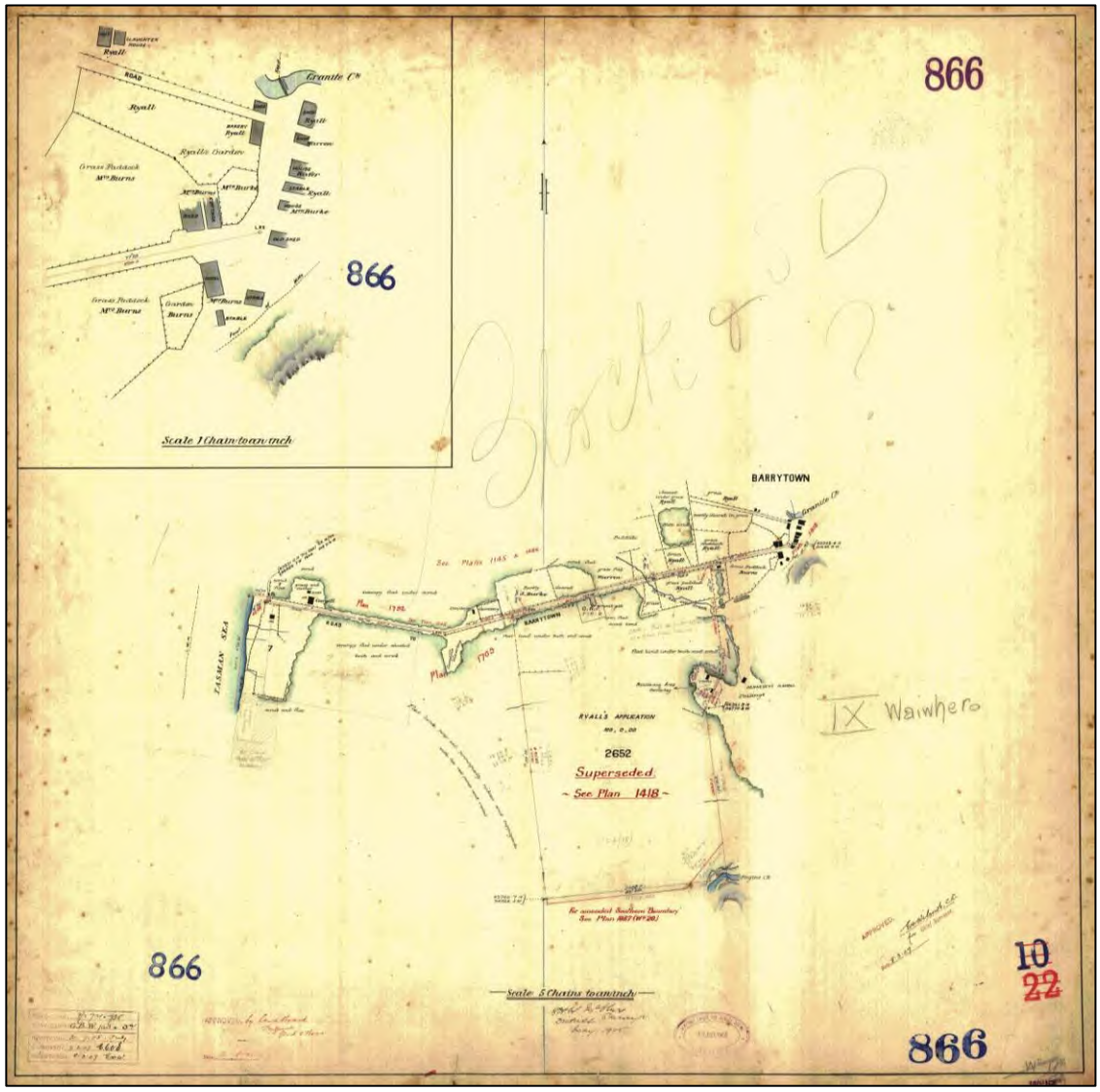

Figure 5-3. Extent of the township in proximity to the project area illustrated in 1907 (SO 866).

5.3 History of the Project Area

The project area is located on the Barrytown Flats on the foreshore of Pakiroa Beach. The Te Tai Poutini Coastal Trail traversed the coastline in the vicinity of the project area. The wetland environment of the project area would have had important mahinga kai and mahinga toi resources for Poutini Ngāi Tahu passing through. Historic sources note copious amounts of harakeke and raupō in the area during the nineteenth century (SO 7873, SO 7948), which are both valued mahinga kai plant sources to Poutini Ngāi Tahu (Tumahai, 2010). Kokopu, koura, and tuna would have been gathered from the streams in the project area, with bird species such as putakitaki and weka found grazing in the wetlands within the project area (Tumahai, 2010).

Following the arrival of Pākehā and the signing of the Arahura Deed, the project area was surveyed as Crown Land, with the project area located in Block V and IX of the Waiwhero Survey District (Mackay, 1860). Early pākehā settlement in the project area was largely transient and associated with the gold rush at Canoe Creek and blacksanding activities along the foreshore (Cyclopedia Company Ltd, 1906). Settlement was primarily focussed along the foreshore with the old coast road running along the western extent of the project area (Figure 5-7). The eastern project area remained as wetland with dense scrub cover until the twentieth century (SO 866, SO 1145, SO 1789). Legal land boundaries were not of significance in early phases with huts and mining activities frequently located in Crown Land (SO 866, SO 3687, S0 7948). The majority of the land parcels in the project area were subdivided in the twentieth century with flax milling, land clearance, and grazing activities taking place (SO 1145, SO 1789, SO 1944).

The largest transformation in the project area occurred from the 1930s after the northern project area was included in the Barrytown Gold Dredging Ltd claim and the southern area in McKechnie's claim (SO 3059, SO 3109). The landscape was permanently altered from 1937 by large scale dredging, with the land being converted back into farms from 1945 (Figure 5-4, Figure 5-5, Figure 5-6, Figure 5-7). Further modification took place with the construction of irrigation ditches, access tracks in the following years with large scale hump and hollowing taking place after 1981 (Retrolens, 1981).

Figure 5-4. Dredging in the southern portion of the project area for the Barrytown dredge in 1936 (West Coast Recollect, 1936).

Figure 5-5. Dredged area (blue line) in the project area (red line) in 1951 (Retrolens, 1951).

Figure 5-6. Barrytown Flats showing dredge ponds and the road along the beach (West Coast Recollect, 1940).

The following sections will detail the history of the project area, and a summary of key events is provided in Table 5-1. Histories have been organised by block in the following sections.

Table 5-1. Summary of key events and land transactions in the project area. Events directly related to archaeological features or deposits are highlighted in blue.

Year	Event	Source
Pre-1860	Māori ara tawhito and nohoanga in use nearby	Te Rūnanga o Ngāi Tahu, 2022
1860	Arahura Deed was signed, project area surveyed as Block V and IX, Waiwhero Survey District	Mackay, 1860
Block V Waiwhero, SD		
1880	Education reserve (Res. 1339) subdivided from Block V. Construction on School started.	Grey River Argus 1880b, SO 3687
1881	School opened in Education reserve (Res. 1339)	Grey River Argus 1881
1881	Section 6 (later becomes Section 7, Block V) in the northern corner of the project area is subdivided by this date and occupied by Raymond Poschich, a miner.	SO 3687
1901	Settlement and old water races illustrated along the foreshore adjacent to the school reserve.	SO 7948
1901	James Trent & George Davies apply for Special Claim G.26 along the foreshore from modern section RS2933, crossing Warren Road, to midway up RS 2932.	SO 7948
1905	Cargill has a home, shed, fence in a cleared area at southern edge of project area.	SO 866
1909	Section 2639 surveyed and occupied by D. Dennehy. Dennehy's Drain cutting through vacant land to the west. Warren Road (ID 3700202) formed.	SO 1145
1916	Remaining land subdivided into RS 2931, 2930, 2929, 2928, 2927, 3316, 3255. Road ID 3702892 also surveyed at this time	SO 1944
1934	All the above land parcels, except for RS 3255, are Surveyed as Part of Special Claim G. 157 for C. McKechnie.	SO 3109
1939	School moved from education reserve to a new site outside of the project area.	
1940	Eastern part of section part of Special Claim No G178, Barrytown Gold Dredging Ltd. Described as swampy with bush.	SO 8611
1952	Education reserve (Res. 1339) re-surveyed as Section 4033, Block V Waiwhero.	SO 4574
Block IX Waiwhero SD		
1875	Evan H. Lewis leases section 7, Block IX Waiwhero. The surrounding land is shown to be unsubdivided and owned by the Crown, with road reserves on the northern and western aspects.	SO 3683, SO 3687
1881	E.H. Lewis occupying northern part of property with a claim in the northwestern corner of the site along Cargill Road.	SO 3687
1889	M. Hannah & others shown as having a claim along the foreshore for the extent of the project area	SO 7873
1905	Section 7 occupied by Lewis has a dwelling house and fences in a clearing in the northwestern area of the property.	SO 866
1905	Several claims are shown along the foreshore, including P.(?) Warren and MacKays. However, these appear to not have been occupied but not subdivided.	SO 865
1913	Section 3201 subdivided along Cargil Road, where Cargill's clearing illustrated in 1905 is sectioned off.	SO 1709
1931	Sections 1657 and 1656 to the south are subdivided.	SO 2881
1934	All land in Sections 3201, 1656 and 1657 are surveyed as part of Special Claim G. 157 for C. McKechnie. The eastern portion of Section 7 is included in Special Claim G. 157. The western portion is not part of the claim and becomes Part Section 5 Block IX Waiwhero.	SO 3109

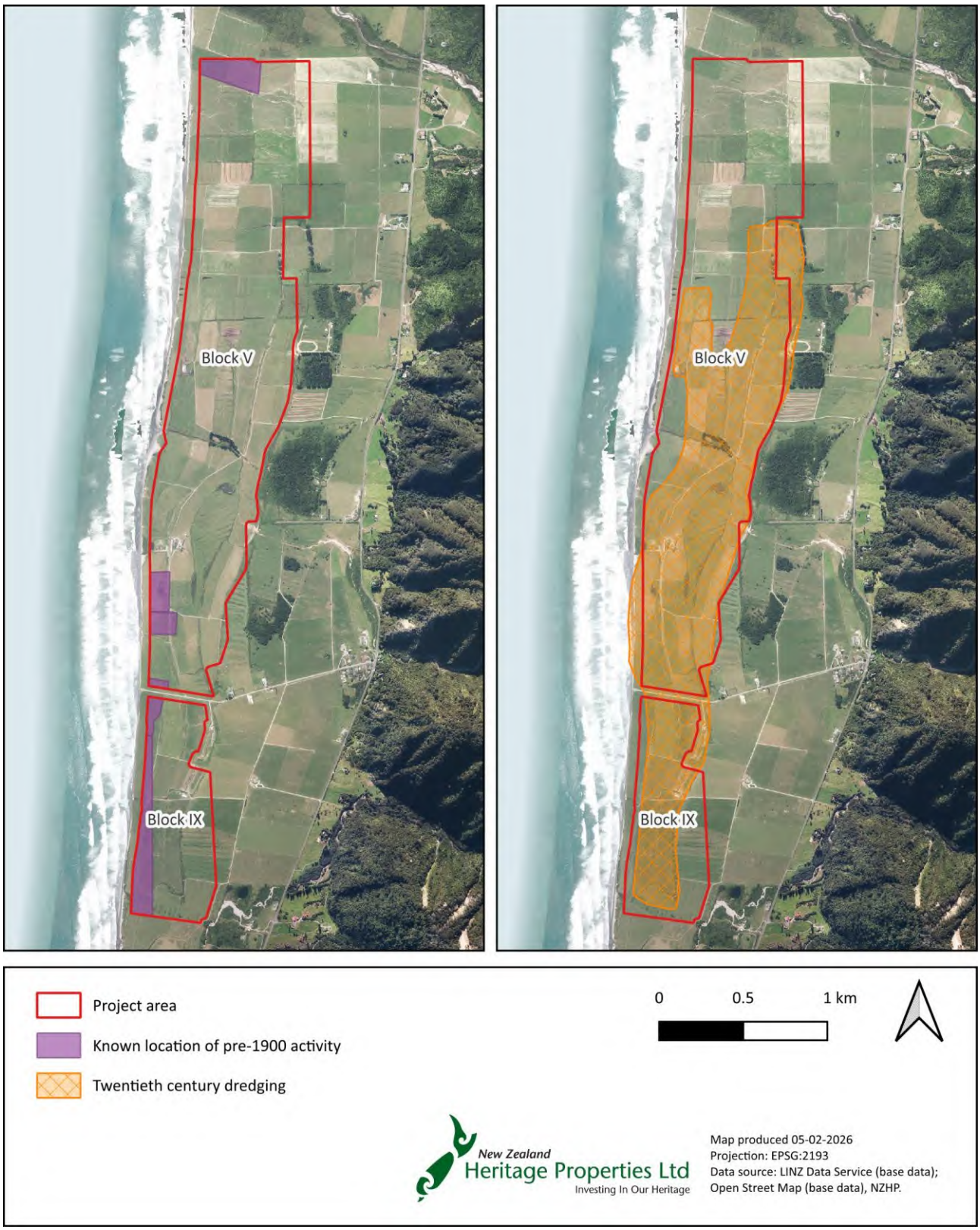

Figure 5-7.The known location of historically recorded pre-1900 activity (left). Twentieth century dredging within the project area (right). Dredge shapefile supplied by the client.

5.3.1 Block V Waiwhero Survey District

The section of the project area to the north of Cargill Road was originally part of Block V Waiwhero Survey District. Pre-1900 occupation occurred at the northern end of the block, at the southern end of the block adjacent to Cargill Road, and in an education reserve just north of Cargill Road (Table 5-1). As mining activities were taking place in the vicinity, such as the early Canoe Creek claims which extend into the northern project area, it is possible

that transient mining occupation, or other associated activities, were taking place within the project area prior to 1900 for which there is little information in the historical record.

The first school in Barrytown was located on the foreshore, approximately 310m north of Cargill's Road (Figure 5-8, Figure 5-9). Construction began in 1880 with the school opening in 1881 (Grey River Argus, 1880b, 1881). From later photos, the school appears to be a single room timber structure with an A-frame roof and sash windows, with a lean-to on its northern end (Figure 5-8). The opening of the school was considered an important milestone within the Barrytown community with one local remarking '*…it was quite a treat to see boys and girls wending their way to the seat of knowledge, instead of roaming about the bush as they did formerly'* (Grey River Argus, 1881).

By 1881, the land south of Canoe Creek, including at the northern aspect of the project area, was occupied by Raymond Poschich (SO 3687, Figure 5-9). Poschich was listed as living in Canoe Creek in the 1878 electoral roll (Grey River Argus, 1878) and along with his sons, was involved with gold mining in the area with several claims and mentions of water races and dams involved with their workings (Grey River Argus, 1881, 1885). Section 7, Block V, was still under the occupation of the Poschich family by 1916, with landscape changes seen in the form of a lagoon crossing into the section (SO 1944).

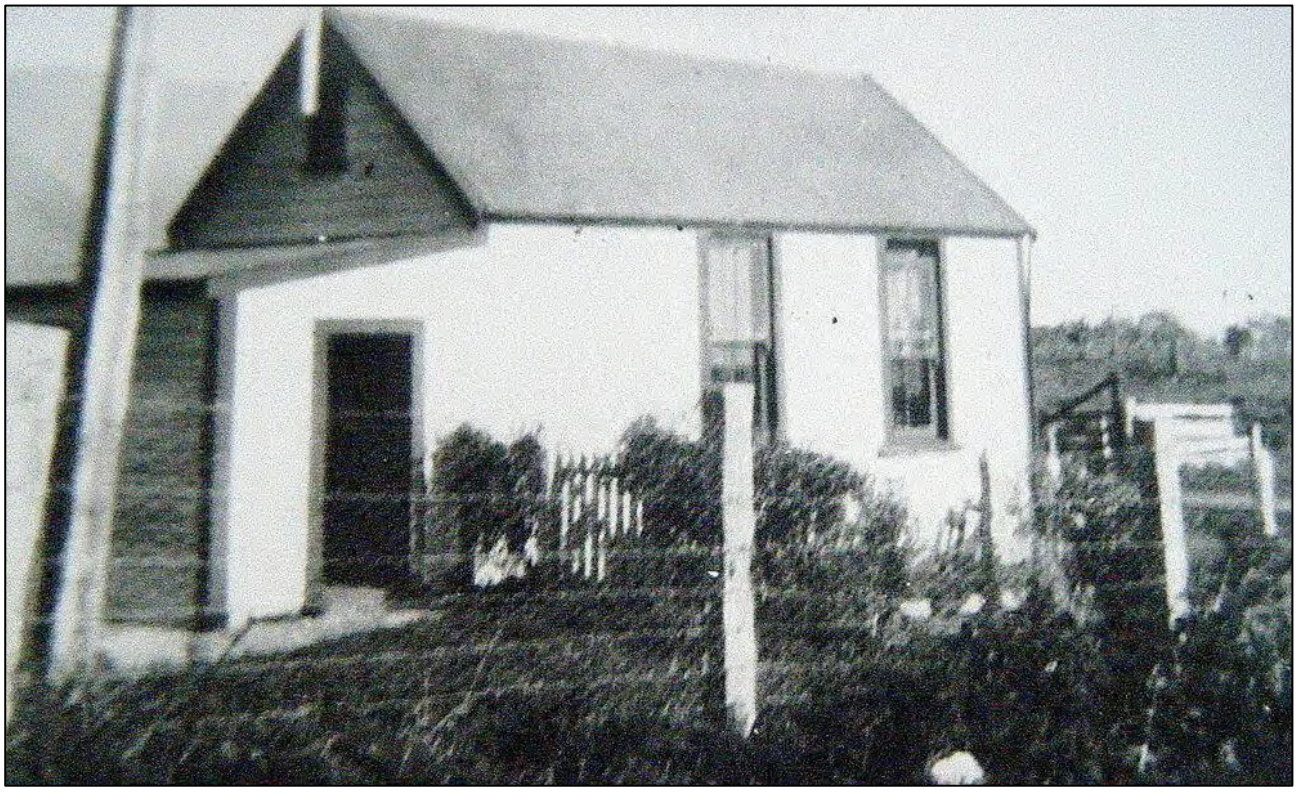

Figure 5-8. Barrytown School, situated in the education reserve Block V, in 1917 (West Coast New Zealand History, 1917).

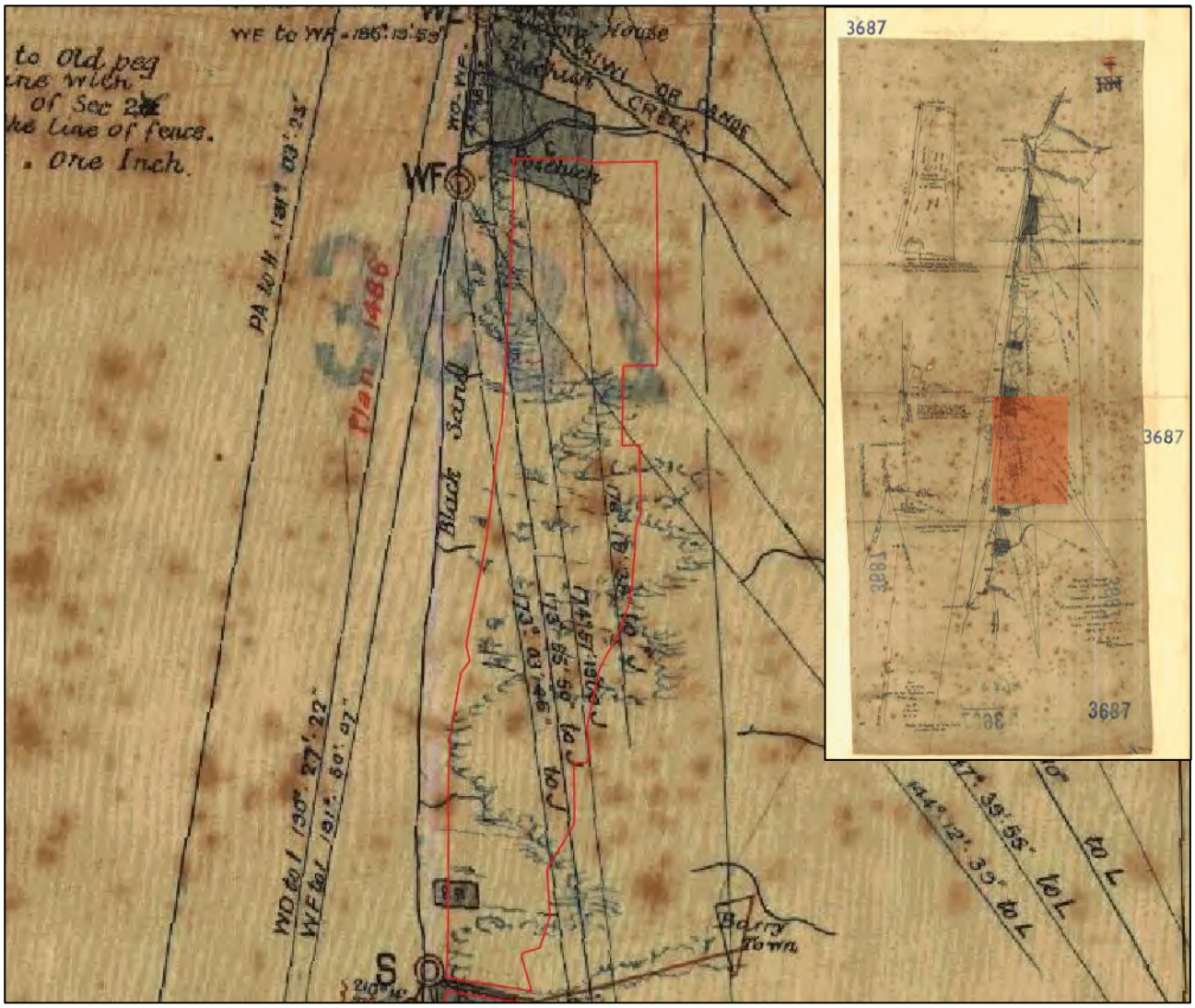

Figure 5-9. Claims of Poschich (north) in Section 6, and the education reserve in Block V, Waiwhero SD in 1881 (SO 3687). Approximate extent of PA in Block V outlined in red.

Additional pre-1900 activity in Block V was recorded outside of the formal land divisions. A 1901 survey plan of Special Claim G.26 shows a small mining settlement just north of the education reserve with a hut and several water races (SO 7948, Figure 5-10). A hut on the foreshore is labelled as being occupied by 'Millar', as well as two water races, one belonging to Cargill, both labelled as being 'old' (Figure 5-10). The identity of Millar could not be established; however, it is highly likely that these features were present prior to 1900. Peter Cargill was recorded to be living at Seventeen Mile Beach and working as a miner by 1878 (Ancestry.com, 1878). A 1905 survey map shows he had a house, shed, and fence in a cleared area to the north of Cargills Road (SO 866, Figure 5-11). The surrounding land is shown to be swampy flat under flax.

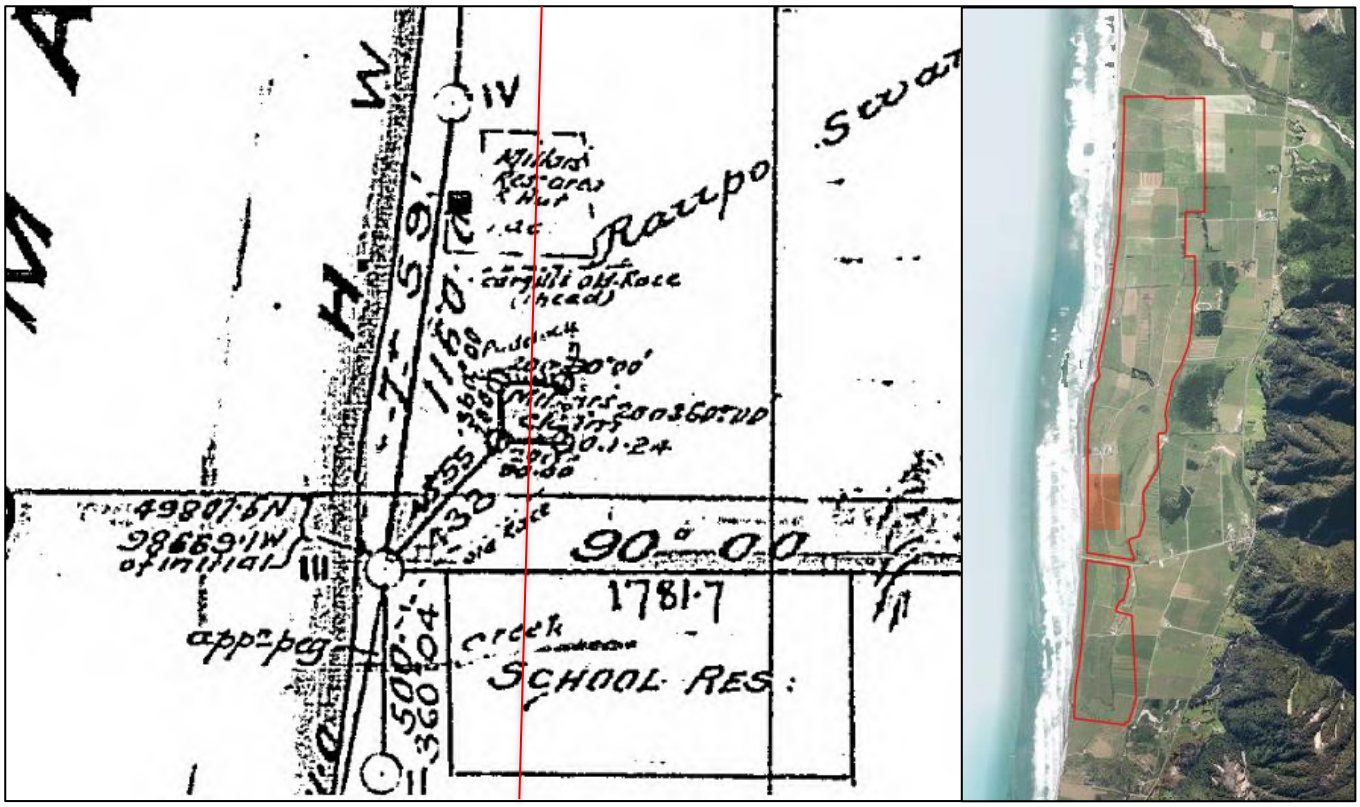

Figure 5-10. The small mining settlement adjacent to the school (SO 7948). Approximate western border of the project area in red. Location indicated in inset of the PA.

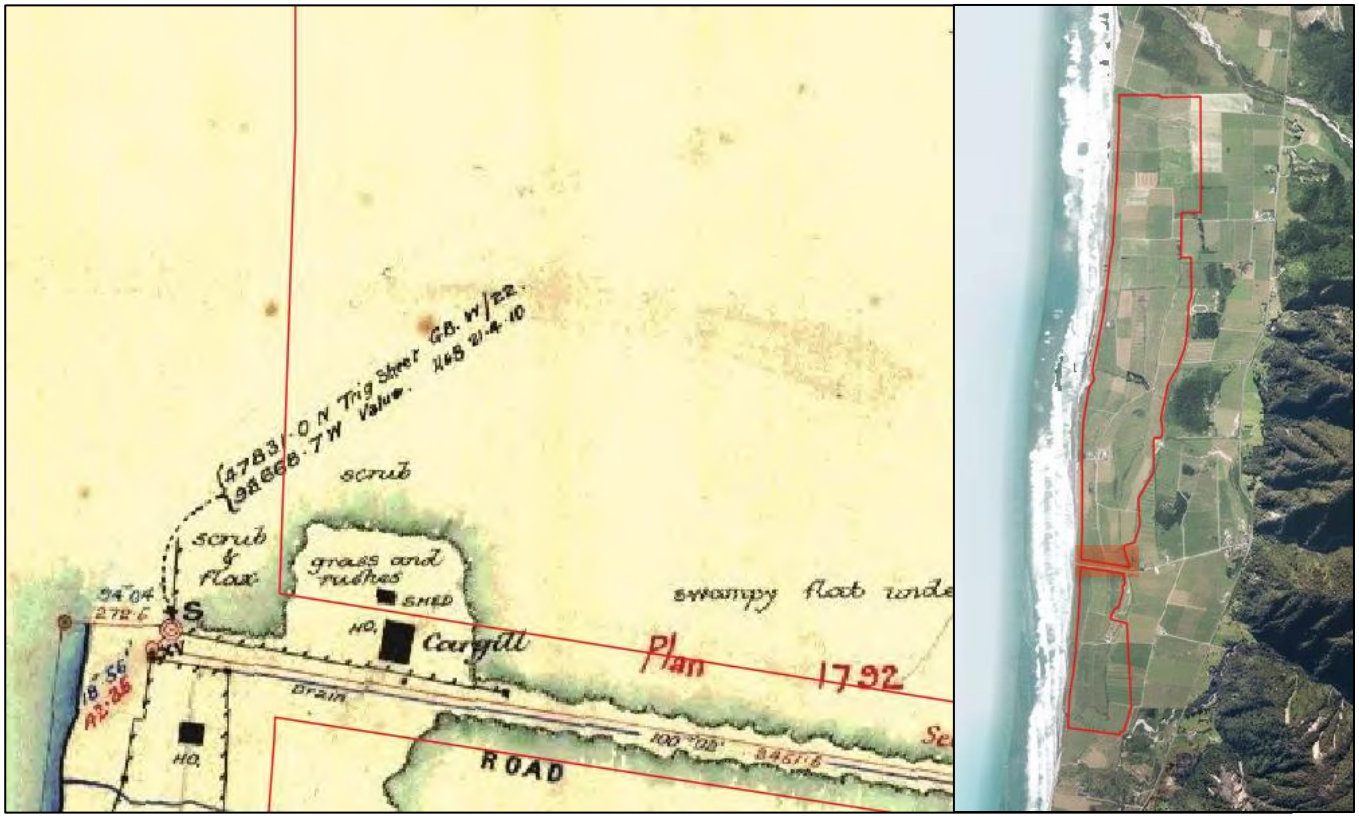

Figure 5-11. Cargill's house and shed just to the north of Cargill Road in 1905 (SO 866) Project area in red. Location indicated in inset of the PA.

The rest of Block V, Waiwhero District was subdivided in the early twentieth century. Section 2639 was surveyed in 1909 and occupied by Dennehy who was undertaking flax milling in Barrytown from 1903 (West Coast Times,

1903). He excavated a drain to the west through what would become RS 2932, to drain the swampy land to gather flax (Greymouth Evening Star, 1914). The initial track, underlying the modern Warren Road (Road ID 3700202) was created to transport flax from the harvesting areas to the mill in Barrytown (Grey River Argus, 1924). The remaining land parcels and road reserves were surveyed to their modern appellations in 1916 (SO 1944), prior to being incorporated into C. McKechnie's Special Claim G. 157 in 1934 (SO 3109). The northern sections of the project area, previously occupied by Poschich, were included as part of Special Claim No G178, Barrytown Gold Dredging Ltd in 1940.

The school was relocated to the eastern end of Cargill Street in 1939 after the old school became too small (Greymouth Evening Star, 1939). Additionally, the surrounding land was surveyed as part of Special Claim G.157 in 1934, with widescale dredging activities taking place around the school thereafter. The old school site was surveyed as Section 4033, Block V, Waiwhero SD in 1952. Although the section was not originally part of Special Claim G.157, 1950s aerials indicate dredging activity across the section (Retrolens, 1951). In the aerials only the foreshore to the west, outside of the project area remains intact and there is no indication of a surviving school building on the site (Figure 5-12).

Figure 5-12. Education reserve (red rectangle) within the dredged zone in 1951 (Retrolens, 1951). The yellow rectangle indicates the dredged area which once contained the small mining settlement adjacent to the school.

5.3.2 Block IX Waiwhero Survey District – encompassing Lot 1 DP 406050, Part Section 5, Block IX Waiwhero SD

The section of the project area to the south of Cargill Road was originally part of Block IX Waiwhero Survey District. Pre-1900 settlement in the project area was centred along Seventeen Mile Beach, with several special

claims and dwellings established along the coast (Figure 5-13, Figure 5-14). The surrounding land moving inland was described as a mix of swampy flat under stunted bush and shrub, and flat land with poor soil, with nikau, supplejack, with a few rimu and rata (Figure 5-14).

Evan H. Lewis had a claim in the northwestern corner of Block IX by 1881 fronting Cargill Road which was subdivided off to become Section 7, Block IX, Waiwhero Survey District (later became Part Section 5) (Figure 5-13). By 1905, Lewis had a cleared section with a dwelling house and fencing just outside of the project area (Figure 5-14). M. Hannah & others had a claim along the foreshore, which had been transferred to Warren and Mackay by 1905, however the land was not further subdivided at this time (Figure 5-15).

Most of Block IX Waiwhero encompassed by the project area was included as part of the Special Claim G.157 for C. McKechnie in 1934 (SO 3109), with the exception of the southern extent which was originally part of McIlroy's claim and the parcel encompassed by Part Section 5, Block IX Waiwhero SD, which was the eastern portion of Lewis' original claim.

Figure 5-13. Claims of E.H. Lewis (Section 7) in Block IX, Waiwhero SD in 1881 (SO 3687). Extent of PA in Block IX outlined in red.

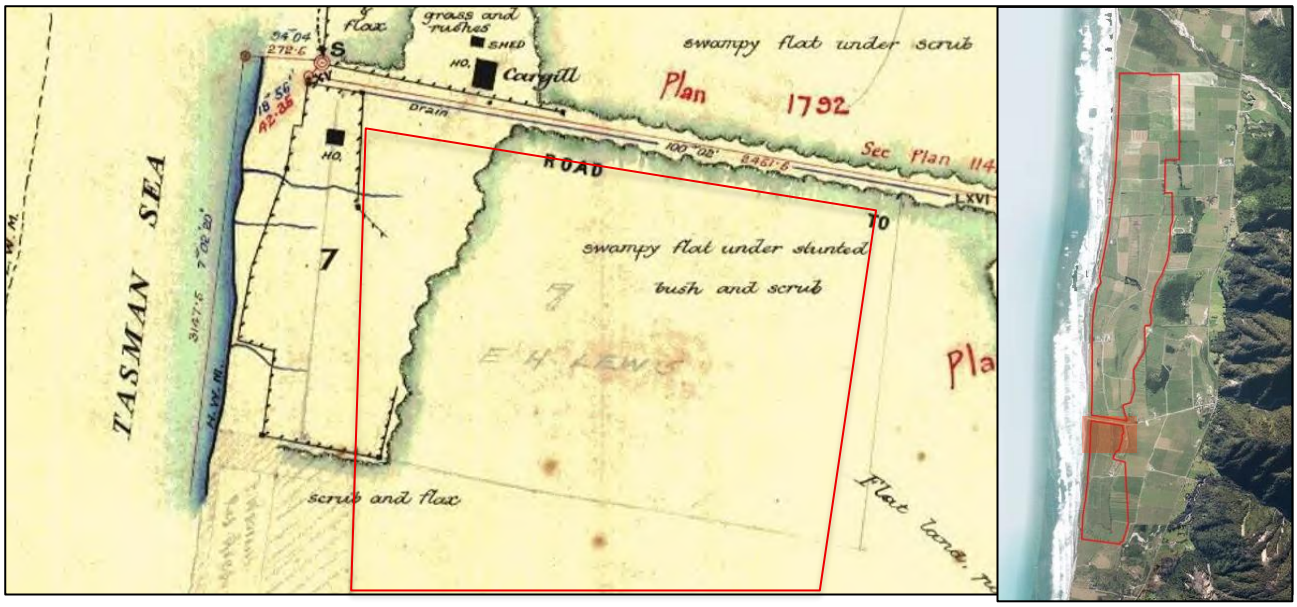

Figure 5-14. Section 7 occupied by E.H. Lewis in 1905 (SO 866). Approximate project area encompassing Block IX, Waiwhero SD in red.

Figure 5-15. McKay's claim along the western edge (SO 865).

6 Previous Archaeological Investigations and Archaeological Context

This section examines the broader archaeological and heritage context of the project area, considering the previously recorded archaeological sites as well as other archaeological and heritage sites within the vicinity. The locations of previously recorded sites near the project area are detailed in Section 6.2. However, please note that the recorded sites only reflect those identified to date and thus may not be a true representation of the distribution of sites in the area.

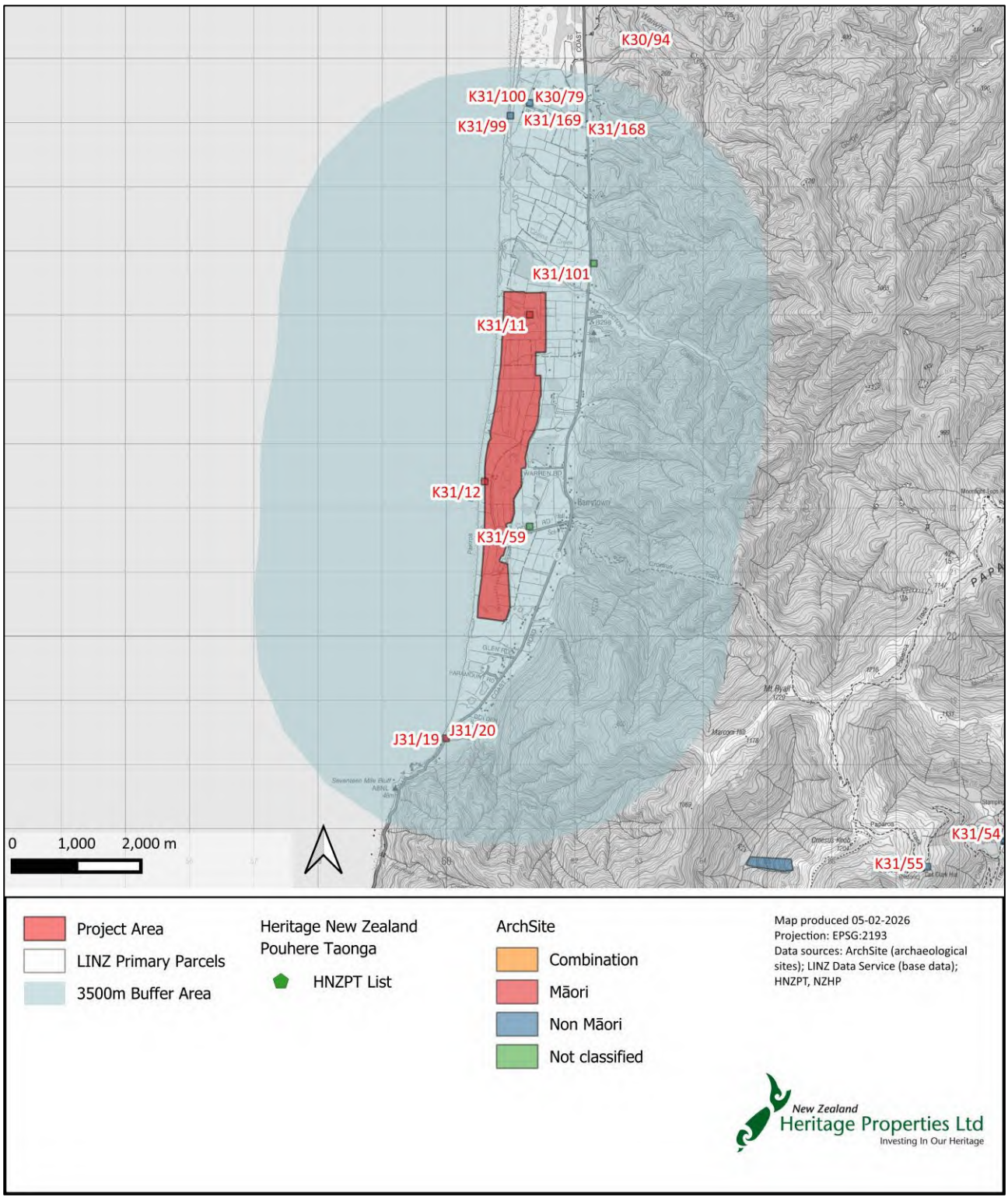

Figure 6-1. Previously recorded archaeological sites within the vicinity of the project area.

6.1 Previous Research and Investigations within the Project Area

There are two archaeological sites recorded within the project area: K31/11 and K31/12. The site records document artefact findspots that were reported in 1981 by a local landowner; neither site has been visited by an archaeologist (Voight, 1981a, 1981b).

Part of a shaped patu and a small greenstone chisel were recorded as K31/11 and a shaped greenstone pendant as K31/12. Additionally, the forms note other pieces of greenstone pebbles from Canoe Creek to Cargill Road (Voight, 1981a, 1981b). Both sites were described as located along the beach. K31/11 is located in the northern part of the project area, to the south of Canoe Creek. The site has been recorded inland, which does not match the description on the context form. The second find spot, K31/12, is further to the south in proximity to Warren Road. The presence of these findspots on the beach suggests that they may have eroded out of the foreshore and therefore increases the potential for other material to be present in the area.

There is no evidence to suggest that archaeological investigations have previously taken place in the project area.

6.2 The Wider Archaeological Context

There are nine recorded sites within a 3.5km radius of the project area (Table 6-1) (Figure 6-1). Only two sites are directly associated with Māori occupation, with two midden/oven site types (J31/19, J31/20) recorded to the south of the project area. The other seven sites are three mining-gold site types, three historic-domestic sites associated with gold mining occupation, and one burial/ cemetery.

It must be noted that these only represent the extent of recorded archaeology and are not representative of the full extent of possible archaeological remains in the area. Just 5km to the north of the project area where extensive surveys were carried out in 1977 and 1990, a large number of archaeological features associated with Māori occupation were encountered including midden, stone working areas, fireplaces, find spots, pits, terraces, and a cave shelter (Nichol, 1990). The lack of sites in proximity to the project area is a result of the area not having been previously surveyed and of extensive disturbances rather than a reflection of the distribution of pre-1900 activity. Nichol (1990) argues that that the distribution of sites and findspots in the vicinity of Canoe Creek may suggest the presence of a major unrecorded site in the area, and that the most likely spots for features to be encountered would be along the dune ridges and in the drier areas. Nichol (1990) reasons that due to the large populations inhabiting and traveling through the area it is inevitable that burials will be encountered during any large scale mining work on the Barrytown Flats, however no further evidence has been found to support the presence of burials within the project area.

The midden/oven sites (J31/19, J31/20) were recorded to have eroded out of the dune system at the southern end of Pakiroa Beach. Both noted the presence of mussel and charcoal. The gold mining sites were located to the north of the project area with trenches (K30/79), pits (K31/99), as well as the subsurface remnants of buildings (K31/169) recorded. The hut sites are located to the east of the project area close to Coast Road. The huts have been recorded based on the presence of stone rubble in rectangular arrangements (K31/100, K31/168) and on historical information with further evidence from domestic plant patterning. The cemetery (K31/59) is immediately to the east of the project area; it is noted to largely be derelict with only 21 graves still visible.

Table 6-1. List of recorded archaeological sites within 2.5km radius of the project area

ArchSite	Brief Description	Site Type	Ethnicity
J31/19	Shell midden	Midden/Oven	Māori
J31/20	Midden	Midden/Oven	Māori
K30/79	Curvilinear depression - mining trench	Mining - gold	Non- Māori
K31/100	Hut site	Historic- domestic	Non- Māori
K31/101	Hut sites	Historic- domestic	Non- Māori
K31/168	Possible stone hut site	Historic- domestic	Non- Māori

K31/169	Building remains	Mining - gold	Non- Māori
K31/59	Cemetery	Burial/cemetery	Non- Māori
K31/99	Depressions - possible prospectors' pits	Mining - gold	Non- Māori

6.3 Potential Unrecorded Archaeological Sites

Based on the documentary evidence and previous archaeological investigations in the vicinity, this assessment has identified the possibility of encountering unrecorded artefact find spots, midden/oven, mining-gold, and historic-domestic site types within the project area.

6.3.1 Artefact Find Spots

This assessment has found that unrecorded findspots may be encountered in the project area. Find spots are the only previously recorded site types within the project area. Due to the presence of the nearby ara tawhito, Poutini Ngāi Tahu would have ventured across the project area to procure resources while travelling. Artefacts caches have frequently been found in wetland areas across Aotearoa with highly valuable material often cached for safe-keeping or for functional purposes (Gumbley, Johns, & Law, 2004; Phillips, Johns, & Allen, 2002). Additionally, early Pākehā occupation in the area was transitory with little permanent settlement, there is the possibility of finding discarded artefacts from the early gold miners in the project area.

Across Aotearoa there are 1913 find spots recorded in total with 44 of these being in Te Tai o Poutini. The find spots predominantly record adzes and other lithics, while three record the presence of canoe/waka and one records a glass bottle cache.

6.3.2 Midden/oven Sites

Unrecorded midden/oven sites may be encountered within the project area. Midden/oven sites are common around the coast of Aotearoa with 3477 recorded in Te Waipounamu, 131 of which are found within Te Tai o Poutini. They are the most common site type in the previously surveyed area of the northern Barrytown Flats with just over half of all sites recorded in the area being midden/oven site types. Several have been recorded in proximity to the project area in the coastal dune system. These sites are common throughout coastal New Zealand. It is not surprising that multiple midden sites have been identified on Barrytown Flats and along Pakiroa Beach due to the ara tawhito crossing the project area and the abundant mahinga kai which would have once been present in the area.

6.3.3 Gold Mining Sites

This assessment has determined that there is the potential for encountering unrecorded mining sites. Given that the documentary resources have identified that the project area was occupied by miners with several mining claims within the project area, and that the beach was an area used for blacksanding, there is the potential that mining evidence may be encountered in the project area.

Across Te Waipounamu, there are more than 3800 mining – gold sites and a further 191 sites associated with other forms of mining that have been previous recorded in the ArchSite database. As of December 2024, there were 1721 recorded archaeological sites within Te Tai o Poutini, 810 of which are classified as gold – mining, accounting for 47% of all sites in the district. However, it should be noted that this number will be much higher as this only includes the sites that have been recorded to date. This number does also not consider related sites, such as miner's huts, ancillary structures, etc. which may be classified differently on ArchSite. The previously recorded sites are largely concentrated in Te Tai o Poutini, Central Otago, and in smaller pockets in the Marlborough, Tasman, and Southland Districts. The nature of gold mining sites is varied as features relate to different working aspects of the gold fields and trace chronological differences in mining technology and equipment. For example, many features relate to the storage and movement of water required for sluicing and hydraulic elevating (e.g., water races, reservoirs, ponds, aqueducts, dams), others relate to the physical remains of mining activities (e.g., sluice faces,

tailings, prospecting pits) or the specific equipment and machinery that was utilised (e.g., dredges, stamper batteries, machinery). In addition, there are also often features and materials associated with the domestic lives of miners living near workings (e.g., stone and sod huts, hut floors, artefacts).

6.3.4 Historic-Domestic Sites

This assessment has determined that there is the potential for encountering unrecorded historic-domestic sites. Given that the documentary resources have identified several small huts in the project area as well as indicating that there were many miners blacksanding along the foreshore and squatting nearby, there is the potential that historic-domestic site types may be encountered in the project area.

Historic-domestic sites are common around Aotearoa but underrepresented in Te Tai o Poutini, with 13376 recorded in Te Waipounamu, only 103 of which are found within the West Coast. Recorded historic-domestic sites in the district primarily relate to mining settlements, with small transitory structures such as hut sites and camp sites being the most common historic-domestic site type.

7 Results of the Site Survey

A site visit was carried out on 10 to 12 December 2024 by Bree Wooller and Leah Harding to record the extent and condition of visible archaeology and to identify areas of modification within the project area that may affect the condition of subsurface archaeology (Figure 7-1). Based on the twentieth century history of the site, large extents of the area were dredged as well as heavily modified for agricultural activities. Both activities involved extensive earthworks which would have modified any archaeology that would have been detectable on the surface, although deeper archaeology may still be present. Sample areas of heavy modification were surveyed, to establish the improbability of identifying archaeology through a transect survey, before they were excluded. Areas of known pre-1900 activity were still surveyed regardless of modification. The following section will describe the results of the site survey, documenting the site setting and condition of potential pre-1900 features.

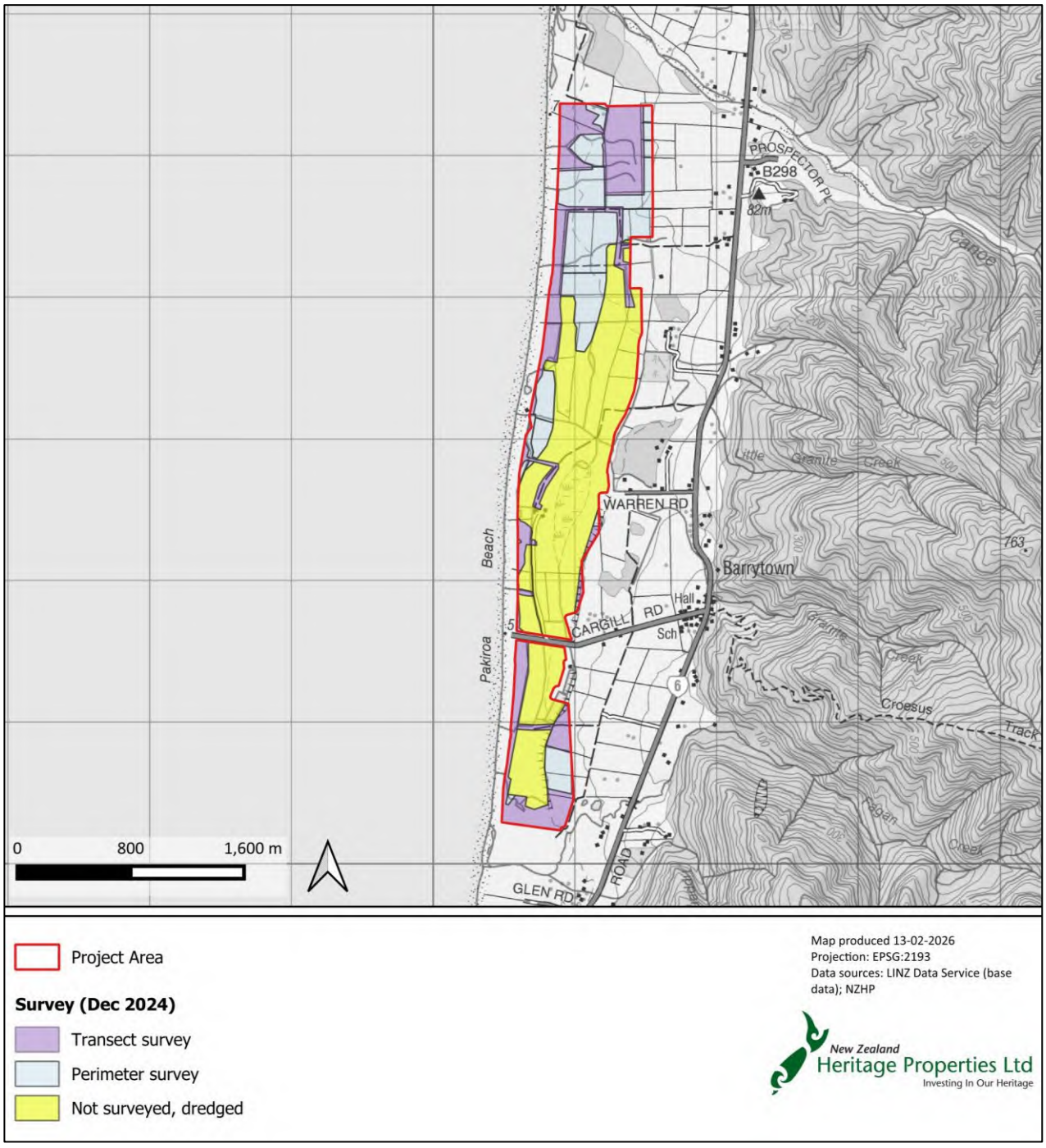

Figure 7-1. Map of project area showing areas surveyed. A map of the transects walked is provided in Appendix A.

7.1 Setting

The project area is situated to the west of the settlement of Barrytown on the flats adjacent to Pakiroa Beach (Seventeen Mile Beach). The land is primarily used for farming and consists of fenced paddocks, with access ways, and drainage ditches transecting the landscape.

The site survey found a large portion of the surface area has previously been disturbed through ploughing, dredging, and hump and hollowing (Figure 7-2). Approximately a third of the project area had been humped and hollowed. In the hollows the deposits were waterlogged and boggy, and at times were overgrown with foliage (Figure 7-3). A large portion of the project area has previously been dredged. A sample of dredged sections were transacted; the terrain was undulating, boggy, and covered in tussock and short grasses.

The terrain and foliage cover varied across the project area. Numerous creeks and tributaries criss-cross the landscape, resulting in large swaths of uneven, boggy terrain covered in long 300-500mm grass and tussocks (Figure 7-4). Some areas were waterlogged to the extent that they were not traversable. Elsewhere the terrain was gently undulating to flat and covered with short tussocky grass (Figure 7-4, Figure 7-5). Some fields appeared to have been extensively grazed and heavily rutted by stock, while others had deep plough lines. No evidence of pre-1900 material was visible in the surveyed disturbed areas.

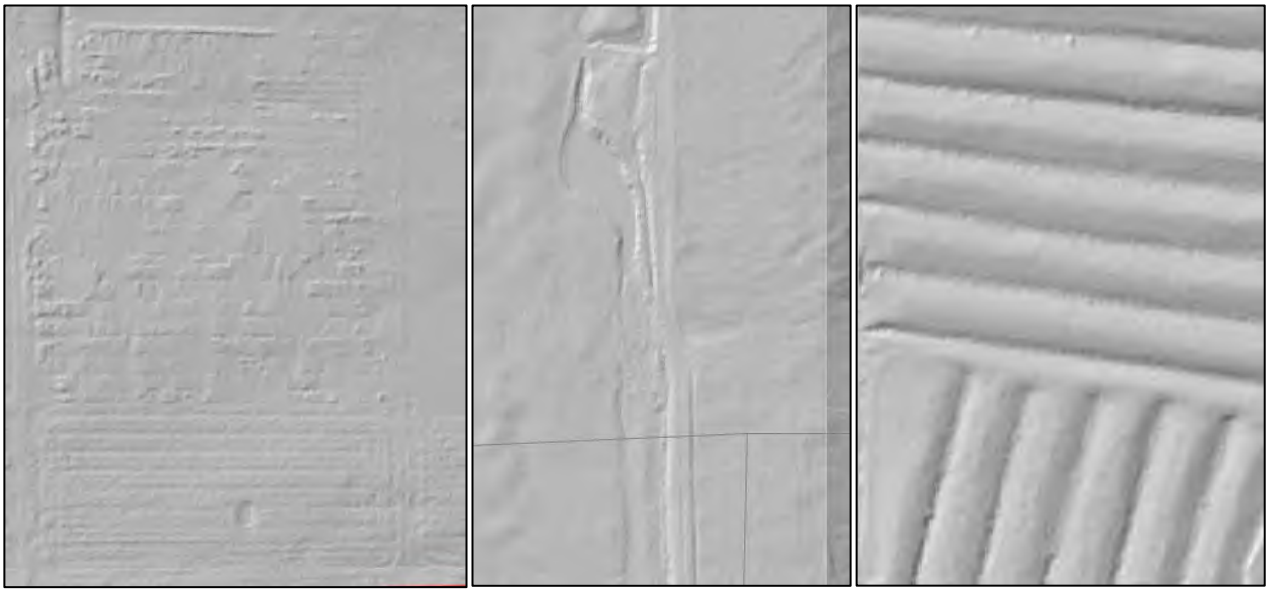

Figure 7-2. Ploughing (left), dredging (centre), and hump and hollowing (right) in the project area as seen in the LiDAR imagery.

Figure 7-3. Hump and hollowing in the eastern fields, looking northeast (Wooller, 2024).

Figure 7-4. Tributaries in RS 2927, looking north. Note the tussocky grass in the foreground and the grazed pasture in the background (Wooller, 2024).

Figure 7-5. Foreshore with cobbled beach, looking south (Wooller, 2024).

Figure 7-6. Eroded bank along the foreshore adjacent to Lot 5, looking east, scale bar = 500mm (Wooller, 2024).

7.2 Results

Three points of interest (POI) were identified and recorded during the pedestrian survey of the project area, while the recorded locations of the archaeological sites (K31/11 and K31/12) were revisited with no evidence of archaeology found. The following sections will discuss the survey results by historic block.

7.2.1 Block V Waiwhero Survey District

No archaeological features or material was found in Block V, Waiwhero District. The locations of known activity and recorded archaeological site were revisited and are discussed below.

7.2.1.1 Find Spot K31/11

No evidence of archaeological features or deposits were found in the recorded location of K31/11. The findspot is located in a boggy paddock between two creeks with small tributaries crossing through the vicinity of the

recorded archaeological site (Figure 7-7). The surface was covered in long tussocky grass that obscured the surface; however, sections of eroded creek and stock rutting showed no evidence of archaeological material. A survey of the LiDAR imagery and aerials show no evidence of archaeological features in the vicinity (Figure 7-8).

Figure 7-7. Vicinity of K31/11, looking west (Harding, 2024).

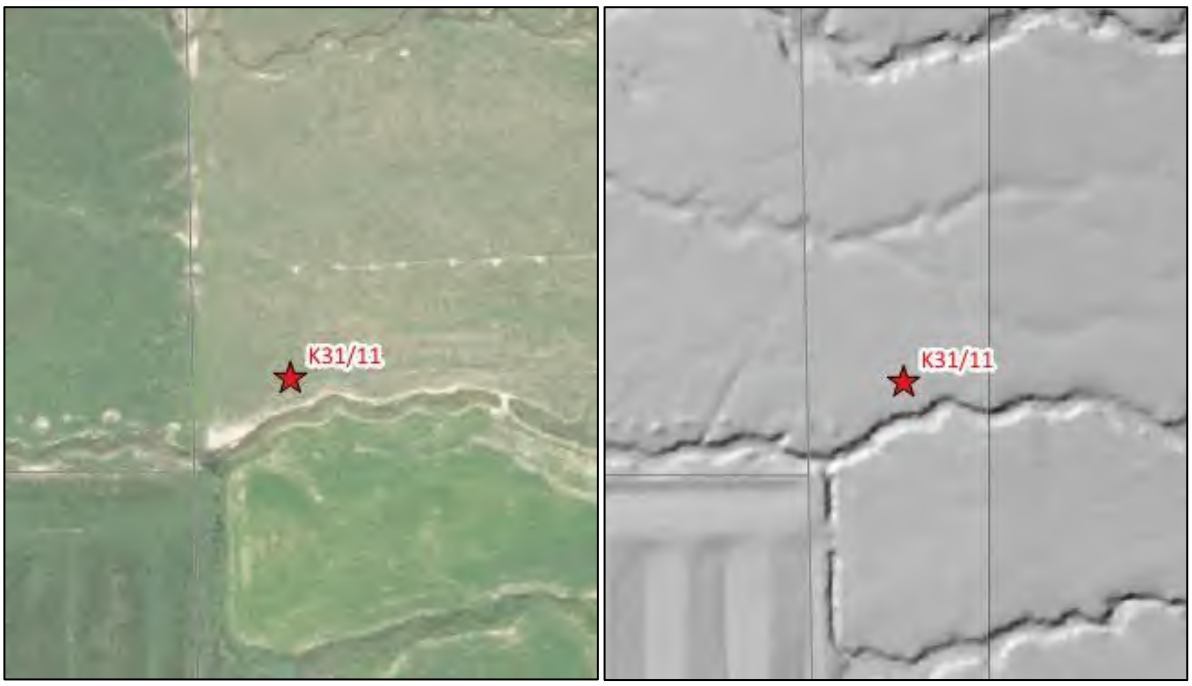

Figure 7-8. Modern aerial (left) and LiDAR imagery (right) showing the approximate location of K31/11. Note the site location is an approximation based on an oral account.

7.2.1.2 Find spot K31/12

No evidence of archaeological features or deposits were found in the recorded location of K31/12. The findspot is on the margin of the dredged zone, with only a small coastal strip and a section of wetland which had not been

dredged. Harakeke, umbrella sedge, and tussock were growing along the foreshore, while the shoreline was covered in cobbles, so visibility was poor (Figure 7-9, Figure 7-10). A survey of the LiDAR imagery and aerials show no evidence of archaeological features in the vicinity (Figure 7-11).

Figure 7-9. Foreshore in proximity of findspot K31/12, that has not been dredged, looking north (Wooller, 2024).

Figure 7-10. Foliage growth and stone coverage in proximity to find spot K31/12. Looking east, scale bar 500mm (Wooller, 2024).

Figure 7-11. The vicinity of find spot K31/12 shown in the 1951 aerial (left) and the LiDAR imagery (right). Note the site location is an approximation based on an oral account.

7.2.1.3 Poschich's Claim

South of Canoe Creek, gold mining activities were undertaken in the northern part of the project area by 1881. The primary occupant was Raymond Poschich who had several claims in the area with historical sources noting water races and dams in relation to the Poschich's workings in Barrytown Flats. Only the southern edge of Poschich's claim is within the project area. No evidence of archaeological deposits or features associated with Poschich's claim were located within the project area. The area was extensively humped and hollowed, which presumably would have destroyed any archaeological evidence, such as water races or hut sites, within the project area (Figure 7-12). However, depending on the mechanism used, pockets of features may remain under the humps, while find spots relating to his occupation and mining activities may be present subsurface.

Figure 7-12. Hump and hollowing in what was Poschich's Claim. Looking southwest. The extent of the ground disturbance can also be seen on the LiDAR, right (Poschich's claim in purple).

7.2.1.4 Educational Reserve and the Adjacent Mining Settlement

No evidence of archaeological deposits or features were located at the site of the former school, and the pre-1900 settlement consisting of Millar's hut and Cargill's water races. The area was recorded to have been previously

dredged, and this was supported by the survey results (Figure 7-13, Figure 7-14). The surveyed area was gently undulating, likely the result of redeposited dredge material. The boundary between the dredged zone and the coastal margin was not visible. An irrigation channel ran along the southern perimeter. The field had been ploughed previously, and although there was modern concrete chunks and metal noted along the coastal margin, there was no evidence of pre-1900 material relating to the school on the property.

Figure 7-13. Looking northwest across the former Educational Reserve (Wooller, 2024).

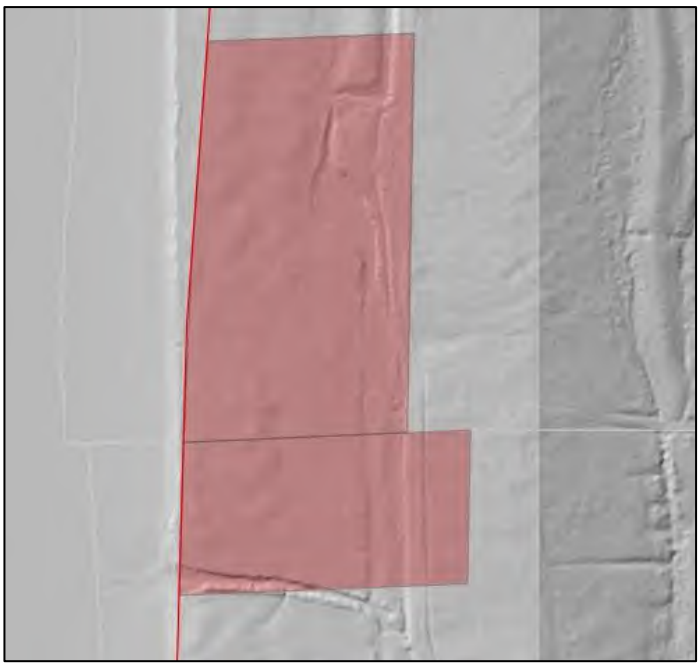

Figure 7-14. LiDAR imagery showing the area of pre-1900 activity (red) as dredged.

7.2.1.5 Cargill's Hut Site

No definite evidence of archaeological deposits or features were located at Cargill's hut site. However, the site visit noted that the boundary of the dredging appeared to be further to the east than previously thought, indicating that subsurface remains relating to Cargill's settlement may be present within the project area. Based on historic plans,

the hut site appears to be just outside the project area; however, potential remains for posts or foundations relating to out buildings including the shed, fence posts, or artefacts relating to Cargill's occupation (Figure 5-11). A large cluster of arum lilies were observed just outside the project area in this location. The plants were of interest as arum lilies were not noted elsewhere on the survey and were a common ornamental garden plant favoured by early European settlers in New Zealand. A discrete cluster may be indicative of historic planting.

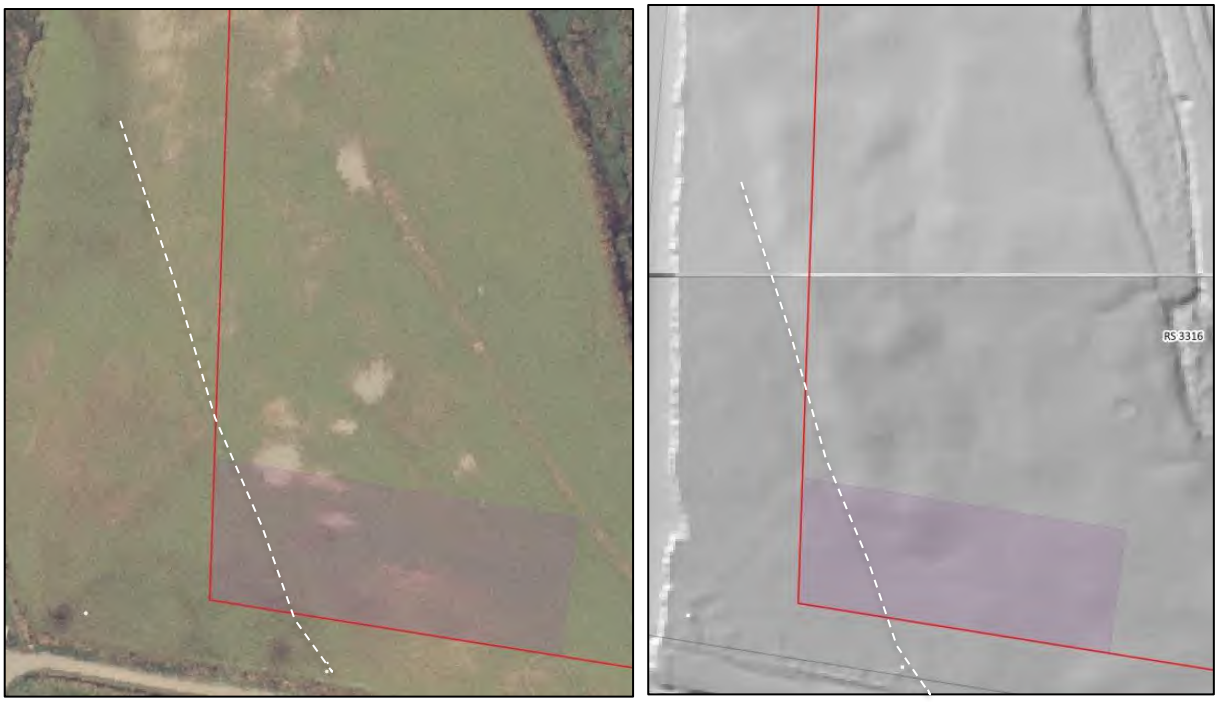

Figure 7-15. The location of Cargill's settlement (purple) and the suspected edge of dredging (white dotted line), pictured overlaying the 1981 aerial (left)and the LiDAR imagery (right).

Figure 7-16. Arum lily patch, looking west (Wooller, 2024).

7.2.1.6 Dune Ridge System (POI 001-002)

Along the foreshore in the northwestern corner of RS 2932, there are two high ridge formations within the project area which appear to have been a somewhat unmodified part of the original dune landscape (Figure 7-17, Figure 7-18, Figure 7-19). However, a drain and a pond were excavated directly to the east of the ridges sometime between 1951 and 1981 (Retrolens, 1951, 1981) and there is the possibility the ridges are formed from the spoil from the drain (Figure 7-20). This could not be de determined from aerial imagery or historic photos of Barrytown Flats.

If the ridges were dune formations they would be of interest as they may have formed a high point in the surrounding wetland environment, making them a prime spot for a nohoanga for manawhenua travelling up and down the coastline. The dunes are approximately 870m north of the findspot K31/12. However, the landscape to the south of the dunes has been highly modified by the excavation of Dennehy's drain in the early twentieth century, dredging, and then hump and hollowing. The dunes appear to be denser and more compact than the terrain of surrounding paddock which was boggy and heavily rutted from livestock. The area was planted in short grass. The high dune ridges stretch along an extent of approximately 300m, while smaller dunes continue north for a further 200m.

Figure 7-17. Looking north across the ridges (Harding, 2024).

Figure 7-18. Undulating slope looking northwest (Harding, 2024).

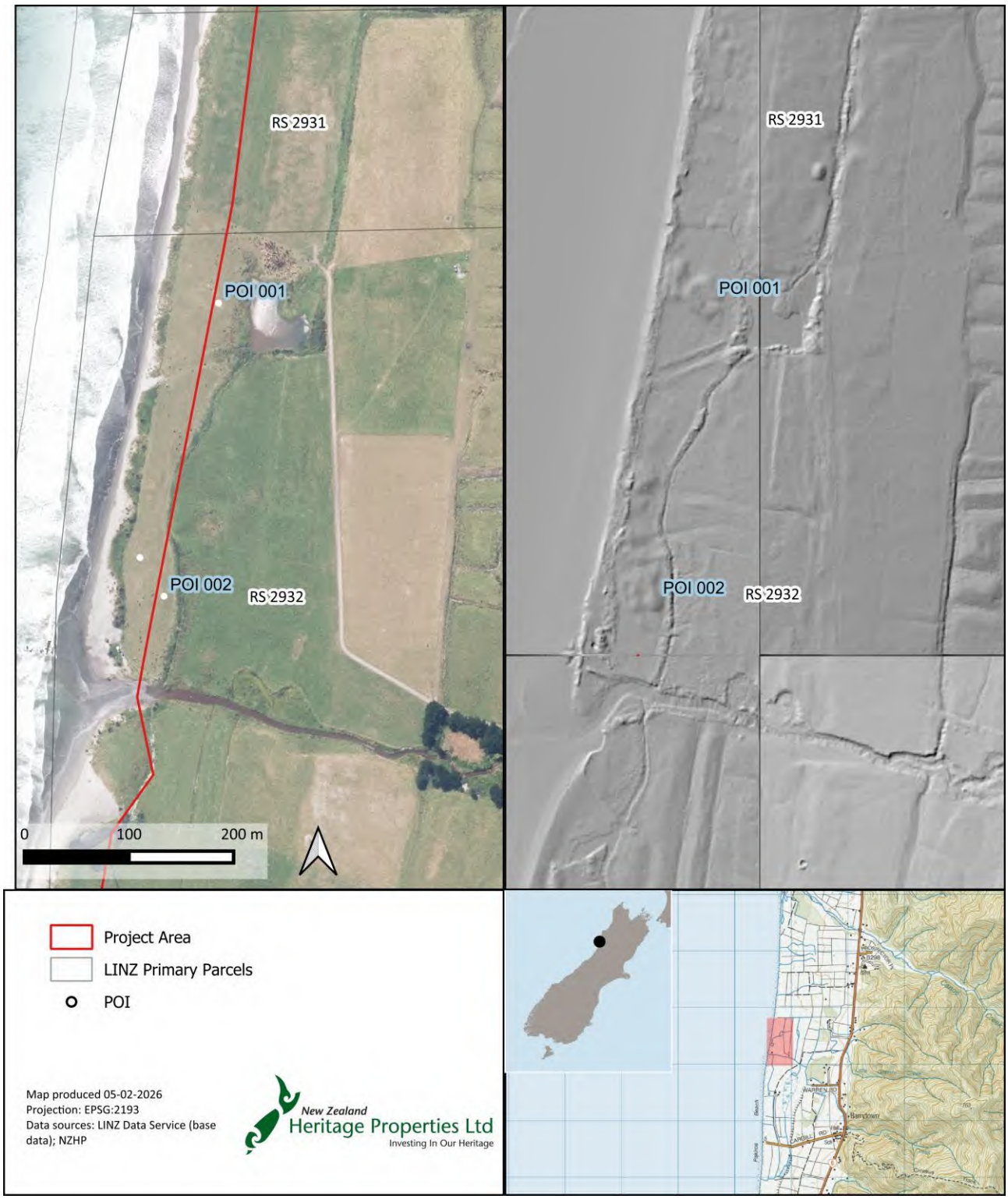

Figure 7-19. Points of interest in relation to modern property boundaries and as shown on shown on LiDAR imagery just within the project area

Figure 7-20. Aerial imagery 1951 (left) and 1981 (right). Ridge areas circled in red (Retrolens, 1951, 1981).

7.2.2 Block IX Waiwhero Survey District

No archaeological features or material was found in Block IX, Waiwhero District. One suspected archaeological feature, a drystone structure (POI 003) was identified. The locations of known activity were revisited and are discussed below.

7.2.2.1 Cargill Road Drystone Structure (POI 003)

Beneath Cargill's Road on its southern aspect the remnants of a stacked drystone masonry structure are visible (Figure 7-21). The feature consists of two walls extending up from the ditch and extending into the road reserve. Although the project area has a twenty-metre setback from Cargill Road and the drystone feature, the feature might inadvertently by modified by the creation of the Cargill Road bund, by vibrations, or dust accumulation.

Figure 7-21. Stacked drystone structure beneath Cargill Road (Wooller, 2024).

7.2.2.2 Lewis' Claim

No evidence of archaeological deposits or features were located at the site of Lewis' mining claim (Part Section 5, Block IX Waiwhero SD). The survey indicated that the project area intersecting with the historic claim had been heavily disturbed by hump and hollowing, and this was supported by LiDAR results (Figure 7-22). The surveyed area had regular flattened humps running east-west, with marshy hollows draining into an irrigation channel at the edge of the dredge zone. The margin between the disturbed area and the undisturbed coastal strip was clear, however, only the disturbed zone is within the project area.

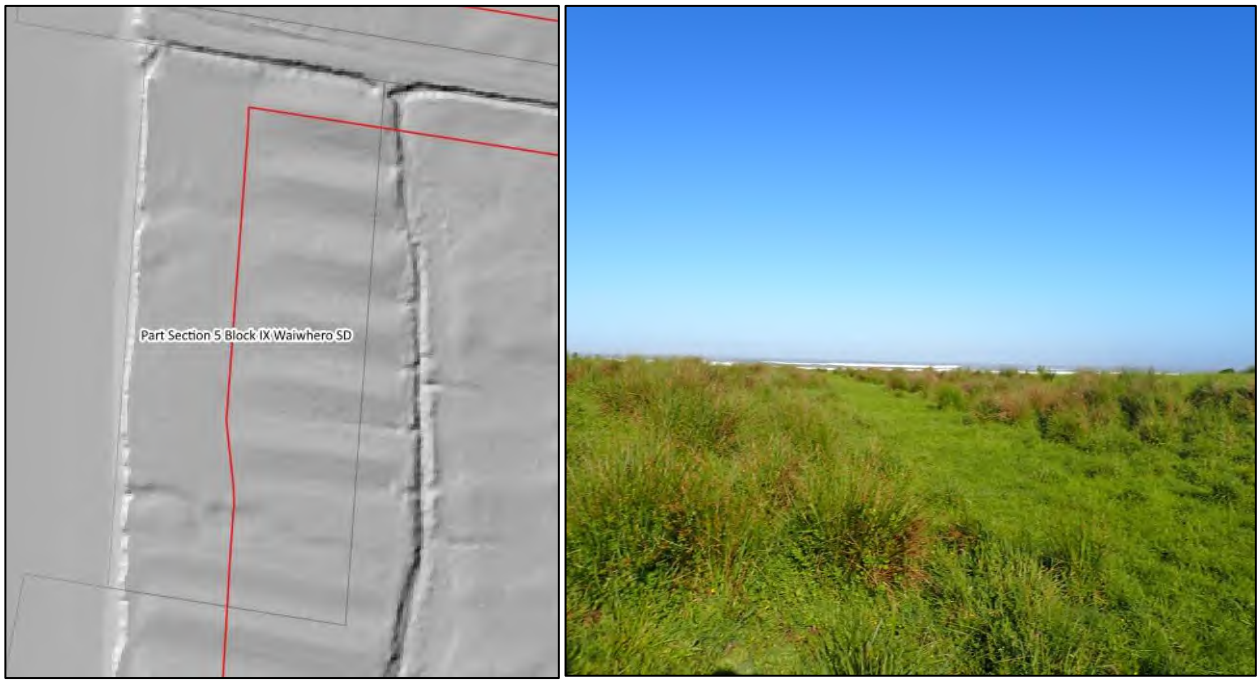

Figure 7-22. The eastern edge of Lewis' Claim shown to be humped and hollowed in the LiDAR data (left) and during the survey, looking west (right). The red line indicates the project area boundary.

7.2.2.3 Hannah's Claim

No evidence of archaeological deposits or features were located at the site of Hannah's mining claim (Lot 1 DP 406050, Block IX Waiwhero SD). The survey indicated that the project area intersecting with the historic claim had been heavily disturbed by dredging initially, then hump and hollowing (Figure 7-23, Figure 7-24). The extent of modern disturbance was supported by LiDAR results (Figure 7-24). The surveyed area had marshy undulating ground, associated with the dredging and overgrown waterways in the artificial linear hollows. The humped areas were narrow and steep forming dry high points running north south along the foreshore and along the southern edge of the dredge zone. The southwestern corner had modern irrigation channels excavated parallel to the foreshore but otherwise appears undisturbed. Likewise, a paddock along the western edge is recorded to have been on the margin of the dredge zone, however the site visit identified this area to be less undulating than the surrounding land and may have been undisturbed. This was also observed in the LiDAR imagery (Figure 7-24).

Figure 7-23. Hump and hollowing within Hannah's claim, looking southeast (Wooller, 2024).

Figure 7-24. LiDAR imagery of the project area (left). The red line indicates the project area, and the yellow dotted line is the eastern side of Hannah's claim. The southwestern corner of the project area (right), with irrigation channel running through. Looking south (Wooller, 2024).

8 Research Results

The historical and archaeological research, as well as the results of the archaeological survey, indicate that there is a high potential that pre-1900 archaeological features and deposits survive within the project area and will be impacted by the proposed works. Encountered archaeology will be associated with artefact find spots, midden/oven sites, mining-gold sites, and/or historic domestic sites.

Prior to Pākehā arrival in the area, the coastline was traversed by manawhenua travelling along an ara tawhito, with the dune ridges in the project area possible sites of nohoanga as well as mahinga toi and mahinga kai within the wetland inland area. During the survey the recorded locations of the two find spots (K31/11 and K31/12) in the project area were revisited and no further material was identified. This is not surprising given that the site locations were recorded based on oral reports from landowners in the 1980s, and the extent of land modifications and farming activities that have taken place since then. The sites of the two find spots (K31/11 and K31/12) are considered destroyed on the basis of the site record forms and the site visit, and they will not be further discussed. The site record forms have been updated to reflect the results of the survey. However, the presence of the findspots in proximity to each other is indicative that there is a high potential other subsurface sites are present in the vicinity. Although the project area has undergone a large amount of surface modification, in situ subsurface areas remain intact outside the dredged area, particularly in the northern project area, and may contain artefacts while the dredged areas may contain redeposited archaeological material. As the proposed works involve intensive earthworks within the project area, including in proximity to the coastal margins and historic wetland areas, **there is reasonable cause to suspect that Māori artefacts will be encountered within the project area.** POI 002 – 003 record what appears to be an area of intact dune surface which may have provided a dry sheltered spot with good visibility of the surrounding landscape and may have been utilised as a nohoanga. This is further supported by the presence of the nearby find spot K31/11, **suggesting there is reasonable cause to suspect Māori archaeology will be encountered and affected by the proposed work** along the western margin of the project area in RS 2932 (Figure 8-1).

Early Pākehā activity within the project area was transient and associated with the gold rush at Canoe Creek, with later beach mining activities taking place along the foreshore of Seventeen-Mile Beach. Early mining claims were recorded in the project area to the south of Canoe Creek in the northern project area (Porschich), and along the foreshore to the south of Cargill Road (Lewis, Hannah, Warren). No evidence of archaeological features or deposits were found during the survey of these areas, with a large amount of modern disturbance recorded. However, small sections of land along the western and southern margins of the project area, within the mining claims, appear relatively undisturbed. The surrounding archaeological landscape indicated that archaeological features such as water races, prospecting pits, and hut sites are located within areas of pre-1900 mining activity, with these not always being visible prior to excavation, so **there is reasonable cause to suspect that archaeology relating to mining may be present across the project area, with a higher chance of encountering these** in discrete patches in the western and southern portions of Lot 1 DP 406050, Block IX, Waiwhero SD (Figure 8-1).

With the development of Barrytown and more permanent occupation in the area there was the construction of a schoolhouse and several dwellings in the project area. The site of the first school was in the project area, however the area has been dredged, and it is unlikely any archaeology remains intact. Settlement at this time was along the foreshore, with the western part of the project area remaining as wetland which was not cleared or drained until well into the twentieth century. Formal subdivision was piecemeal and largely occurred in the twentieth century. However, early beach miners, such as Cargill, were squatting within the project area prior to settlement. Although Cargill's hut site appears to be on the boundary of the dredge zone, his shed and other structures may remain intact. The assessment has determined that **there is reasonable cause to suspect that archaeology related to historic-domestic site types may be present across the project area,** with a higher probability in the southwestern corner of RS 3316 (Figure 8-1).

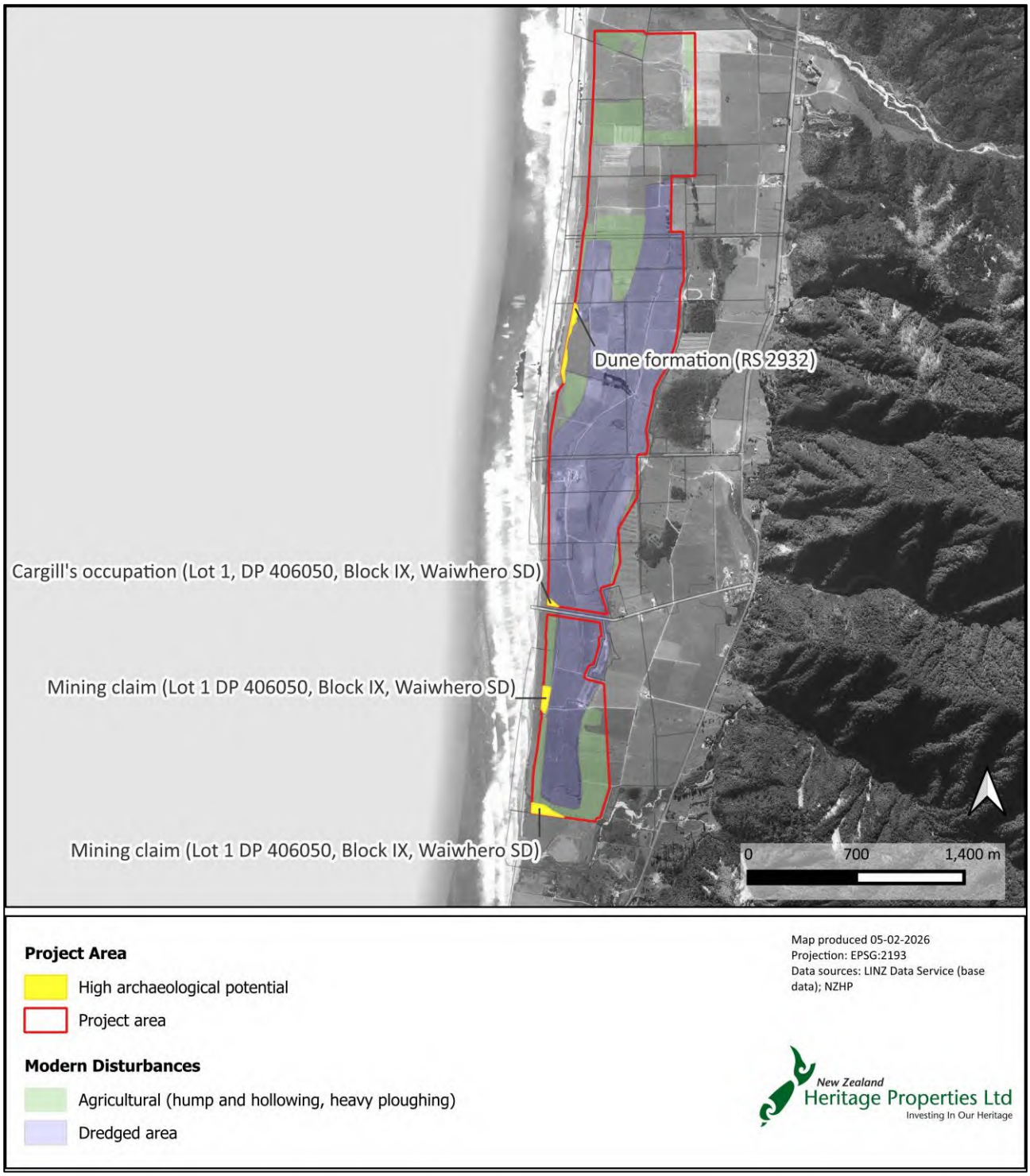

Figure 8-1. High archaeological potential areas and areas of modern disturbance.

8.1 Constraints and Limitations

During documentary research there was a limited number of sources available digitally, this limited the understanding of land transactions and property ownership. However, as most of the occupation was largely transitory during the nineteenth century, the unavailable land transaction data would have added little to the overall understanding of the history of the project area.

The site survey was constrained by a number of factors. Primarily, safe access to survey areas constrained the areas which were able to be transacted. Fields with livestock were not accessed, nor were those with only ponytail fencing separating the livestock from the rest of the paddock. Fields which were deemed to boggy to safely survey, or that

required deep creek crossings, were not accessed. Fields without safe entry points were also not accessed in accordance with NZHP's health and safety regulations. These fields were viewed from an access track or from the fence line. The ground cover in a number of fields had high tussocky grass or other shrub vegetation which limited visibility of archaeological deposits or features. In the first instance, the distance between transects was decreased, however the ground cover still impacted the survey. To minimise the limitations caused by the above factors a thorough desktop survey of LiDAR and aerial photographs was undertaken.

9 Archaeological and Other Values

The following sections summarise the values for unrecorded archaeological sites that may be encountered within the project area.

9.1.1 Unrecorded Artefact Find Spots

An evaluation of the archaeological values is provided for unrecorded artefact finds in Table 9-1. Overall, unrecorded find spots are considered to have **medium** archaeological value depending on their rarity, information potential, and amenity value.

Table 9-1. Summary of archaeological value for unrecorded artefact find spots.

Value	Assessment
Condition	**Subsurface/unknown**: The project area has undergone a vast amount of modification, as a result encountered findspots may not be in situ but redeposited in dredge fill or while excavating field drainage systems.
Rarity or Uniqueness	**Moderate:** This site type is relatively uncommon within the Grey District and nationwide in comparison to other site types.
Contextual Value	**Low-Moderate:** Artefact findspots are recorded as such as they are not found in relation to other features within the context of a wider site. However, Māori artefact find spots in this location would have a higher contextual value than a typical findspot as they would be associated with the ara tawhito that passed through this area. The presence of artefacts provides wider contextual value into the use of a landscape.
Information Potential	**Moderate**: Artefacts have information potential in revealing how people made use of their environment both through the manufacturing of the artefact as well as the purpose it was created for as well as temporal information for transient occupation in the area.
Amenity Value	**Low-Moderate**: Most artefact find spots are discrete and once disturbed they are gone and offer no amenity value in situ. Once retrieved, artefacts provide tangible links to the past, and depending on the artefact may be returned to iwi or displayed in the local museum. However, thus must be done under the direction of manawhenua and in accordance with tikanga.
Cultural Associations	**Māori and Pākehā**

9.1.2 Unrecorded Midden/Oven Sites

An evaluation of the archaeological values is provided for unrecorded midden/oven sites in Table 9-2. Overall, unrecorded midden/oven sites are considered to have **medium** archaeological value depending on their condition, context, and extent.

Table 9-2. Summary of archaeological value for unrecorded midden/oven sites.

Value	Assessment
Condition	**Subsurface/ unknown**: Midden and oven sites are found in a range of conditions, including destroyed, below ground, poor, fair, and good. It is probable many within the project area have been modified or damaged to some extent as a result of erosion as well as impacted by mining and dredging as well as activities as fossicking, ploughing and track cuttings. The presence of such sites near the proposed works, however, is indicative of heightened potential to encounter potentially intact archaeological remains.
Rarity or Uniqueness	**Low:** This site type is common along the adjacent coastline.
Contextual Value	**Moderate**: When considering wider interpretation sites of this type in comparisons to other recorded sites, they have a moderate contextual value as they provide insight into resource use on the wetlands, streams and coastline in this locality providing comparative information for changing patterns of such resource use. Additionally, midden/oven sites will have contextual value to as they would be associated with the ara tawhito that passed through this area.

Value	Assessment
Information Potential	**Low**: Midden/oven sites with single or few features provide limited information on how resources were used and exploited. **Moderate:** Midden/oven sites that form larger site complexes add to our understanding of occupation and activity, resource use and activity within the wider landscape.
Amenity Value	**Low**: Most midden/oven sites with single or few features are located below ground, and most others are eroding out of banks and cuttings or scattered and thus have a low amenity value. **Moderate:** While many larger midden/oven sites are still recorded below ground, they have higher potential to provide more information for public interpretation and education.
Cultural Associations	**Māori**

9.1.3 Unrecorded Mining-Gold Sites

An evaluation of the archaeological values is provided for unrecorded mining sites in Table 9-3. Overall, unrecorded mining sites are considered to have **medium** archaeological value based on their contextual value, information potential, and amenity value.

Table 9-3. Summary of archaeological values for mining sites.

Value	Assessment
Condition	**Subsurface/unknown**: Sites of this type are found in a range of conditions, including destroyed, subsurface, poor, fair and good. It is probable many within the project area have been modified or damaged to some extent as a result of erosion as well as impacted by mining and dredging as well as activities as fossicking, ploughing and track cuttings. The presence of such sites near the proposed works, however, is indicative of heightened potential to encounter potentially intact archaeological remains.
Rarity or Uniqueness	**Low:** This site type is common on the Barrytown Flats.
Contextual Value	**Moderate**: This site when compared to other mining sites in the surrounding area may provide an in depth look at mining strategies along Barrytown Flats.
Information Potential	**Moderate**: This site could provide information about mining strategies and provide spatial data about concerning mining locations.
Amenity Value	**Low-Moderate**: Some unrecorded mining sites may contain features or material that provide good opportunities for public interpretation or education, such as in situ features or artefacts. This will be dependent on their accessibility and condition.
Cultural Associations	**Pākehā and potentially Māori**

9.1.4 Unrecorded Historic-Domestic

An evaluation of the archaeological values is provided for unrecorded historic-domestic sites in Table 9-4. Overall, unrecorded historic-domestic sites are considered to have **medium** archaeological value based on their underrepresentation in Barrytown, contextual value, and information potential.

Table 9-4. Summary of archaeological values for historic-domestic sites.

Value	Assessment
Condition	**Subsurface/unknown**: Sites of this type are found in a range of conditions, including destroyed, subsurface, poor, fair and good. It is probable many within the project area have been modified or damaged to some extent as a result of erosion as well as impacted by mining and dredging as well as activities as fossicking, ploughing and track cuttings.
Rarity or Uniqueness	**Moderate:** Although historic-domestic sites are very common across New Zealand, this site type is underrepresented on the Barrytown Flats with only 5% of identified sites having this site type.

Value	Assessment
Contextual Value	**Moderate**: Although there are few historic-domestic sites recorded in Barrytown, there are many mining historic-domestic sites recorded in New Zealand. A historic-domestic site in the project area has potential to have contextual value on a regional and national level, as well as in association with the surrounding mining activities.
Information Potential	**Moderate**: This site could provide information about the physical structure of miners houses as well as information on coastal mining settlements and mining lifestyles.
Amenity Value	**Low-Moderate**: Some unrecorded domestic sites may contain features or material that provide good opportunities for public interpretation or education, such as in situ features or artefacts.
Cultural Associations	**Pākehā and Māori**

9.1.5 Other Values

Ngāti Waewae are best placed to comment on the cultural values within the project area and NZHP recommends TiGa Minerals and Metals Ltd provide this assessment to Ngāti Waewae for consultation.

No other relevant values (e.g. historic heritage sites) were identified during the assessment.

10 Assessment of Effects and Other Considerations

Section 46 (g)(ii) of the HNZPTA requires an assessment of the effects of the proposed works, as detailed in Section 1.2, on archaeological and other values, which were assessed in the previous section. The assessment of effects takes into account the criteria established by HNZPT (2019) as outlined in Section 3. Also considered here are methods to avoid, minimise, and mitigate any adverse effects to archaeology.

Ngāti Waewae are best placed to comment on the cultural values, and the effects of the proposed works on these values within the project area. As such, NZHP recommends TiGa Minerals and Metals Ltd provide this assessment to Ngāti Waewae for consultation. No other relevant values (e.g. historic) were identified during the assessment.

10.1 Assessment of Effects on Archaeological and Other Values

This assessment has identified that there is the potential to uncover unrecorded artefact find spots, midden/oven sites, mining-gold, and historic-domestic archaeological sites during the works. However, all archaeological remains across the project area are expected to be subsurface, and their location and condition are unknown. As stated in the research results, findspots K31/11 and K31/12 are destroyed, so will not be impacted by the proposed works. It is probable the condition of a vast number of encountered features will be poor due to natural coastal erosion, stock trampling, previous dredging, and environmental modifications (i.e. hump and hollowing). However, despite the likely poor condition of subsurface features, there is still the potential archaeology is present across the site. Unrecorded archaeology that may be encountered include artefact caches, midden and oven features, flumes or sluice boxes.

Although the project area has undergone a large amount of surface modification, the dredged areas may contain redeposited archaeological material not in situ. Hump and hollowed areas may have intact archaeology under the humps. As the history of the area records largely transient and ephemeral occupation across the project area, archaeology could be encountered anywhere across the site. Higher potential areas for encountering archaeology are addressed below.

Considering the large extent of the earthworks across the majority of the project area, **NZHP considers the magnitude of impact on any potential unrecorded archaeological sites will be moderate to major**, dependant on where the site is located. The complete or partial destruction of encountered sites removes them from the archaeological record, having a negative impact on their contextual value, information potential, and amenity value.

- The high archaeological potential zones are on the margins of the project area and likely extend outside of the mining disturbance zone, so encountered archaeology will only be destroyed within the project area, resulting in a **moderate impact.**
- Proposed works are anticipated to result in the complete destruction of any unrecorded archaeological sites encountered within the project area, resulting in a **major impact**.

NZHP recommends that that an archaeologist monitor all earthworks (stripping of topsoil,) that are likely to encounter archaeological remains (see areas of high archaeological, Figure 8-1) until it can be shown that no archaeology survives. NZHP recommends the investigation of all identified areas of archaeological potential to be undertaken in unison prior to the commencement of mining activity.

This assessment has identified that there is potential to encounter unrecorded archaeological sites with importance to mana whenua within the project area. **NZHP recommends that mana whenua should be engaged and have the opportunity to be actively involved.** This includes consultation at the archaeological assessment phase.

10.2 Recommendations to Avoid, Minimise and/or Mitigate Adverse Effects

Recording of archaeological features and deposits along with subsequent analysis and reporting will form a permanent record of the modification of each site. From this record we will increase our understanding of the site and mitigate, to some degree, the loss of contextual value between features and materials at the site level.

10.2.1 Sites and Features to be Avoided or Protected

While it is ideal to plan to avoid archaeological sites, there are no above ground sites in the project area, and it is not possible to plan to avoid the sites due to the scale of the required earthworks within the project area.

A drystone structure (POI 003) was noted under the southern side of Cargills Road, outside of the project area. To avoid damaging the structure the Cargill Road bund should not be built up against this structure. The use of heavy machinery should by limited or monitored in proximity to the structure, to limit the potential damage from vibrations. Dust and vibration plans, when finalised by the client, should be provided to NZHP to inform future protections for the structure as necessary.

10.2.2 Mitigation for Information Loss

NZHP recommends that that an archaeologist monitor all earthworks (stripping of topsoil,) that are likely to encounter archaeological remains (see areas of high archaeological potential Figure 8-1) until it can be shown that no archaeology survives. NZHP recommends the investigation of all identified areas of archaeological potential to be undertaken in unison prior to the commencement of mining activity.

Based on the historical and archaeological research, as well as the archaeological site survey, NZHP has identified areas where there is a higher potential for archaeological remains to be encountered and any earthworks within these zones should be monitored by an archaeologist (Figure 8-1). The high potential areas include features noted in historical maps and those identified during the archaeological survey, as well as a consideration of environmental features which may indicate an increased probability of archaeological material being encountered. Areas of extensive dredging in the twentieth century, as supplied to NZHP by the client, have been excluded from red zones, as the excavation depths of the twentieth century mining works extended into natural deposits. The exception to this is when the survey identified marginal areas within the dredge zone which appear to be intact. By having an archaeologist on site in high-potential areas, the features can be identified as they are exposed (rather than after they are truncated or heavily disturbed) and recorded following best practice. We consider that the on-call protocol alone is not sufficient to mitigate the information loss on site due to the high likelihood of encountering features, many of which are unlikely to be recognised by contractors in the field, such as water races, hut sites, oven features, and others. Beyond this area of high potential, NZHP recommend that work proceed under an on-call protocol (OCP). Find spots may be encountered anywhere on site, including outside of the red zone and in areas thought to have modern ground disturbance, however as artefacts are generally readily identifiable, OCP will be appropriate.

NZHP recommends that topsoil stripping, in high-potential areas where archaeological monitoring is required, be undertaken over consecutive days, at the beginning of each stage of works and prior to any other earthworks taking place in this stage. Within these zones, where archaeological monitoring is recommended, excavations should be undertaken with a hydraulic excavator (not a bulldozer) so that any features exposed are not immediately disturbed further by bulldozer tracks during the process of excavation. Excavations undertaken by hydraulic excavator should be done in systematic scrapes across the archaeological areas to be monitored until natural deposits are reached. As archaeological features are exposed, they will then be excavated by hand and recorded by the archaeologist(s). If archaeological features extend beyond the red zones, archaeological monitoring and recording should continue until the archaeologist is satisfied that no further archaeological material survives.

All archaeology that is encountered should be investigated and recorded to best practice. NZHP recommends that if structures are encountered, they should be recorded to a Level III standard as defined in HNZPT's guide,

Investigation and Recording of Buildings and Standing Structures (2018). Such structures may include hut remains, water races, fluming, and sluice boxes.

Beyond the recording during fieldwork, mitigation for information loss also includes analysis of all artefactual material recovered during the excavations and reporting on all archaeology in a final report. Where archaeology is encountered, further commensurate historic research will be required to provide context to the finds. Site record forms must be created or updated for all sites where archaeology has been encountered.

NZHP recommends that a site instruction be prepared to provide the practical steps for managing the archaeological requirements under the authority, defining the roles and responsibilities of the client, their contractors, and archaeologists. The site instruction will clearly define the areas when an archaeologist must be present, procedures for archaeological monitoring, protocols for the discovery of Māori archaeology and kōiwi, and OCP for the unexpected discovery of archaeology.

Briefings for contractors and project managers are recommended to ensure that all parties understand the conditions of the authority and their individual responsibilities. The briefing will outline when an archaeologist is required on site, the types of archaeology expected to be encountered, and the OCP. Such steps will ensure that archaeological values, such as information value and possible amenity purposes, are increased through appropriate archaeological investigation. NZHP recommends that the the initial briefing should be done in an office space to best enable the digital presentation of the briefing to maximise engagement. Though for those unable to attend in person, the briefing can be done via videoconference (i.e., Zoom, Microsoft Teams, Skype).

10.3 Summary of Effects on Archaeological Values

As discussed, in Section 9, NZHP has identified the potential archaeological values for unrecorded artefact find spots, midden/oven, mining-gold, and historic-domestic sites which may be encountered within the project area. The summary of these values and the impact of the works on these sites is provided here.

The archaeological value for unrecorded find spots, mining-gold, and historic-domestic sites are all considered to have **medium** archaeological value, while unrecorded midden/oven sites are considered to have **medium** archaeological value depending on their condition, context, and extent. Considering the large extent of the earthworks across the majority of the project area, as the works will significantly modify or completely destroy any remains encountered associated with these site types, the impact will be moderate to major.

NZHP considers that the overall impact of the proposed works on the archaeological landscape will be moderate to major. However, with the archaeological monitoring of high-potential areas, recording, analysis and reporting on any archaeological or heritage features modified by the proposed works NZHP supports approvals under the FTAA, including a resource consent application and archaeological authority to modify these sites.

11 Conclusions and Recommendations

This archaeological assessment has identified that there is reasonable cause to suspect that unrecorded artefact find spots, midden/oven sites, mining-gold and historic-domestic sites are present within the project area and will be affected by the proposed mineral sand mining. Therefore, an archaeological authority is required. The two previously recorded sites (K31/11 and K31/12) will not be impacted; however, their presence is indicative of other sites in the vicinity. Due to the presence of the ara tawhito, manawhenua would have ventured through the project area and procured resources from the wetland areas while travelling. Find spots are the only previously recorded site types within the project area and as artefacts caches have frequently been found in wetland areas there is reasonable cause to suspect that unrecorded findspots may be encountered and are considered to have **medium** archaeological value. Midden/oven sites are the most common site type in the vicinity, based on the abundance of mahinga kai which would have once been present in the area there is reasonable cause to suspect that unrecorded midden/oven sites may be encountered along the coastal margin. Unrecorded midden/oven sites are considered to have **medium** archaeological value. Historic era occupation of the project area centred on miners' blacksanding along the foreshore and squatting nearby. As a result, there is reasonable cause to suspect that unrecorded gold-mining and historic-domestic sites are encountered, both of which are considered to have **medium** archaeological value. Due to the nature of the proposed works the overall impact of the works on the archaeological values of unrecorded sites if encountered will be moderate to major. However, with the recommended mitigation outlined in Section 10.2, the overall impact of the works on the unrecorded sites if encountered would be reduced but will remain moderate to major.

On the basis of this assessment, NZHP supports this application with the following recommendations:

1. **Authority Application:** As the proposed works described in Section 1.2 could affect unrecorded archaeological sites, an archaeological authority under Section 44 of the HNZPTA 2014 must be obtained from HNZPT prior to any modification of the site.
    a. The previously recorded sites (K31/11, K31/12) are destroyed so will not be impacted.
    b. If development plans are altered from those reviewed for this assessment , then HNZPT and NZHP must be alerted, as any changes may alter the assessment of effects or invalidate the authority.

2. **Protection of sites/features:** As a first principle, every practical effort must be made to avoid damage to any archaeological site, whether known, or discovered during any redevelopment of the site.
    a. **Drystone structure under Cargills Road -** To avoid damaging the structure the Cargill Road bund should not be built up against this structure. The use of heavy machinery should by limited or monitored in proximity to the structure, to limit the potential damage from vibrations. Dust and vibration plans, when finalised by the client, should be provided to NZHP to inform future protections for the structure as necessary.

3. **Site Instruction:** All works must be carried out in accordance with a site instruction. Any amendments to the site instruction will require prior written approval from HNZPT. The site instruction will include the points outlined in Section 10.2.2.

4. **Contractor Briefing:** All contractors working on the project must be briefed by the s45 approved person (or person nominated on their behalf) on the possibility of encountering archaeological evidence, how to identify possible archaeological sites/features during works, the archaeological work required by the conditions of the authority, and contractors' responsibilities with regard to notification of the discovery of archaeological evidence to ensure that the authority conditions are complied with. NZHP recommends that the briefing be undertaken in an office space to best enable the briefing to be presented digitally, thus maximising engagement.

5. **Archaeological Monitoring:** All earthworks that may affect an archaeological site must be monitored by the s45 approved person (or person nominated on their behalf) in accordance with the site instruction.
    a. Any archaeological features and material encountered shall be recorded, analysed, and interpreted in accordance with current archaeological practice and as outlined in the site instruction.

6. **Archaeology of Māori origin:** If archaeological material of Māori origin is discovered at any stage, all work must stop within 20m of the find. NZHP will assist the authority holder in contacting all relevant parties including tangata whenua via Ngāti Waewae and HNZPT in accordance with the site instruction.
    a. Any taonga tūturu are *prima facie* the property of the Crown who will be notified of the find. Taonga tūturu will be registered with the Ministry for Culture and Heritage. NZHP, in collaboration with manawhenua, shall notify the Ministry of Culture and Heritage and establish the most appropriate temporary storage, management and care for taonga tūturu, until such time as traditional or actual ownership is determined, with an appropriate institution or kaitiaki.

7. **Kōiwi (human remains):** Should kōiwi be encountered, all work must stop within 30m of the find. NZHP will assist the authority holder in contacting all affected parties as soon as practicable, including tangata whenua via Ngāti Waewae, HNZPT, and the police. The Ngāi Tahu policy for kōiwi tangata shall also be followed (Te Rūnanga o Ngāi Tahu, 2019).

8. **Reporting:**
    a. Within 20 working days of the completion of on-site archaeological work, the site record forms must be updated or submitted to ArchSite.
    b. Within 12 months of the completion of on-site archaeological work, a final report on any archaeological material that is found must be prepared in accordance with *ASG12 Archaeological Report Guideline* (HNZPT, 2023) and submitted to HNZPT for inclusion in the digital library, Ngāti Waewae and to the Grey District Council.

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Appendix A Additional Maps

Transect survey map and labelled land parcels within the consent area, from north to south.

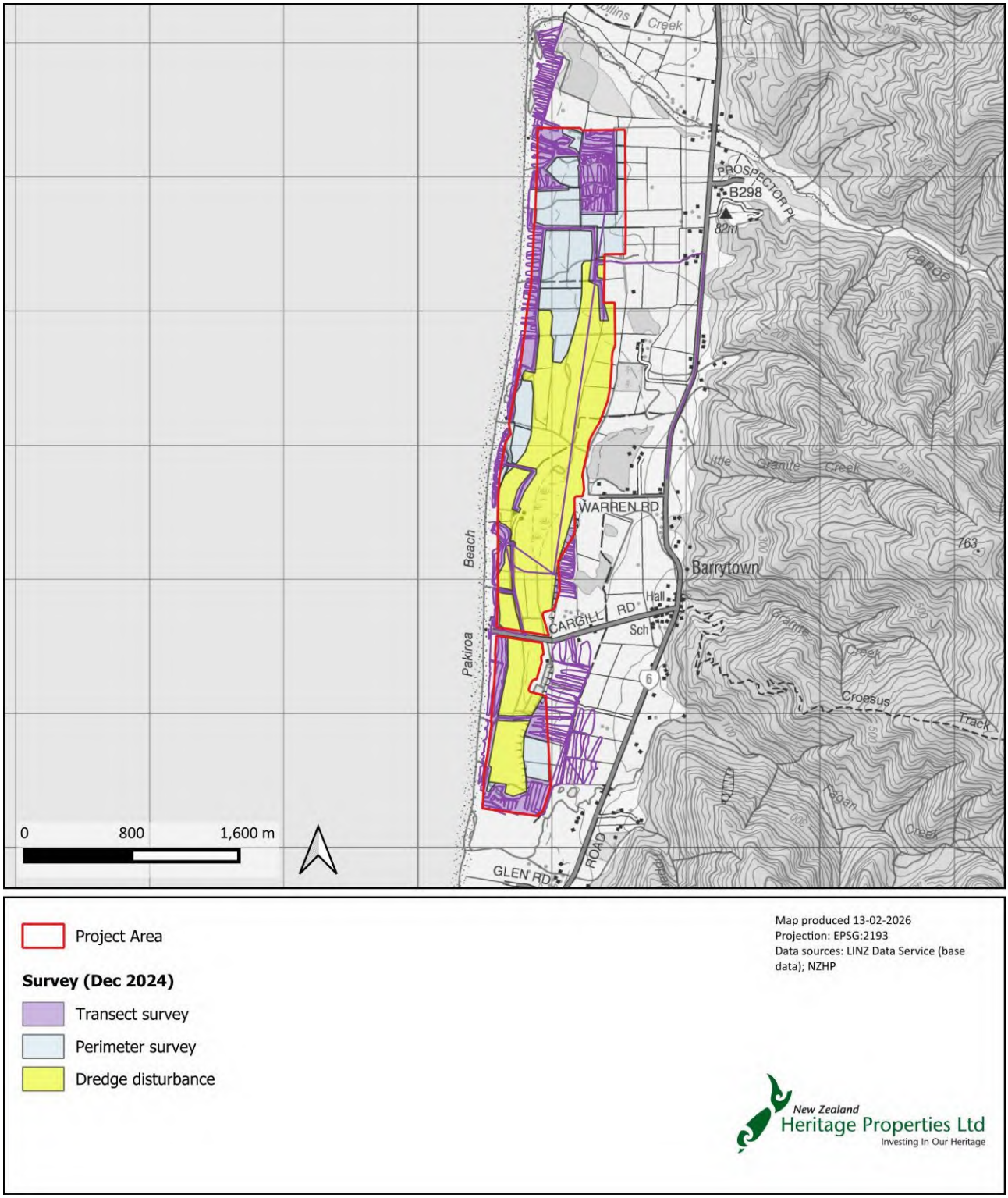

Figure 12-1. Survey map showing transects walked, Dec 2024. Note the survey covered the SRB beyond the scope of the current project area (mining disturbance zone).

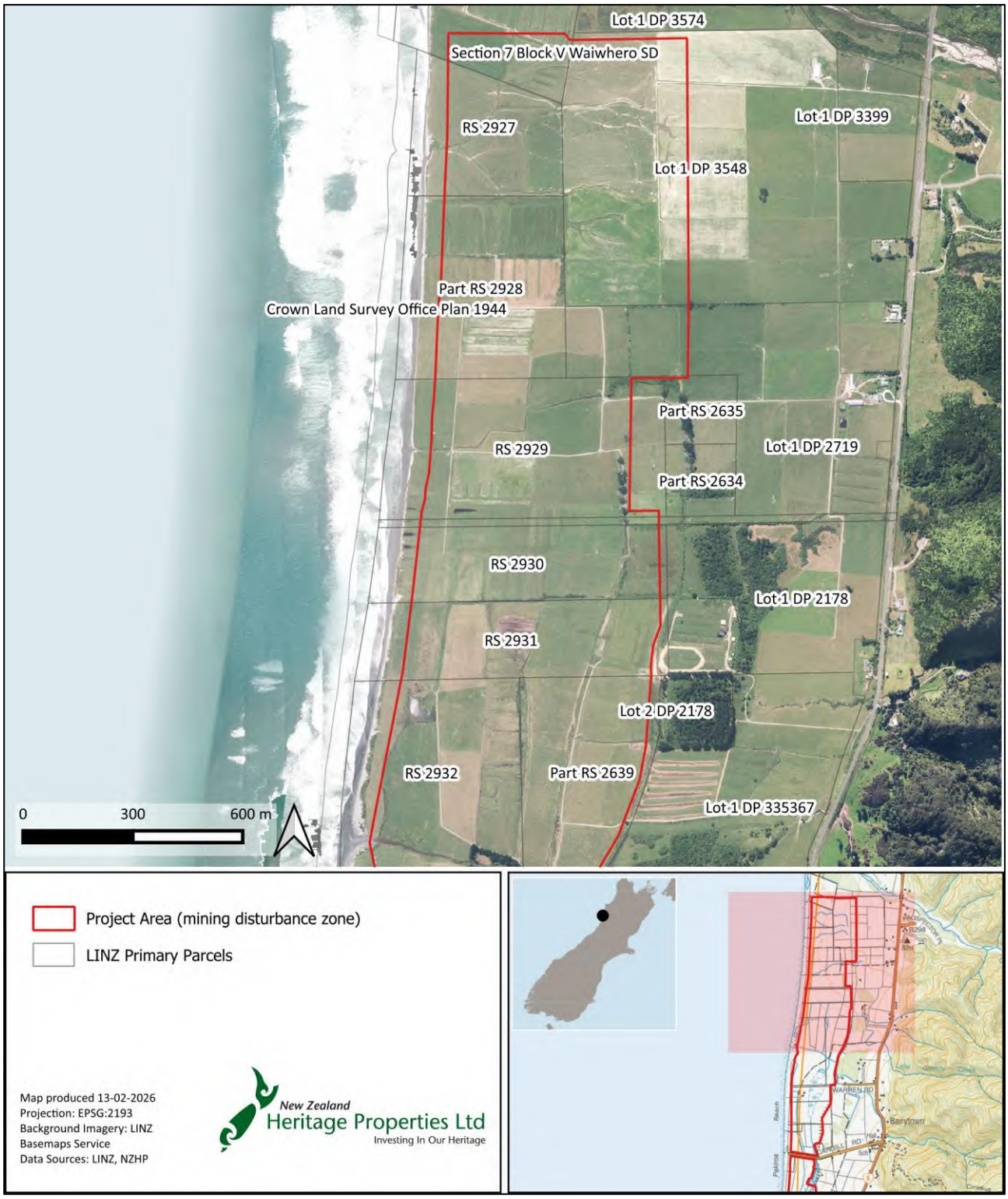

Figure 12-2. Land parcels in northern project area.

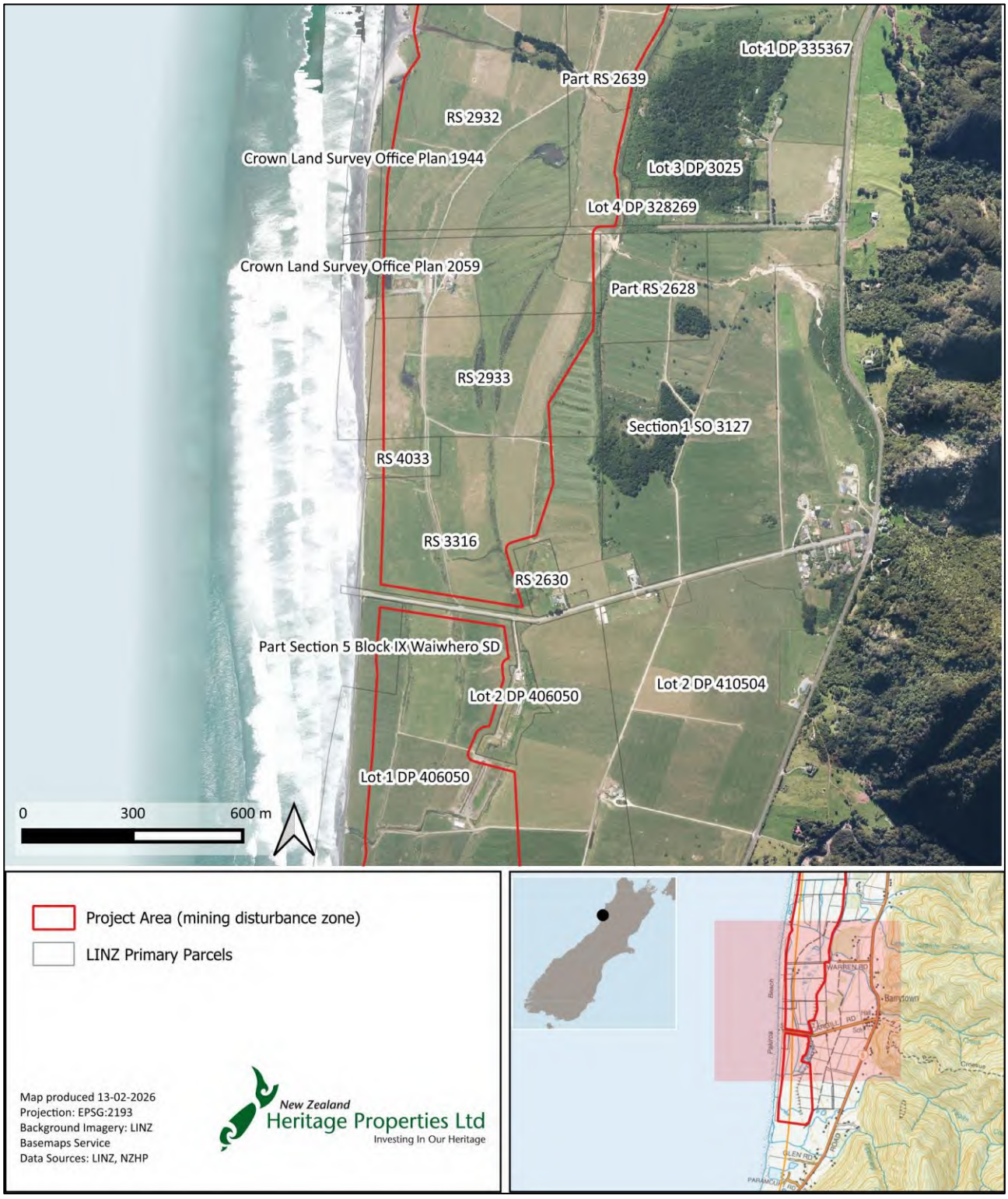

Figure 12-3. Land parcels in central project area.

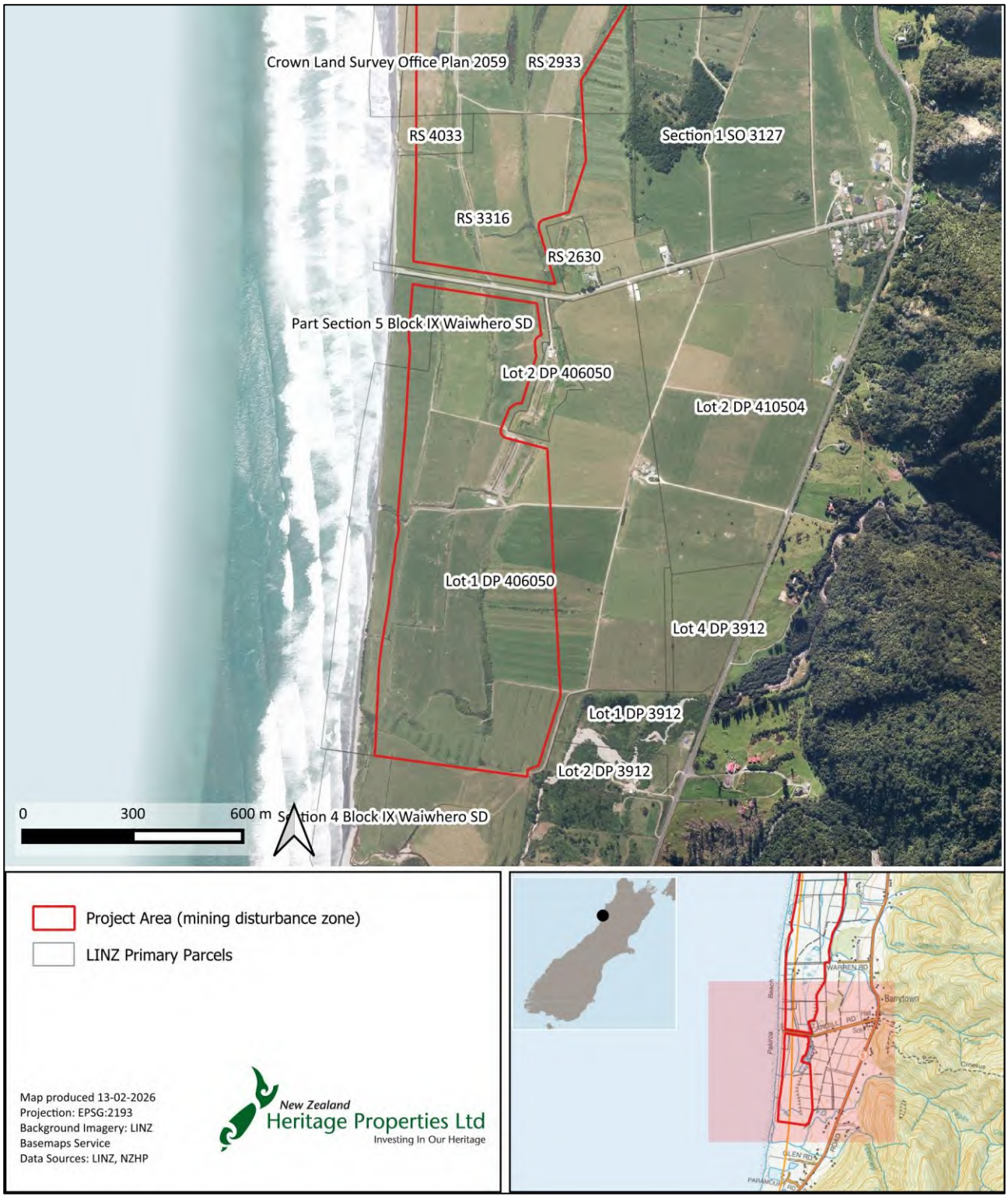

Figure 12-4. Land parcels in southern project area.

Appendix B Archaeological Site Record Forms

NEW ZEALAND ARCHEOLOGICAL ASSOCIATION INCORPORATED

Summary Site Record

ARCHSITE archaeological site recording scheme

NZAA Site Number:	K31/11	**Site Coordinates (NZTM)**	
Imperial Site Number:	S37/27	**Easting:**	1461246
Site Type:	Artefact find	**Northing:**	5324958
Site Name(s):		**Source:**	CINZAS

Finding Aids to the Location of the Site:

Brief Description:
FINDSPOT

Condition of Site when last visited:
No Recent Info

This report contains a summary of the information about this site held in ArchSite.

For a complete Site Record Form containing all the recorded information, please contact the ArchSite Coordinator.

For further information please contact:

ArchSite Coordinator, PO Box 6337, DUNEDIN

admin@archsite.org.nz

NEW ZEALAND ARCHEOLOGICAL ASSOCIATION INCORPORATED

Summary Site Record

ARCHSITE archaeological site recording scheme

NZAA Site Number:	K31/12	**Site Coordinates (NZTM)**	
Imperial Site Number:	S37/28	**Easting:**	1460545
Site Type:	Artefact find	**Northing:**	5322359
Site Name(s):		**Source:**	CINZAS

Finding Aids to the Location of the Site:

Barrytown, along the sea beach about 0.8 km above the entrance road to the beach.

Brief Description:

Findspot for a shaped greenstone (brown trout) pendant (?), reported in 1980. Finder possesses some 30 pieces of greenstone pebbles found along the beach, among the greenstone is the patu piece and two greenstone chisels.

Condition of Site when last visited:

No Recent Info

This report contains a summary of the information about this site held in ArchSite.

For a complete Site Record Form containing all the recorded information, please contact the ArchSite Coordinator.

For further information please contact:

ArchSite Coordinator, PO Box 6337, DUNEDIN

admin@archsite.org.nz

Appendix C

Proposed conditions - archaeological authority

Barrytown Critical Minerals Project
Southern Block
Proposed Conditions of Archaeological Authority

1.	The authority holder must ensure that all contractors working on the project are briefed by the s45 approved person , who may appoint a person to carry out the briefing on their behalf, prior to any works commencing on: a. The possibility of encountering archaeological evidence; b. How to identify possible archaeological sites during works; c. The archaeological work required by the conditions of this authority; and d. Contractors' responsibilities with regard to notification of the discovery of archaeological evidence to ensure that the authority conditions are complied with.
2.	Prior to the start of any on-site archaeological work, the authority holder must ensure that Heritage New Zealand Pouhere Taonga is advised of the date when work will begin. This advice must be provided at least 2 working days before work starts. The authority holder must also ensure that Heritage New Zealand Pouhere Taonga is advised of the completion of the on-site archaeological work, within 5 working days of completion.
3.	Any earthworks that may affect any High Archaeological Potential sites (attached as Figure 8-1) must be monitored by the s45-approved person who may appoint a person to carry out the monitoring on their behalf. Topsoil stripping of these sites must be undertaken by a hydraulic excavator and occur over consecutive days at the beginning of each stage of works and prior to any other earthworks in this stage.Any archaeological evidence encountered during the exercise of this authority must be investigated, recorded and analysed in accordance with current archaeological practice.
4.	Immediately following the discovery of material suspected to be a taonga, kōiwi or archaeological site the following steps shall be taken: a. All works on the site will cease immediately at that place and within 20m around the site; b. Immediate steps will be taken to secure the site to ensure the archaeological material is not further disturbed; c. The contractor/works supervisor/owner will notify the Rūnanga, Council and the Area Archaeologist of Heritage New Zealand. In the case of kōiwi (human remains), the New Zealand Police must be notified;

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	d. The Rūnanga and Heritage New Zealand will jointly appoint/advise a qualified archaeologist who will confirm the nature of the accidentally discovered material; e. The contractor/works supervisor/owner will also consult the Rūnanga on any matters of tikanga (protocol) that are required in relation to the discovery and prior to the commencement of any investigation and enable access to Rūnanga in accordance with any site safety requirements; f. If kōiwi (human remains) are uncovered, in addition to the steps above, the area must be treated with utmost discretion and respect, and the kōiwi dealt with according to both law and tikanga, as guided by the Rūnanga. Remains are not to be moved until such time as Rūnanga, NZ Police and Heritage New Zealand have responded; g. Works in the site shall not recommence until authorised by the Rūnanga, Heritage New Zealand (and the NZ Police in the case of kōiwi) and any other authority with statutory responsibility, to ensure that all statutory and cultural requirements have been met; h. All parties will work towards recommencing activities in the shortest possible timeframe while ensuring that any archaeological sites discovered are protected until a decision is made on whether the archaeological material is to be recorded and/or removed.
5.	Any taonga tūturu are prima facie the property of the Crown who will be notified of the find. Taonga tūturu will be registered with the Ministry for Culture and Heritage. Heritage New Zealand, in collaboration with manawhenua, shall notify the Ministry of Culture and Heritage and establish the most appropriate temporary storage, management and care for taonga tūturu, until such time as traditional or actual ownership is determined, with an appropriate institution or kaitiaki.
6.	Although bound to uphold the requirements of the Protected Objects Act 1975, the contractor/works supervisor/owner recognises the relationship between Ngāi Tahu whānui, including its Rūnanga, and any taonga (Māori artefacts) that may be discovered. Where Rūnanga so request, any information recorded as a result of the find such as a description of location and content, is to be provided for their records.
7.	That within 20 working days of the completion of the on-site archaeological work associated with this authority, the authority holder shall ensure that site record forms are updated or submitted to the NZAA Site Recording Scheme.

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8.	That within 12 months of the completion of the on-site archaeological work, the authority holder shall ensure that a final report, completed following the Archaeological Report Guideline (AGS12 2023), is submitted to the Heritage New Zealand Pouhere Taonga Senior Archaeologist for inclusion in the Heritage New Zealand Pouhere Taonga Archaeological Reports Digital Library, to tangata whenua via Ngāti Waewae, the Grey District Museum, and the NZAA Central Filekeeper. a. One hard copy and one digital copy of the final report are to be sent to the Heritage New Zealand Pouhere Taonga Senior Archaeologist. b. Digital copies of the final report must also be sent to to tangata whenua via Ngāti Waewae, the Grey District Museum, and the NZAA Central Filekeeper.
9.	Protection of sites / features: As a first principle, every practical effort must be made to avoid damage to any heritage site, whether known, or discovered during any redevelopment of the site, including: a. Drystone structure under Cargills Road - To avoid damaging the structure the Cargill Road bund should not be built up against this structure. The use of heavy machinery should by limited or monitored in proximity to the structure, to limit the potential damage from vibrations.

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Letter to Māori Heritage Council

TĀIKO CRITICAL MINERALS
WEST COAST NEW ZEALAND

Mining with the environment
Working with the community
A world class, high grade critical minerals deposit

4 March 2026

Leauanae Laulu Mac Leauanae
Secretary for Culture and Heritage and Chief Executive
Ministry for Culture and Heritage
C/O Bridie Cooper (Executive Assistant)
By email: Bridie.Cooper@mch.govt.nz

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Kei te rangatira, tēnā koe

Tāiko Critical Minerals Limited – Barrytown Minerals Project – Fast-track Approvals Act 2024 application

1 Tāiko Critical Minerals Limited (**TCM**) is the authorised person with respect to the Barrytown Minerals Project (**Project**), which is a Schedule 2 listed project in the Fast Track Approvals Act 2024 (**FTAA**).

2 We are writing to you because TCM will be applying for all approvals necessary under the FTAA to mine the Southern Block of the Barrytown Minerals Project, including an archaeological authority. The Māori Heritage Council will be asked for a report on the application for archaeological authority under section 51(2)(d) of the FTAA.

3 A comprehensive project description is contained at **Appendix A**.

4 By way of summary, the Project is to undertake mineral sand mining to obtain ilmenite, garnet and other minerals across an area of the Barrytown Flats, in the Grey District. Resource consent has already been granted to TCM for initial stages of the Project, including to undertake mineral sands mining to the north of the Project site (on the Central Block), to establish and operate a Mineral Separation Plant at Rapahoe (including transportation from Barrytown Flats to the MSP) and to establish and operate a Wet Concentrator Plant for processing on site. Mining of the Southern Block is likely to take place over approximately 14 years, followed by rehabilitation of the site.

5 The application will seek all approvals for mining and related activities within the Southern Block including (but not limited to):

(a) the extraction of sand using a floating dredge over approximately 280 hectares;

(b) remediation, rehabilitation and closure activities, including the establishment of a constructed wetland and reshaping of contours over 408 hectares.

6 The application will seek an approval normally required for under the Heritage New Zealand Pouhere Taonga Act 2014 to modify or destroy recorded and unrecorded archaeological sites.

7 The FTAA requires Māori values of archaeological sites to be assessed as part of the application for an archaeological authority. New Zealand Heritage Properties Ltd has undertaken an archaeological assessment, which is attached at **Appendix B**. That report identifies some Māori values including two recorded artefact find spots, potential midden/oven sites, and potential mining and historic-domestic sites.

8 The two recorded archaeological sites (find spots) are:

(a) K31/11 - part of a shaped patu and a small greenstone chisel.

(b) K31/12 - a shaped greenstone pendant.

9 The artefacts from both find spots have been removed and there is no evidence that further features or deposits relating to the site remain in situ. Thirteen points of interest related to European settlement have also been identified.

10 The archaeological assessment notes that Ngāti Waewae are best placed to comment on Māori values of archaeological sites and suggests that the report be provided to them as part of consultation. TCM has been consulting with Ngāti Waewae in the preparation of the application and they have been invited to provide an assessment of Māori values on archaeological sites if they so wish.

11 Proposed conditions for the archaeological approval are attached at **Appendix C**. The proposed archaeological conditions have been informed by the archaeological assessment. It is also proposed to include the accidental discovery protocol conditions in the resource consent conditions.

12 Heritage New Zealand Pouhere Taonga has also been invited to consult on the application.

13 We would appreciate confirmation that you have received this letter and any feedback you may have on the proposed conditions for the archaeological authority. If any further questions or matters arise that you would like to discuss, please do not hesitate to contact us. We would be grateful for your response by 27 March 2026. We are happy to make NZHP available for any questions or further discussions you consider necessary.

Nāku, nā

Mike Meehan

Project Director

E: mike.meehan@tigamm.co.nz

Ph: 021-289-8636

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Appendix A
Project Description

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Barrytown Critical Minerals Project
Southern Block

Project description – draft for consultation
4 March 2026

1. Overview

1.1 This section sets out a detailed description of the Project to inform the applications made for approvals under Schedules 5, 7, and 8 of the FTAA.

1.2 Tāiko Critical Minerals (formally TiGa Minerals and Metals, the **Applicant**) holds various resource consents from the Grey District Council and the West Coast Regional Council authorising the extraction, processing, and transportation of mined material in the form of Heavy Mineral Concentrate (**HMC**) from the Central Block (**CB**) at Barrytown, as part of its critical minerals project on the Barrytown Flats. Minerals sought to be obtained through the process are ilmenite, garnet, zircon and gold.

1.3 The initial resource consent for mining, HMC production, transportation and associated ancillary activities was subject to a publicly notified process. Through this extensive process, all aspects of the company's operations were assessed against the relevant District and Regional Plans, the Resource Management Act 1991, and applicable national direction. This enabled full participation by interested parties and agencies and resulted in a robust set of consent conditions, which have informed the company's Fast-track application, including the substantive environmental data set the company has produced and which is ongoing.

1.4 Following the granting of the substantive resource consent for the CB (north of Canoe Creek), an additional resource consents have been granted for a Mineral Separation Plant (**MSP**) at Rapahoe. Consent for the establishment, operation and maintenance of a centralised Wet Concentrator Plant (**WCP**) adjacent to the Southern Block (**SB**), associated water management infrastructure (known as the Mine Water Facility (**MWF**)) and access road, is currently being processed by the Grey District Council. Consent for the earthworks component of this activity was granted by the West Coast Regional Council in February 2026. The MSP and WCP will process material from the CB and the SB.

1.5 In adopting this approach, the company has undertaken extensive consultation with the local community, mana whenua, Councils, and relevant agencies throughout these community-facing processes. This engagement has contributed to the development and acceptance of comprehensive consent conditions and management provisions. It has also enabled the assessment and approval of high interest matters, such as trucking activities on State Highway 6. As a result, the Fast-track application is focused on seeking all necessary approvals for the mining activity within the SB. **Plan A** shows the three resource blocks of the Barrytown Critical Minerals Project.

1.6 The SB comprises approximately 408ha on the Barrytown Flats as shown in **Plan B**. All land subject to this application is privately owned with access to the site approved by the respective landowners. Mining activity is proposed to occur on approximately 280ha of the total area, which is known as the 'mining disturbance area' and shown in **Plan B**. Earthworks will be undertaken on parts of the SB outside the mining disturbance area to assist with recontouring and rehabilitation.

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1.7 Mining on the SB will be undertaken using a floating dredge of modern design. Mining will be undertaken in three sections as follows (shown on **Plan C**), although only one section will be mined at a time:

(a) Section 1: Granite Creek North;

(b) Section 2: Granite Creek South;

(c) Section 3: Cargill Road.

1.8 Mining of the SB is expected to commence in approximately 2034 - 2035 once the mineral resource on the CB has been exhausted. The WCP and MWF will be used to process material from both the CB and SB.

1.9 Various measures are proposed for the avoidance, minimisation and mitigation of ecological (terrestrial and freshwater), landscape, visual, noise and dust-related effects. The Project also includes significant ecological and landscape enhancements in the form of an extensive wetland, realignment of creeks into natural patterns, riparian planting and stock exclusion fencing.

1.10 Mining of the SB is expected to take approximately 14 years (excluding preparation and rehabilitation), based on the extraction rate of 2,000,000 tonnes per year (producing 400,000 tonnes of HMC per year). This will extend the overall mining component of the Barrytown Minerals Project to approximately 30-35 years. Taking into account pre-mining construction works and post-mining final rehabilitation and mine closure works, it is anticipated that the Project will be completed between 2055 and 2060. Approvals are sought for 35 years to provide sufficient time for mining activity to occur over stages, final rehabilitation and operational factors to take place.

1.11 The anticipated work programme for the Project is as follows:

(a) Bunding and initial mitigation planting – 1 year (2027);

(b) Mining of the Central Block (consented) – 6 years (2029 – 2034);

(c) Mining Section 1: Granite Creek North (Stage 1) – 7 years (2035 - 2042);

(d) Mining Section 2: Granite Creek South (Stage 2) – 4 years (2043 – 2047);

(e) Mining Section 3: Cargill Road (Stage 3) – 3 years (2047 - 2050);

(f) Final rehabilitation – 3 years (2050 – 2053); and

(g) An operational contingency period of 6 years (2050 – 2056 followed by the final rehabilitation proposed in (f)).

2. Consents sought and relevant land parcels

2.1 All resource consents necessary are being sought, including for the following activities:

Consent type	Activity	Rule breaches
Grey District Plan		
Land use consents	Clearance of indigenous vegetation	Rule 19.7.5(vii): Clearance of indigenous vegetation exceeds

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		permitted activity volumes outside of an SNA
Decisions Version Te Tai o Poutini Plan Rules under appeal are noted with an * e.g. ECO-R1*		
Land use consent	Clearance of indigenous vegetation	ECO-R9*: the clearance of indigenous vegetation in the coastal environment and riparian margins will exceed the permitted activity volumes
	Earthworks within riparian margins	NC-R4*: because the earthworks will be undertaken across the mining disturbance area including creeks and their riparian margins
	Structures within riparian margins	NC-R5*: existing farm bridges will be replaced post mining which are not permitted under this plan
	Structures in the coastal environment	CE-14*: existing farm bridges will be replaced post mining which are not permitted under this plan
	Mineral extraction	GRUZ-R25*: do not comply with permitted activity rule due to volume of material to be extracted, mining to be undertaken within the riparian margins of creeks and wetlands, will disturb two historic heritage sites; undertaken within 250m of a sensitive activity on an adjoining site; and operate outside permitted hours.
West Coast Regional Land and Water Plan		
Land use consent	Earthworks within riparian margins; Earthworks in the non-erosion prone area outside riparian margins; Vegetation disturbance in riparian margins	Rule 16 WCRLWP: do not comply with permitted activity rule as earthworks will exceed permitted volumes and vegetation clearance will take place in riparian margins with creeks to be mined across the site
Land use consent	Activities within the bed of a river outside of a wetland identified in Schedule 1 or 2	Rule 35 WCRLWP: Creek beds will be reconstructed in the same or similar locations and represent meandering

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		pathways, and water will be drained during diversions
Water permit	To take and use water for the purpose of mineral sand processing	Rule 55 WCRLWP: the take and use of water from Canoe Creek to operate the Wet Concentrator Plant is a restricted discretionary activity
Water permit	To take and use ground water for the purpose of mineral sand mining and processing	Rule 56 WCRLWP: to take and use groundwater intercepted during mining to pump run-of-mine material to the Wet Concentrator Plant.
Land use consent	Diversion of water	Rule 58 WCRLWP: five creeks across the SB will require diversion which is a discretionary activity
Discharge permit	To discharge water to the mining void	Rule 71 (discharge to water and land) WCRLWP: to discharge water to the mining void is a discretionary activity due to the augmentation of lime
Regional Air Quality Plan		
Discharge permit	To discharge dust to air from stockpiling and handling gravel, sand and soil	Rule 16: consent being sought as precautionary measure to authorise unanticipated dust emissions
Freshwater NES		
	Vegetation clearance within, or within a 10m setback from, a natural inland wetland	Section 45D(1)
	Earthworks within, or within a 10m setback from, a natural inland wetland	Section 45D(2)
	Earthworks outside a 10m, but within a 100m setback, from a natural inland wetland that will result in partial or complete drainage of the wetland	Section 45D(3)
	Diversion of water within, or within a 100m setback from, a natural inland wetland	Section 42D(4)

	Discharge of water into water within, or within 100m setback from, a natural inland wetland	Section 45D(5)
	Reclamation of bed of rivers	Section 57

^For completeness it is noted that the mining activity relies on a number of permitted activity rules in the district and regional plans.
*Rule under appeal.

2.2 The application relates to the following land parcels:

Legal description
Section 4-6 Block V Waiwhero Survey District contained in Record of Title WS2D/1085
Section 7-8 Block V Waiwhero Survey District contained in Record of Title WS2D/855
Lot 1 DP 3548 and Rural Section 2927 contained in Record of Title WS8C/143
Part Section 2928 Block V Waiwhero Survey District and Defined on DP 764 contained in Record of Title WS1A/1166
Lot 1 DP 2719 and Lot 2 DP 339364 contained in Record of Title 161879
Section 2929 and Part Section 2634 – 2635 Block V Waiwhero Survey District and defined on DP 764 contained in Record of Title WS2A/228
Rural Section 2930 contained in Record of Title WS1B/293
Rural Section 2931,2932,2933,3316 and Part Rural Section 2639 contained in Record of Title WS8B/528
Section 4033 Block V Waiwhero Survey District contained in Record of Title WS1A/892
Part Section 5 Block IX Waiwhero Survey District contained in Record of Title WS2B/591
Lot 1 DP 406050 contained in Record of Title 486401.

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3. Initial works

3.1 Initial works on the site will be undertaken prior to the commencement of any mining. These include:
(a) Bunding, planting (associated with noise bunds) and fencing; and
(b) Establishment of the mine starter pit.

3.2 A mine starter pit is required in each of the three sections to establish the initial dredge pond in which the floating dredge will operate. Separate starter pits are necessary because the sections are divided by physical features that will not be disturbed i.e. Granite Creek separates Sections 1 and 2, and Cargill Road separates Sections 2 and 3. These starter pits enable the dredge to begin operations independently within each section.

3.3 The floating dredge will be transported to each mine starter pit using conventional mining equipment transport methods in order to avoid adverse effects on the surrounding environment. This approach is consistent with the methodology proposed for transporting the dredge to the Application area and for its initial assembly.

3.4 The mine starter pit will be developed by excavating into the water table. An area of approximately 100m wide x 300m long, and up to 10m deep will be excavated using an excavator and trucks, removing approximately 270,000m^3 of material. This size allows for:

(a) A dredge pond (mine void) of approximately 100m x 100m;
(b) A 100m x 50m area behind the dredge for the deposition of tailings following processing; and
(c) A 100m x 100m area in front of the dredge pond at various stages of excavation, ready to be mined.

3.5 The first mine starter pit will be located in Section 1: Granite Creek North. Material extracted from the starter pit will be used for the construction of the noise control bunds adjacent to Lot 2 DP2178 and another near Warren Road, located along the eastern boundary. Both bunds will be approximately 3m high with a 4.8m crest. The Warren Road bund will extend approximately 280m. Constructing the bunds at this early stage enables associated planting to be carried out in advance and allows time for vegetation to establish. The location of the starter pit is shown in **Plan D**. The construction of both the starter pit and the Section 1: Granite Creek North bunds are anticipated to take approximately two months.

3.6 A similar approach will be taken for Sections 2 and 3, with a mine starter pit excavated prior to the commencement of mining in each section. For Section 2, material excavated from the starter pit will be used to construct an 'L-shaped' noise control bund on the northern side of Cargill Road. For Section 3, material excavated from the starter pit will be used to construct a noise control bund along the southern side of Cargill Road near 101 Cargill Road. Both bunds will be approximately 3m high with a 4.8m crest.

3.7 The location of the noise bunds are shown in **Plan E**. Any excess material not required for bund construction will be stockpiled for future processing and rehabilitation.

4. Indicative mining sequence and setbacks

4.1 Following construction of the mine starter pit, the dredge will extract ore in strips. The indicative mining sequence, showing the anticipated pattern and extent of mining over time, is shown in **Plan D**. Mining will generally progress in a north/ south direction, although there will be some mining in an east/west direction where the dredge turns to commence a new strip. **Plan D** also shows the location of each mine starter pit.

4.2 The indicative mine path is influenced by both ore grade distribution and the long-term rehabilitation of the site. Commencing mining in areas with higher ore grades provides an earlier return on investment for the company. Mining from the western (coastal) side and progressing eastward allows previously mined areas to be progressively rehabilitated back to existing ground levels while maintaining natural drainage gradients towards the coast. Land on the western side of the site will be rehabilitated to existing ground levels.

4.3 As mining advances inland, ground levels will be progressively lowered contributing to the formation of a constructed wetland as part of the final landform across Sections 1 and 2

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(Stages 1 and 2). To achieve the post-mining contours across all three Sections (Stages), material will be sourced from areas outside the mining disturbance area but within the wider application boundary. Approximately 110 hectares within the application area provide a readily accessible source of fill material. These areas will be selectively cut and regraded, with suitable material transferred over short haul distances, typically within approximately 100m, using bulldozer "cut and carry" methods. This material will be progressively redistributed into backfilled mining areas to recontour the landform, achieve stable final ground levels and integrate rehabilitated areas with the surrounding landscape.

4.4 Each mining strip will be approximately 100m wide and excavated to a depth of 10m below ground level noting that the depth of mining is dependent on the ore distribution. The coloured strips on **Plan D** represent the expected extent of mining for each year. The total disturbed land area at any one time will be 16ha. Disturbed land means the land within the application area that has been directly affected by mining or associated activities, including areas subject to vegetation disturbance, topsoil stripping, excavation and active mining in the mining void, tailings deposition, overburden placement, bund construction or areas undergoing progressive rehabilitation prior to the re-establishment of stable landform and 80% vegetative cover.

4.5 The dredge is expected to progress at an average rate of approximately 2,200 metres per year or approximately 166 metres per month or 6 metres per day (based on 26 working days in a month). This rate will yield 2,000,000 tonnes of raw material per year and is subject to variation depending on the depth of the ore body, the average grade of the ore encountered and the need to ensure that the total disturbed area for mining is no more than 16ha. Weather conditions can impact progressive rehabilitation, i.e., influencing the rate of growth of vegetative cover (see Section 7 for progressive rehabilitation and vegetation cover).

4.6 It is proposed to set mining back from key environmental features and boundaries as follows:

(a) 20m from the consent boundary;
(b) 20m from Granite Creek;
(c) 20m from Fagan Creek;
(d) 50m from Mean High Water Springs (MHWS);
(e) 20m from the proposed SNA PUN-049, which is adjacent to Section 2 (Granite Creek South);
(f) 20m from all private property boundaries not within the consent area; and
(g) 200m from dwellings other than where noise bunds are proposed.

4.7 These setbacks are shown on **Plan F**.

5. Mining methodology

5.1 Once the mine starter pit has been constructed, the following steps will be undertaken to enable the extraction of ore:

(a) Removal of pasture, small areas of farm vegetation and wildlife checks;
(b) Stripping of topsoil and overburden;
(c) Diversion of streams and drains;
(d) Extraction of run of mine material;
(e) Initial screening of run of mine material and deposit of waste material;
(f) Pumping of run of mine material to WCP.

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5.2 This process is illustrated by **Figures 1** and **2** below and discussed in detail in the following sections.

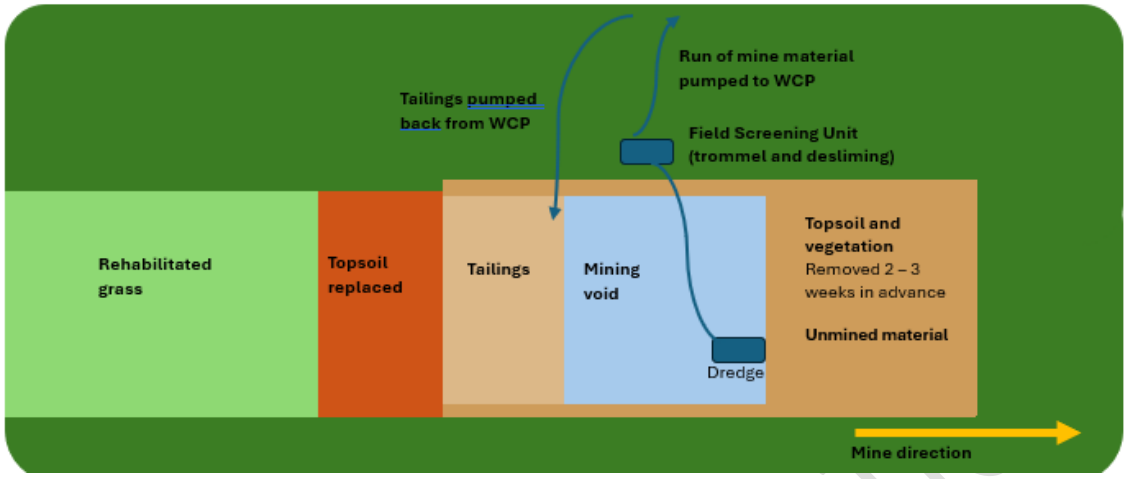

Figure 1: Schematic representation of the mining methodology in plan view

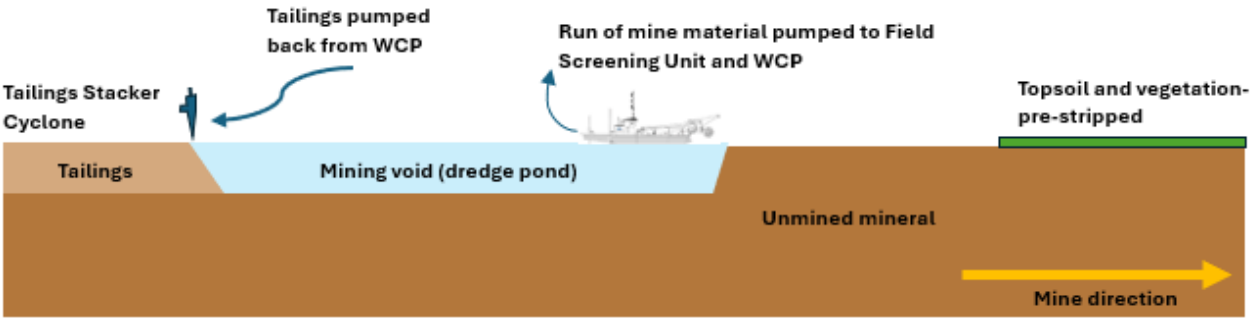

Figure 2: Schematic representation of the mining methodology in profile view

Archaeological Assessment

5.3 An archaeological assessment of the SB has been carried out. The SB was extensively dredged and modified in the 1930's and 1940's and then humped and hollowed for farming purposes. There are two recorded archaeological sites (find spots) within the mining disturbance area. The artefacts from both find spots have been removed and there is no evidence that further features or deposits relating to the site remain in situ. Earthworks on site will proceed under an archaeological authority.

Vegetation removal and wildlife checks

5.4 There are small areas of vegetation located around some creeks, drains and former dredge ponds, which will need to be removed at the same time as topsoil is removed (i.e., 2 – 3 weeks prior to mining). Some of that vegetation has been identified as potential habitat for lizards. In addition, open pasture can potentially be used by breeding birds. **Plan G** shows the waterbodies on site.

5.5 It is proposed to undertake regular surveys of areas scheduled for mining before and during the breeding season to identify any breeding behaviour in the area. Where those surveys identify that nesting is possible, birds will be discouraged from establishing nests through methods such as walkovers, visual cues, audible bird scarers and machinery placement. These actions will be undertaken more frequently and at a greater distance

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from the mining front than in traditional mining operations, reflecting the operational requirements and movement patterns of the floating dredge. Where monitoring identifies the presence of Kororā (little blue penguin), relocatable fencing will be erected around the active mining area (including stripped area, mining void, tailings deposition area and contoured land awaiting resowing) to prevent penguin access and minimise risk of harm.

5.6 Lizard monitoring will be undertaken by a suitably qualified ecologist prior to mining an area of potential lizard habitat. If lizards are confirmed to be present, it is proposed to capture and relocate the lizards to suitable habitat as close as practicable to the site, but outside the mining disturbance area.

5.7 Prior to the commencement of any stream diversion or streamworks activities, native freshwater fish present within affected watercourses or wetland habitats will be salvaged and relocated. Similar to any lizards found, salvaged fish will be relocated to suitable habitat as close as practicable to the site but outside the mining disturbance area.

5.8 Once wildlife (if any) has been appropriately managed, any vegetation useful for rehabilitation will be removed. Where it can be, vegetation will be transferred and used as part of the progressive rehabilitation in the planting around creek mouths, diverted creeks or the constructed wetland.

Topsoil and overburden stripping

5.9 Once vegetation has been removed, topsoil (to approximately 0.2 - 0.6m deep) and overburden will be removed 2 – 3 weeks prior to mining, using an 85-tonne excavator and 40 tonne articulated trucks. The area of topsoil and overburden stripping is shown in Figure 1 above.

5.10 Some of the removed material will be used to create small 1m high safety bunds (to prevent vehicles from driving into the mining void and provide stormwater control) along either side of the mining void. The mining void is the area comprising the dredge pond, the area behind the dredge pond for deposit of tailings after processing, and the area in front of the dredge pond from which run of mine material is being extracted. The remainder of the material will be used for rehabilitation. Initially, that material will be stockpiled for later use, but once mining commences fully, it will be trucked to the rear of the mining void to be used as part of the progressive rehabilitation. The safety bunds provide the separation between stormwater and mine water (mine water being water that is being discharged back into the mining void).

5.11 The total area stripped of topsoil and overburden in advance of mining will be approximately 100m x 100m.

Stream diversions/ removal of drains

5.1 Diversions to, and reconstruction of the existing creeks will be required to enable mining Drainage channels across the site will be diverted to enable mining, and will be reconstructed where required to maintain catchment drainage patterns.

5.12 The specific creeks requiring diversion are shown in **Plan G** and are:

(a) Northern Creek;
(b) Central Creek;
(c) Clarke Creek;
(d) Wasabi Creek; and

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(e) Southern Creek.

5.13 Productive farming practices have resulted in a network of drainage channels developed across the site. As mining progresses, these drains will be diverted to avoid the active mining area.

Little Granite Creek runs along the eastern boundary of the site before joining Granite Creek. These two creeks, Little Granite Creek and Granite Creek, will remain undisturbed and are not proposed to be diverted as part of the mining operation. Canoe Creek and Fagan Creek will also remain unaffected by the activity.

5.14 The diversion methodology differs for each creek or artificial drain depending on their orientation, sequence of mining activities and future purpose (in regards to artificial drains these may be retired or a new 'creek' constructed to manage drainage).

(a) North–south oriented creeks and drains will be diverted into a previously mined area before mining reaches the creek or drain (except where mining is adjacent to the coastal setback boundary). This may require adjustments (widening or narrowing) of the mine path to facilitate this. A permanent reconstructed channel will be built in advance as part of the rehabilitation of the mined land, and the flow will be redirected into it in a single 'livening' event. Refer **Figure 3** for further detail.

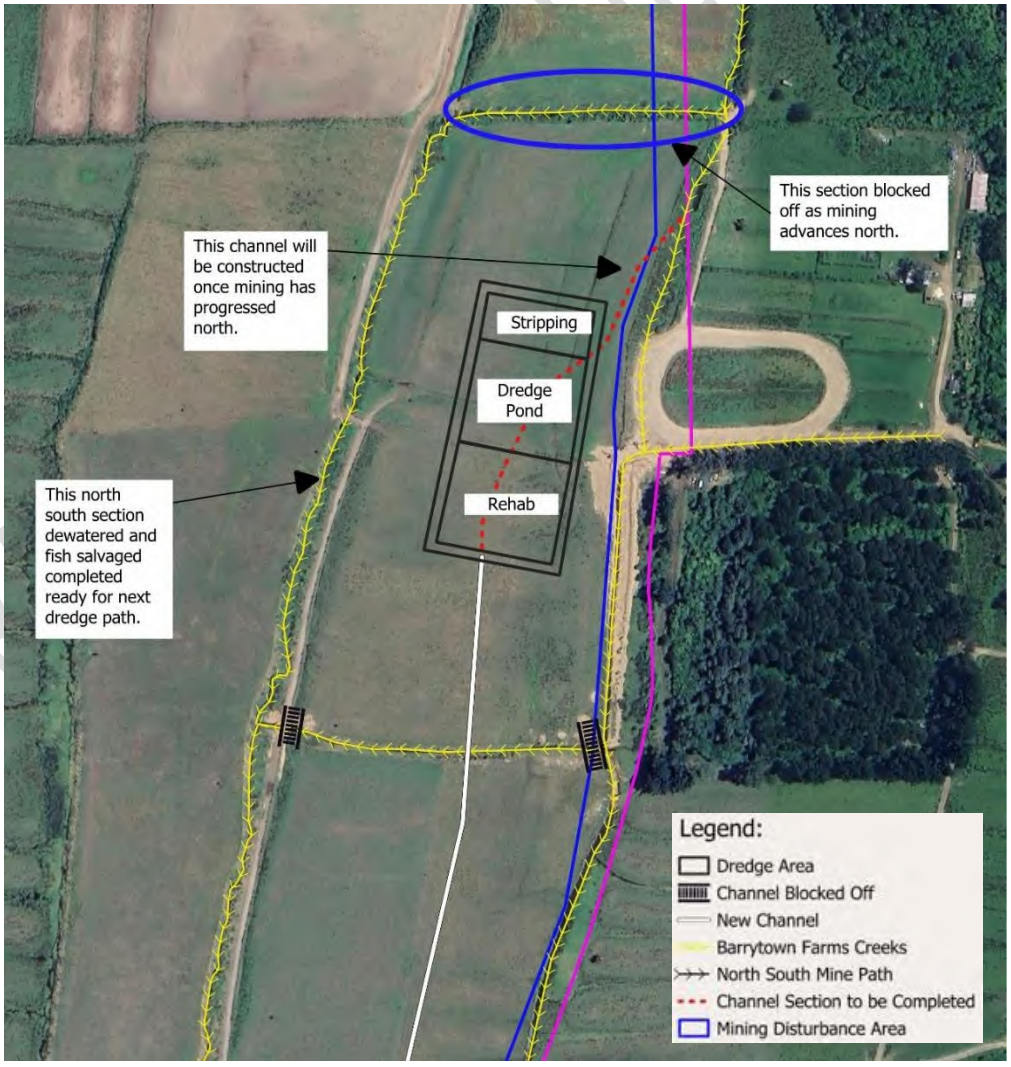
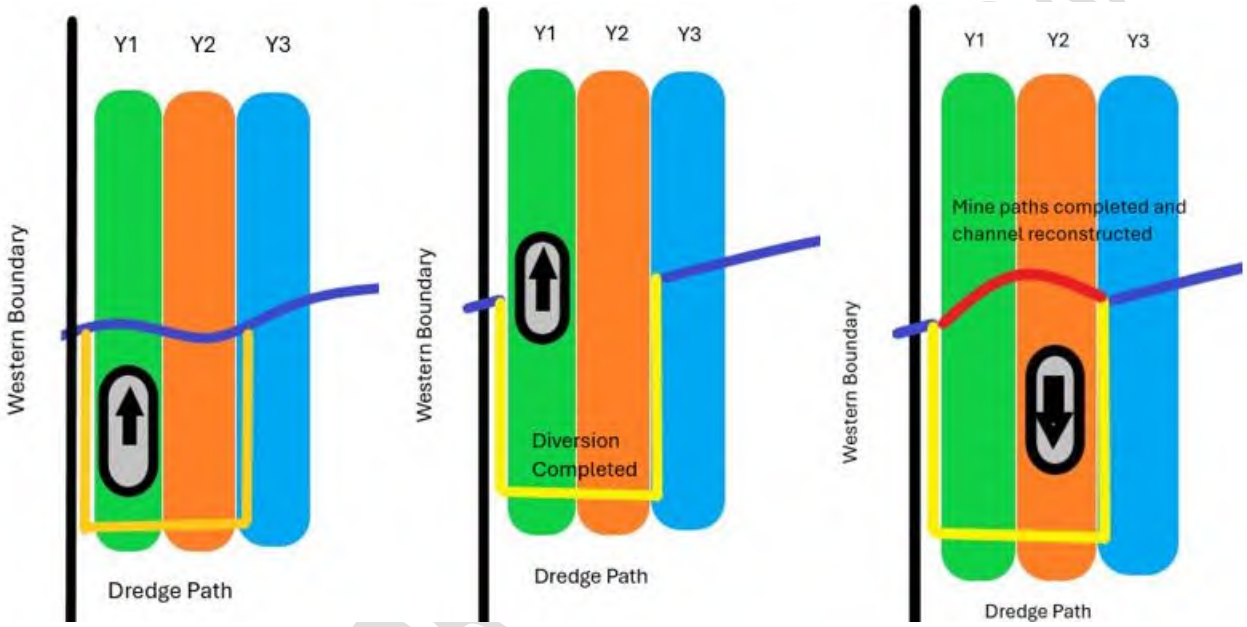


Figure 3: Diversion methodology for north south waterbodies

(b) East–west oriented creeks and drains will be diverted into previously mined areas (behind the mining void) and into the adjacent mine path (to the east as mining moves inland), prior to mining progressing through the creek or drain's existing alignment. This requires a temporary diversion of the creek or drain around the active mining area. Once mining has advanced beyond the alignment, a permanent reconstructed channel can be constructed and the creek, and where required drain, can be reinstated.

Creeks and drains will likely be disturbed several times, with temporary diversions occurring each time the active mining area intersects these waterbodies, potentially once per year for up to 3 months at a time per waterbody. Diverting the creek or drain around two sections of mine path at a time reduces the number of diversions required. Refer **Figure 4** for further detail.



As the dredge approaches the creek or drain, a temporary diversion (shown in yellow) is constructed behind the mining void.

The creek or drain is then diverted into this temporary channel, allowing the dredge to continue along its planned path.

Once the mining void has progressed beyond the proposed reconstructed alignment, the diversion is redirected into the newly rehabilitated channel (shown in red).

Figure 4: Diversion methodology for east west waterbodies

5.15 Fish relocation will be undertaken onsite as part of the diversion process as specified in 4.7.

5.16 The five creeks that will be diverted and mined are Northern Creek, Central Creek, Clarke Creek, Wasabi Creek and Southern Creek. Each of these creeks will be reinstated during progressive rehabilitation. **Table 1** identifies the creeks that are to be diverted, and their pre-mining and indicative post mining lengths. The diversion methodology to be applied has also been identified.

5.17 Some of the original artificial drainage channels may be reinstated, particularly if land contouring alone does not provide sufficient drainage. Creeks and drains will be connected to the constructed wetland area or re-established natural creek systems to support site hydrology and ecological function.

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Table 1: Creek extent pre and post mining

Creek	Length pre-mining (based on continually or intermittent flow extent)	Length post-mining (indicative but not less than the pre-ming length)	Diversion methodology to be applied
Northern Creek	1,088m	1,100m	East West
Central Creek	650m	700m	East West
Clarke Creek	680m	700m	North South
Wasabi Creek	727m	750m	North South / East West
Southern Creek	1,088m	1,100m	East West

Extraction of run of mine material

5.18 Following the removal of topsoil and overburden, the floating dredge can extract the run of mine material (**ROM**) from the newly stripped area from within the mine void without the use of other machinery.

5.19 The floating dredge will sit in a 1ha dredge pond, located in the mining void. The maximum depth of the mining void is 10m, which will maintain a natural water level approximating the ambient water table height. A picture of the type of floating dredge that will be used in the Project is shown in **Figure 5** below.

Figure 5: Floating dredge proposed to be used

5.20 The dredge has a suction cutter at the end of the dredge arm. The suction cutter will excavate the pit face by cutting into the bank and breaking down consolidated material. The loosened material will be drawn in through the suction head below water level, immediately mixed with water taken from the dredge pond to form a slurry and pumped to the field screening unit within the safety bund area.

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5.21 The dredge is capable of precise cutting and will cut slopes at approximately 1 vertical to 3 horizontal (1V:3H), which is consistent with industry standards for cutter suction dredging and provides for stable batters. The presence of water in the mining void provides sufficient pressure to ensure slope stability, as does the progressive tails deposition in the rear of the mining void. Safety bunds around the outside of the mining void will ensure that heavy machinery does not operate on the edge of the mining void, creating pressure on the slopes.

Initial screening of run of mine material and deposit of initial waste materials

5.22 The Field Screening Unit undertakes the initial screening of the ROM. Slurry passes through a trommel (a rotating cylindrical screen), which separates larger, coarser materials and debris (+2mm) from finer particles. Oversized material captured by the trommel is removed from the process stream to prevent damage or blockages in downstream equipment.

5.23 The slurry then enters the desliming circuit, which removes very fine silt and clay particles (referred to, when mixed with water, as "slimes"). By eliminating these particles, the desliming circuit improves the recovery of valuable heavy minerals and reduces the load on the WCP.

5.24 The large reject material from the trommel and the slimes will be returned to the rear of the mining void to be used in the progressive rehabilitation (see Section 7 for further discussion).

5.25 After screening and desliming, ROM is pumped as a slurry to the WCP for further processing.

6. Processing of run of mine material and transportation to market

6.1 Authorisations for further processing and transport are not being sought through this Fast-track application, as they have already been granted (or applications are being processed), as outlined in Sections 1.2 – 1.5. The resource consents and other permissions that have been obtained provide for a full mine to market process that results in finished product being exported to markets around the world. The following information is provided to explain the overall processing methodology and to place the proposed activities within the full operational context.

6.2 Following extraction, ROM will be processed in two stages. The first stage of processing will be undertaken on site at the WCP to extract Heavy Mineral Concentrate (HMC). The HMC will then be transported by truck to the MSP at Rapahoe to undergo the second stage of processing.

6.3 Consent for the MSP at Rapahoe was granted by the Grey District Council in October 2025.

6.4 Consent from the Grey District Council for the establishment, operation and maintenance of the WCP and access road is currently being processed and is expected to be granted prior to lodgment of this application. Consent for the earthworks component of this activity was granted by the West Coast Regional Council in February 2026.

Stage 1 processing - WCP

6.5 Mined ore will be pumped as a slurry from the mining void to the WCP, a fixed processing facility that receives material from mining activities across the resource area. At the WCP, valuable heavy minerals are separated from sand and silt using a water-based gravity

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separation process. This produces three material streams: HMC, middles and tails ('middles' and 'tails' are referred to generically as 'tailings' in this application).

6.6 Tailings are returned to the mining void as slurry, while clean water is managed and reused within the process. The HMC is dewatered to 10-15%, temporarily stored and transported off site by heavy vehicle for further processing at the MSP at Rapahoe.

Stage 2 processing - MSP

6.7 Processing at the MSP enables the extraction of concentrated garnet and ilmenite products.

6.8 The MSP has been strategically located at Rapahoe to ensure proximity to rail where product will be transported in containers to Lyttleton or Timaru Port for export to global markets. Waste material from the MSP (which has come from the SB) will be transported by heavy vehicle back to the WCP at the SB. That material will be deposited within a bunker at the WCP before it is pumped back to the mining void as a slurry to be used to backfill the mine pit for rehabilitation.

6.9 The MSP represents a critical component of the long-term viability and growth of the sand mining industry on the West Coast. The MSP provides significant value-add by enabling on-shore, and in-region, refinement of mineral products prior to export.

7. Management of processing water and stormwater

7.1 Water will be required for the processing of ROM at the WCP. Water used for processing, as well as stormwater captured on the WCP site, will be managed through a MWF located adjacent to the WCP.

7.2 The MWF will include lined treatment ponds and thickener tanks that enable sediment and fine particles to settle out of return water using biodegradable flocculants. Treated (clean) water will be recycled back into the processing system, while settled solids will be combined with tailings and returned to the mine pit as a slurry to support backfilling and rehabilitation.

7.3 The MWF is part of the ancillary infrastructure required to operate the WCP and will be authorised by the consent for the WCP.

Processing water

7.4 Processing water will be sourced from the existing water take location on the CB, unless further investigation identifies a practical alternative water source on the SB through future testing. Consent GDC-3154-23 / WCRC-2023-0046 authorises the abstraction of water for processing CB-mined material at the WCP for a 12 year duration. A new consent is being sought via this application to ensure the water take is available to the newly located WCP, and to support longer-term mining of the SB. It is proposed that the existing consent be surrendered as part of the grant of the new take. The approximate water take location on the CB is indicated on **Plan H**.

7.5 Water taken will be used to fill the ponds at the MWF, storing water for when it is required to be used for processing ROM at the WCP. The peak water take will occur when the WCP is restarted to process material from the SB or following maintenance or shutdowns. This is because the tanks and pipelines of the WCP must be filled with water prior to material being processed. During these periods, the full take of 63l/s will be required, likely over several days.

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7.6 Once processing is underway, water demand will significantly decrease. Water is recycled and reused throughout the plant, reducing the need for a continuous fresh supply. Only intermittent top-ups will be required to offset the water that remains in the HMC, and therefore lost from the site. It is estimated that approximately 10-15% of water drawn from the bore will be retained in HMC. This makes up the largest water loss within the system.

7.7 To compensate, make-up water will be drawn down at an average rate of 9.5l/s for the duration of processing. In practice, make-up water will be taken in short bursts of typically 15-20 minutes at a time, two to three times per day, at the peak rate of 63l/s.

7.8 Tailings will be mixed with water to form a slurry to be pumped back to the mine void. Tailings will be deposited at the rear of the pit by cyclone and the water will re-enter the mine void and rejoin the surrounding hydrological system.

7.9 The slurry circuit (the pumping of ROM to the WCP and tailings back to the mine void, all undertaken as a slurry) is considered to have a largely neutral effect on the water level in the mining void. The water that returns with the tailings help maintain, or even increase, water levels in the void, offsetting any lowering of the water table caused by the removal of the slurry from the mine void.

7.10 The MWF is designed to treat and temporarily hold process water before it is recycled for use in the WCP. After processing, excess water is treated via a thickener tank, which serves as the primary treatment stage. Fines and suspended sediment are separated from the water in the thickener tank. This water then flows into the forebay and ponds for further settling and storage. A flocculant may be added to enhance the settlement of fine particles. Fines and slimes collected in the thickener tank and forebay are pumped back to the mining void and mixed with coarse tailings for use in rehabilitation. Clean water is recycled back into the WCP for reuse in mineral separation processes or for transporting tailings as a slurry back to the mining void.

7.11 There is no discharge from the MWF treatment ponds to any surrounding water bodies. The only discharge is to the mining void.

7.12 If necessary to maintain capacity in the MWF excess water may be pumped back into the mining void to dissipate naturally.

7.13 It is possible that dissolved metals could be liberated and mobilised because of the mechanical processes of mineral separation and sand and slimes deposition during backfilling of the worked excavation. Lime augmentation (i.e. lime dosing) of tailings and slimes at the time of emplacement within the void, and the inclusion of lime boulders in creek reconstruction will mitigate these effects. Both groundwater and surface water quality and quantity monitoring will be undertaken across the site as set out in the Water Management, Monitoring and Mitigation Plan.

Stormwater

7.14 Stormwater captured within the mining disturbance area will be contained on site by the safety bunds constructed on either side of the mining void. It will either be allowed to infiltrate into the sandy subsoils, or directed to discharge into the mining void where there is sufficient capacity for the water to assimilate into the ground water.

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7.15 Stormwater generated in the WCP area, including runoff from roofs, hardstand areas, stockpiles, and processing surfaces, will be collected via a network of drains, bunds and sumps, and directed to the ponds at the MWF. To maintain operational capacity during high rainfall periods, treated stormwater may be pumped to the mining void to dissipate naturally.

8. Rehabilitation and mine closure

8.1 Rehabilitation of the SB will be undertaken in three stages:

(a) Mined land will be progressively rehabilitated as the mining void advances;

(b) Each section will be rehabilitated as it is completed and mining moves to the next section; and

(c) Final rehabilitation and mine closure will be undertaken once mining of the SB is fully completed.

Progressive rehabilitation of mining void

8.2 The total area of disturbed land is proposed to be limited to 16ha within the SB at any one time, for the purposes of mitigating potential effects relating to dust, landscape, visual and sedimentation/ water quality.

8.3 The 16ha limitation for the mining area means that the site will be progressively rehabilitated by filling the mining void with waste material as mining advances, replacing topsoil and re-grassing the mined area. The 16ha limitation is proposed to only apply to those disturbed areas with less than 80% vegetative cover and mined land will be removed from the disturbed area calculation once that level of vegetative cover has been reached. The disturbed area limits include contingency for any periods of slow growth that may occur (e.g. during winter or a cold wet spring).

8.4 Rehabilitation of the mining void will take place at the same time as mining occurs and is expected to be completed within 12 months of the conclusion of mining in that location. The waste material (known as "tailings") produced by the initial screening of raw material at the Field Screening Unit will be pumped back into the rear of the mining void immediately. Any tailings from the WCP will also be pumped back and deposited at the rear of the mining void. Waste material from the MSP that has been transported back to the SB will also be pumped from the WCP to the mining void and deposited with the tailings to assist with rehabilitating the landform.

8.5 The tailings will be deposited at the rear of the mining void using dewatering cyclones which assist in separating water from solids to create a more stable land surface suitable for rehabilitation. The water separated from the tailings as they are dispersed is discharged back into the mining void.

8.6 The material to be returned to the excavated area includes un-mineralised sand, clay slimes, and gravel and rock greater than 2mm. Tailings will be allowed to naturally beach (spread) out. The cyclone will be moved as required to distribute the tailings evenly across the area.

8.7 Tailings will then be levelled and contoured, as per a surveyed final landform design, with the use of excavators and bulldozers ready to receive the pre-stripped overburden and topsoil. This topsoil and overburden, as well as material from outside the mining disturbance area within the wider application area and the bunds as they are retired, will be spread out and used as a growing medium for rehabilitation of the site. Once overburden

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and topsoil are replaced, the land will be re-vegetated with grass and other vegetation that was removed prior to mining, where possible and appropriate.

8.8 Initial vegetative cover will be established as soon as practicable (potentially using hydroseeding) to minimise any erosion potential. This will be followed by the establishment of longer term, permanent pasture species.

Progressive rehabilitation of each section

8.9 As the mining of each section is completed, the section will be rehabilitated to its final landform which includes a proposed wetland of approximately 51.7ha on the eastern boundary of Sections 1 and 2, which will be constructed in stages (addressed in Section 7.17 below).

8.10 Approximately 5.6 million tonnes (equivalent to 2.6 million cubic metres at a bulk density of 2.2 g/cm^3) of HMC will be removed from the mining disturbance area over the life of the project for further processing and export., To achieve the proposed post-mining contours, material will be sourced from areas located outside the mining disturbance area, from the higher terrace, to be used as fill to reconstruct the final landform. When balanced against the available redistribution material, the final change in landform equates to an average reduction in land height of approximately 0.63m across the entire 408ha consent area.

8.11 The western boundary will be returned to its current ground level to minimise any effects from coastal hazards. Restoring this area to its natural elevation maintains the existing buffer between the active coastal environment and the inland mined area and future farmland. This helps to ensure that the rehabilitated land is not at increased risk from coastal hazards such as erosion or ponding from storm surge events.

8.12 The site is naturally wet and exhibits poor drainage, despite the presence of a humped and hollowed landform and an established network of creeks and drains throughout the area. Following mining activities, the site will be rehabilitated to improve drainage and soil conditions, enabling its return to more productive farmland use.

8.13 The final landform will be contoured to slope towards reestablished creeks to improve drainage and ensure the future productive use of the site. The five diverted creeks (Northern Creek, Central Creek, Clarke Creek, Wasabi Creek and Southern Creek – refer section 4.16 – 4.17) will be reconstructed along more natural, meandering paths, as opposed to their straight and rectified channels, to enhance ecological and hydrological values while maintaining current catchment drainage patterns. Post mining creek extent will ensure no loss of extent or value. Some existing drains may be reinstated if contouring alone is insufficient. Some modified humping and hollowing will be incorporated, though it is intended to be less pronounced than the existing humping and hollowing, and will include the raising of the low areas (hollows) above the water table to reduce sediment and nutrient runoff from future farming activity providing long-term ecological benefits and improved drainage across the site.

8.14 Fences, internal farm roads, bridges and culverts will be reinstated as required.

8.15 The anticipated final land contour is illustrated in **Plan I**.

8.16 A Work Programme will be submitted to the Grey District Council and West Coast Regional Council annually, which will specify rehabilitation works to be undertaken in each 12-month

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period. This will include a summary of the rehabilitation completed during the previous 12 months. This is standard practice for mining activities on the West Coast.

Proposed wetland

8.17 The proposed wetland will be constructed in two stages as follows:

(a) The first stage of the wetland will be constructed on Section 1: Granite Creek North, north of Granite Creek and south of the WCP, following completion of Section 1;

(b) The second stage of the wetland will be constructed on Section 2: Granite Creek South, north of Cargill Road and south of Granite Creek, following completion of Section 2.

8.18 The new wetland will be established along the eastern boundary, planted in native species and fenced from stock.

8.19 There will be an increase in the extent and integrity of wetland across the site due to the construction of the new wetland area. Indigenous biodiversity values are expected to increase at the site, including a net gain in wetland area and indigenous vegetation cover.

8.20 The proposed wetland is shown in **Plan J**.

Proposed planting

8.21 The Applicant has engaged Glasson Huxtable Landscape Architects to assess the potential landscape and visual amenity effects of the proposal. The Landscape Assessment identifies areas where current vegetation should be retained and additional planting, associated with the restoration of creeks and construction of the wetland area, is to be undertaken. These plantings have been designed both for ecological and landscape mitigation for the project and will have long term ecological benefits in terms of stream health and habitat for indigenous species.

8.22 Due to the distance of the mining activity from public viewpoints for the majority of its operation, bunding and planting works are restricted to managing the effects of noise. There are four noise bunds also proposed as set out in Section 7.23. Bunds will have an inward facing grassed slope with dense planting on the crest and outward facing slope.

8.23 Planting and bunding includes:

(a) Lot 2 DP2178 bund - 3m high with a 4.8m wide crest (24m width) approximately 500m long;

(b) Warren Road bund – 3m high with a 4.8m wide crest (24m width) approximately 900m long ;

(c) Cargill Road bund - at the eastern edge of the site stretching north – 3m high with a 4.8m crest (24m width) approximately 460m long;

(d) 101 Cargill Road bund – on the western boundary - 3m high with a 4.8m wide crest (24m width) approximately 440m long.

8.24 Retention of key vegetation has been identified at:

(a) Planting clusters near the WCP;

(b) Planting clusters along the eastern application area boundary north of Cargill Road;

(c) Planting patch adjacent to 101 Cargill Road; and

(d) Riparian vegetation adjacent to Granite Creek;

Closure sequence

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8.25 Final rehabilitation of Section 3 (Cargill Road) will occur following the completion of mining activities in this area.

8.26 As progressive rehabilitation will be undertaken across the SB there will be limited final contouring and blending required once mining is complete. Any final contouring/blending at the southern end of the mining disturbance area will use material from within the wider application area as required.

9. Plant and machinery

9.1 The following machinery listed in **Table 2** is likely to be required to undertake mining, pumping and rehabilitation of the site (although specific models may differ).

Table 2: Mining machinery list

Type	Supplier	Model	Number
Bucketwheel Cutter Suction Dredge	Neumann Contractors	Series 350	1
Dozer	Komatsu	D71PX-24	2
Grader	Komatsu	GD655-7	1
Integrated Tool Carrier	Hitachi	ZW220-5	3
Artic 6wd 45 Truck	Hitachi	B45E	3
Excavator (Long stick)	Hitachi	ZX890LCH	2
Excavator (30 or 40 tonne)	Hitachi	ZX345USLC	2
Field Screening Unit (trommel)	Bespoke		1

9.2 Additional mining equipment and vehicles will be used on site, including a variety of pumps (including land-based, floating and submersible) and light 4-wheel drive vehicles for the transport of mining personnel.

10. Site operation

10.1 This section describes how the site will be operated, in terms of hours of operation, site configuration, transport, lighting, dust management and hazardous substances use.

Hours of operation

10.2 Mining activities associated with the extraction of material will be undertaken during daylight hours only, consistent with the existing consent granted for the CB.

10.3 Hours of daylight are between 30 minutes before sunrise to 30 minutes after sunset[1].

10.4 Mining shall not occur between the hours of 0600 and 0700 within 500m of the dwellings located at:

(a) Lot 2 DP2178;
(b) 37, 41, 43 and 50 Warren Road;
(c) 64, 86 and 101 Cargill Road.

10.5 There will be no mining on Sundays.

[1] *Sunrise and sunset times can be found at* https://www.sunrise-and-sunset.com/en/sun/new-zealand/westport/2023/june

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Site configuration

10.6 Access tracks will be required within the mining area. These will be formed to provide light vehicle and machinery access for the preparation, mining and rehabilitation of various areas as mining progresses. These access tracks will move as mining progresses.

10.7 It is proposed to retain the existing access points for farming activities for the duration of the mining activity, to ensure that any ongoing farming traffic is kept separate from the mine traffic.

Vehicle movements

10.8 There are 57 full time staff proposed to be employed across the WCP and wider mine site at the SB. This includes 18 staff to be employed specifically for the mining activity.

10.9 Vehicle movements associated with mining activities are largely generated by the existence of the WCP adjacent to the SB. They will therefore be authorised by the WCP consent.

Lighting

10.10 Due to activities taking place during daylight hours only, only minimal lighting will be required on the mine site and at the mining void.

10.11 There will be limited fixed lighting in the mine area, which may include lighting around the pump to allow for the pump circuit to be checked overnight. Any fixed lighting in the mine area will be shrouded and adhere to the principles outlined below.

10.12 Lighting will not exceed 2.0 lux spill (horizontal and vertical) onto any adjoining property, measured at any point more than 2m inside the boundary of the adjoining property or the closest window on the adjoining property (whichever is the closest).

10.13 All lighting on site will adhere to the Australian Government's National Light Pollution Guidelines for Wildlife January 2023 (or subsequent revision), including but not limited to:

(a) Utilising the Seabird Light Mitigation Toolbox in Appendix G – Seabirds (Schedule 4);
(b) All fixed lighting shall be pointed downward and shielded to avoid light spill, with a lighting temperature of no more than 2000K, and be filtered to reduce blue and violet wavelengths;
(c) Lights shall only illuminate the object or area intended;
(d) Fixed lights shall be mounted as close to the ground as practicable;
(e) External lighting shall use the lowest intensity lighting as possible, while ensuring compliance with workplace health and safety requirements;
(f) External lighting shall be equipped with light minimising technology, including motion sensors or timers;
(g) Mobile lighting within the mine site will adhere to the above principles, including the dipping of headlights of vehicles operating on site.

10.14 Adherence to the above standards will minimise light spill, thereby preserving the natural character and dark night sky of the coastal environment. The measures proposed will also assist in avoiding the risk of adverse effects on the Westland Petrel Colony located approximately 5.5km north of the WCP location. These standards are consistent with the conditions of consent granted for the CB.

Noise

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10.15 Noise will be generated from the activities at the mining void including excavators and front end loaders to strip top soil and overburden, trucks to move material to the rear of the site, the dredge and field screening unit and the spreading of tails from the cyclone.

10.16 Noise generation has been taken into account in the design of the project. Hours of operation control the activity each day. Earthworks near dwellings will be minimised, and noise mitigation bunds will be constructed at four locations as outlined in Section 7.23.

10.17 The site will operate in accordance with a Noise Management Plan, which sets out the management techniques to be applied to ensure that the site operates in accordance with best practice and unnecessary noise generation is minimised by:

(a) Exhaust silencers fitted to all mobile plant;
(b) Power from the grid used in preference to diesel generators where possible;
(c) Vehicles and equipment maintained to avoid unnecessary noise and vibration;
(d) Trucking contractor behaviour expectations including following speed limit; restrictions, no unnecessary sounding of horns or revving of engines, avoidance of engine braking, vehicles to be properly maintained;
(e) Metal to metal contact avoided during the loading of trucks;
(f) No tonal reversing alarms;
(g) Site vehicles to follow speed limits and drive in consistent manner, no amplified music permitted inside vehicle cabs, horns to be used in emergency only;
(h) Access road and working surface maintained free from potholes and corrugations.

10.18 The following noise limits are proposed to apply at or within the notional boundary of any dwelling existing at the date consent is granted on any other site, except in relation to the four dwellings on Warren Road, three dwellings on Cargill Road and at Lot 2 DP2178:

(a) Daytime (0700-2200): 55 dB LAeq (15 min)
(b) Night-time (2200-0700): 45 dB LAeq (15 min) and 75 dB LAFmax
(c) when measured and assessed in accordance with the latest New Zealand noise standards: NZS 6801:2008 “Acoustics – Measurement of environmental sound” and NZS 6802:2008 “Acoustics -Environmental Noise”.

10.19 At some locations, extraction of ore can proceed between 0600 and 0700hrs (classified as night-time under the District Plan) while still complying with the 45 dB L_{Aeq} noise limit.

Dust Management

10.20 Some activities proposed to be undertaken have the potential to generate dust emissions. While the application site is within a high rainfall area, there are periods of dry weather.

10.21 As the mining activity is a wet process dust generating activities will be limited to times of overburden removal and rehabilitation and vehicle movements on site. These activities are intermittent (not always continuous) and can be managed with techniques outlined in the Dust Management Plan. Dust will be managed via visual inspections, use of water carts and other dust suppression techniques as required.

10.22 The Applicant has installed dust monitors on the perimeter of the mine site. These monitoring stations will remain in place for the duration of mining activities on site.

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Hazardous substances use, storage and management

10.23 The refuelling of machinery will be undertaken on site using a mobile fuel tanker with a centralised fuel store located at the WCP (40,000 litres). The proposed above ground tank will be authorised by the WCP consent.

10.24 Re-fuelling will be completed under direct supervision of the machine operator to minimise the risk of spills occurring. Refuelling will occur at least 20m away from waterbodies.

10.25 Mechanical repairs and servicing will occur at the WCP area. In the event of major mechanical break-down, machines may be taken to an off-site workshop. Spill kits and procedures will be available on site in the event of a fuel or oil spill occurring.

10.26 All waste oil and fuel containers will be removed from the site promptly.

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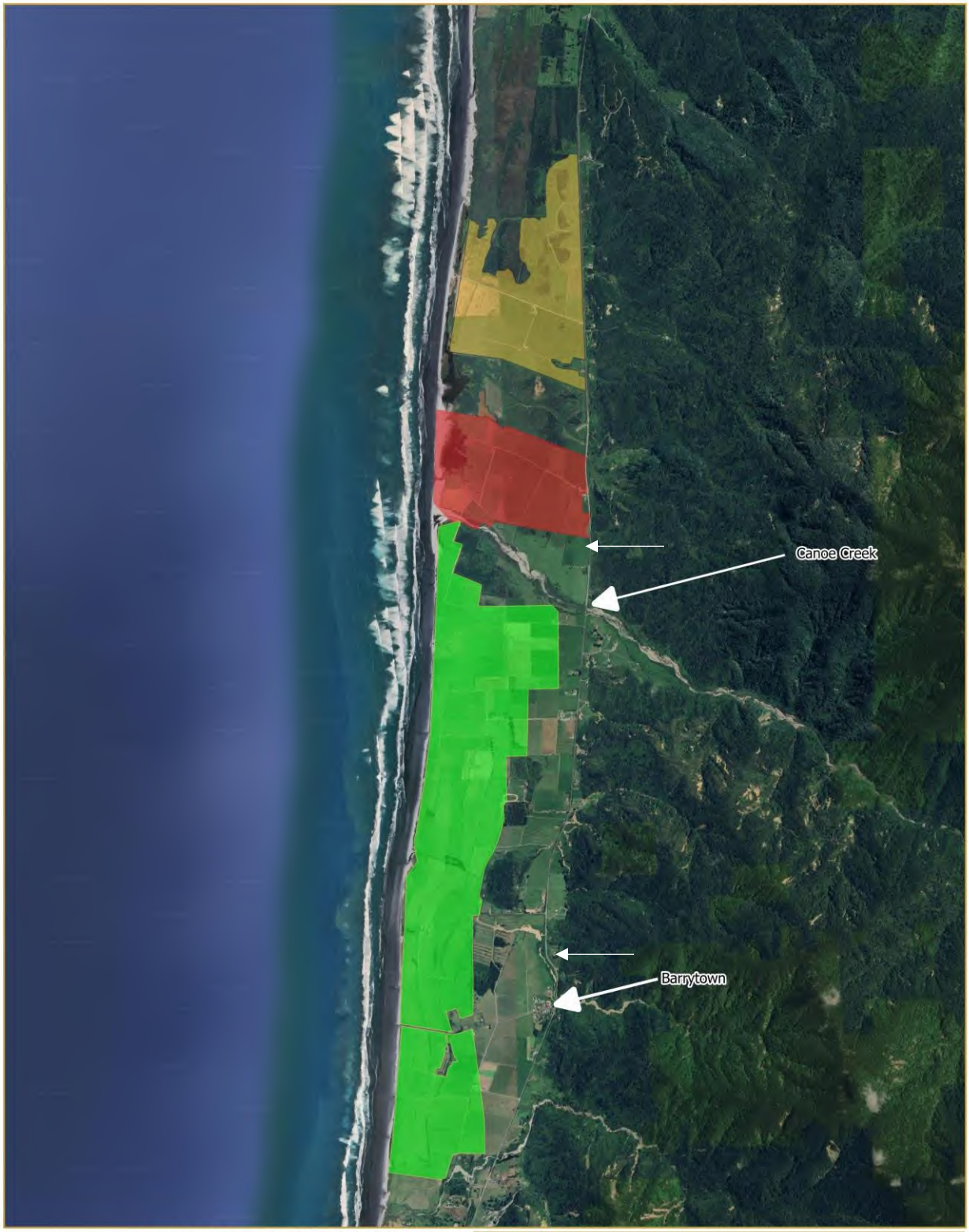
Plan A: Barrytown Critical Minerals Project – Resource Blocks



Plan A - Barrytown Critical Minerals Project - Resource Blocks

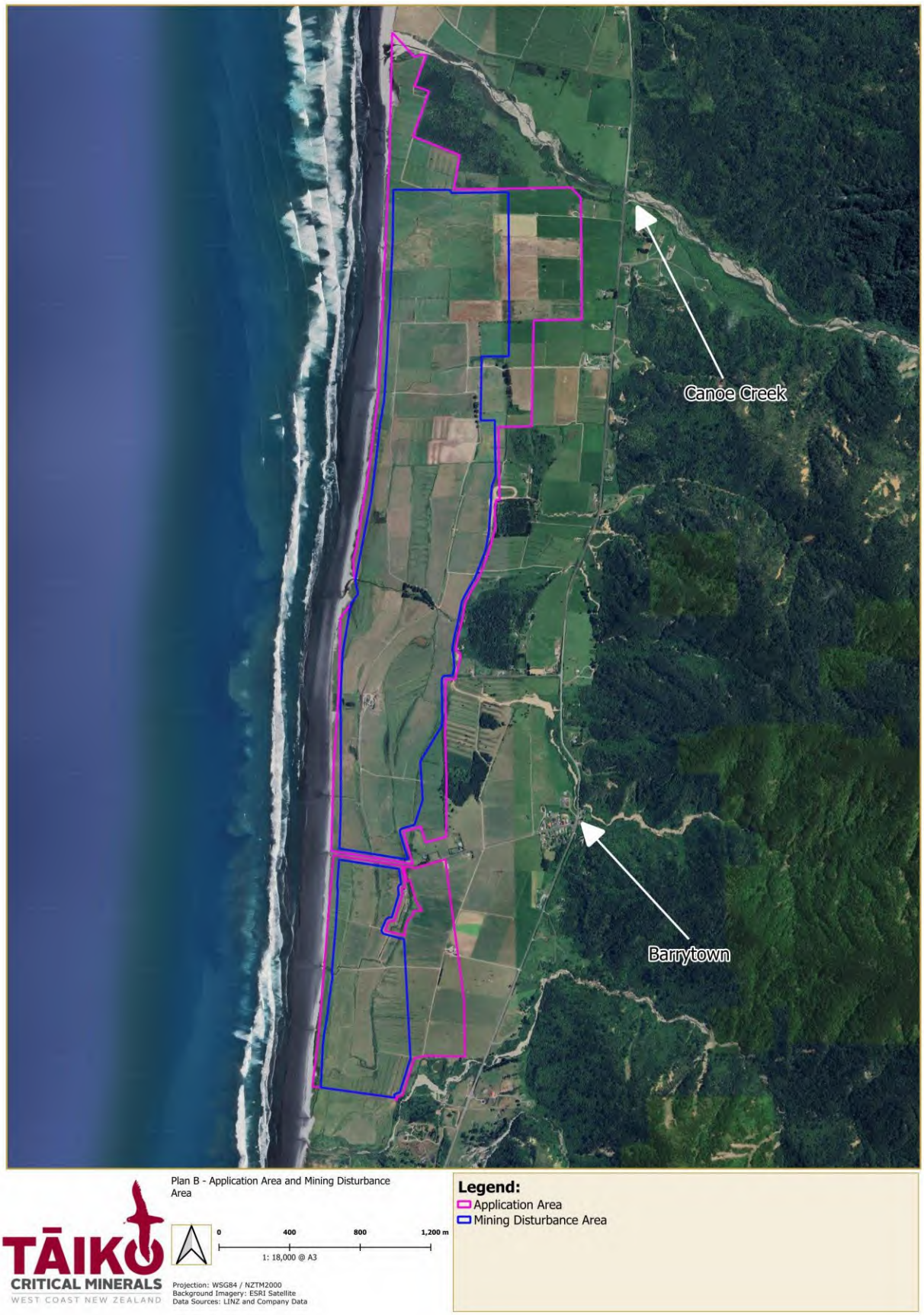
0 400 800 1,200 m

1:30,000 @ A3

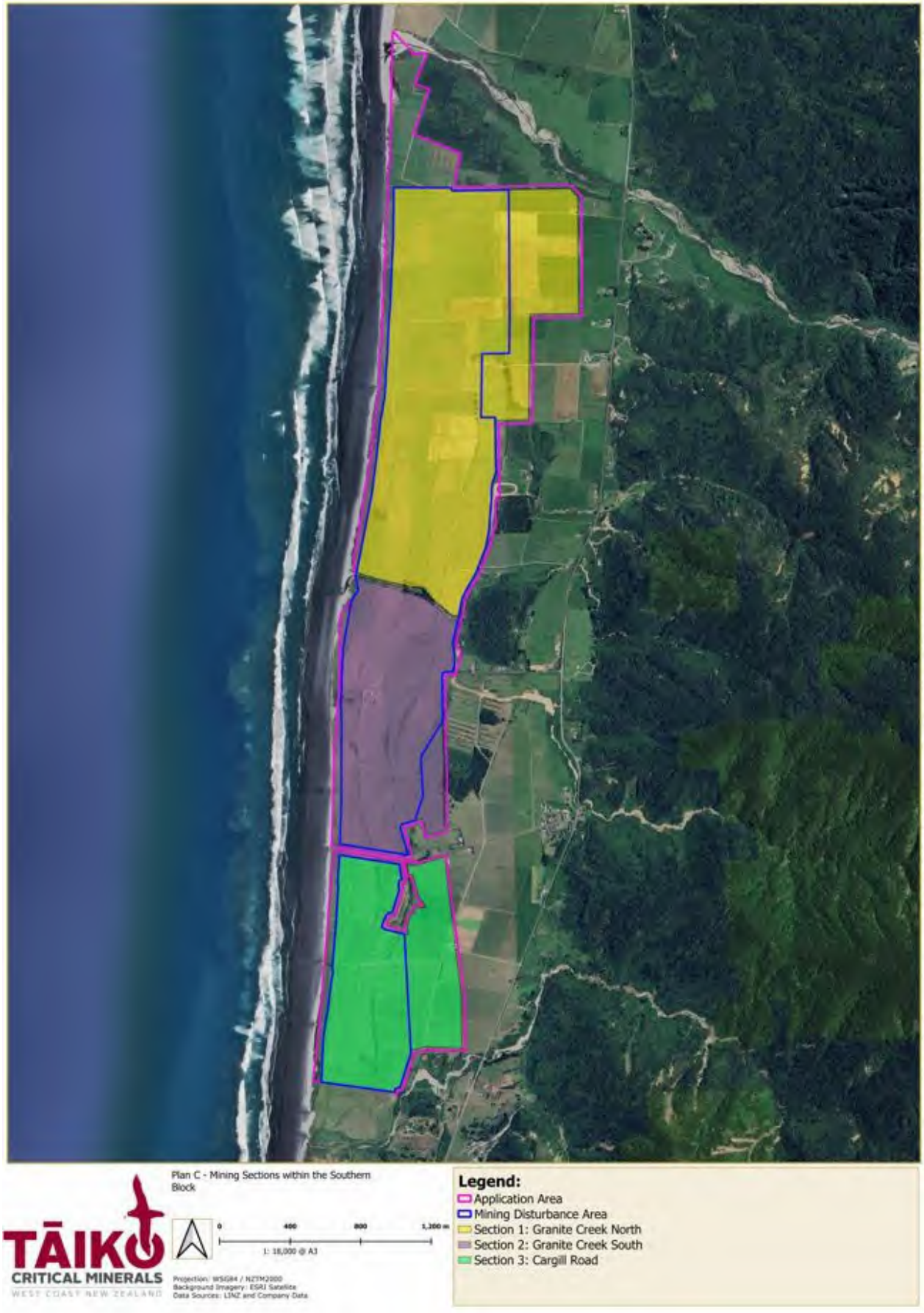
Projection: WSG84 / NZTM2000
Background Imagery: ESRI Satellite
Data Sources: LINZ, Client and/or TPRL Data

Legend:
- Northern Resource Block
- Central Resource Block
- Southern Resource Block

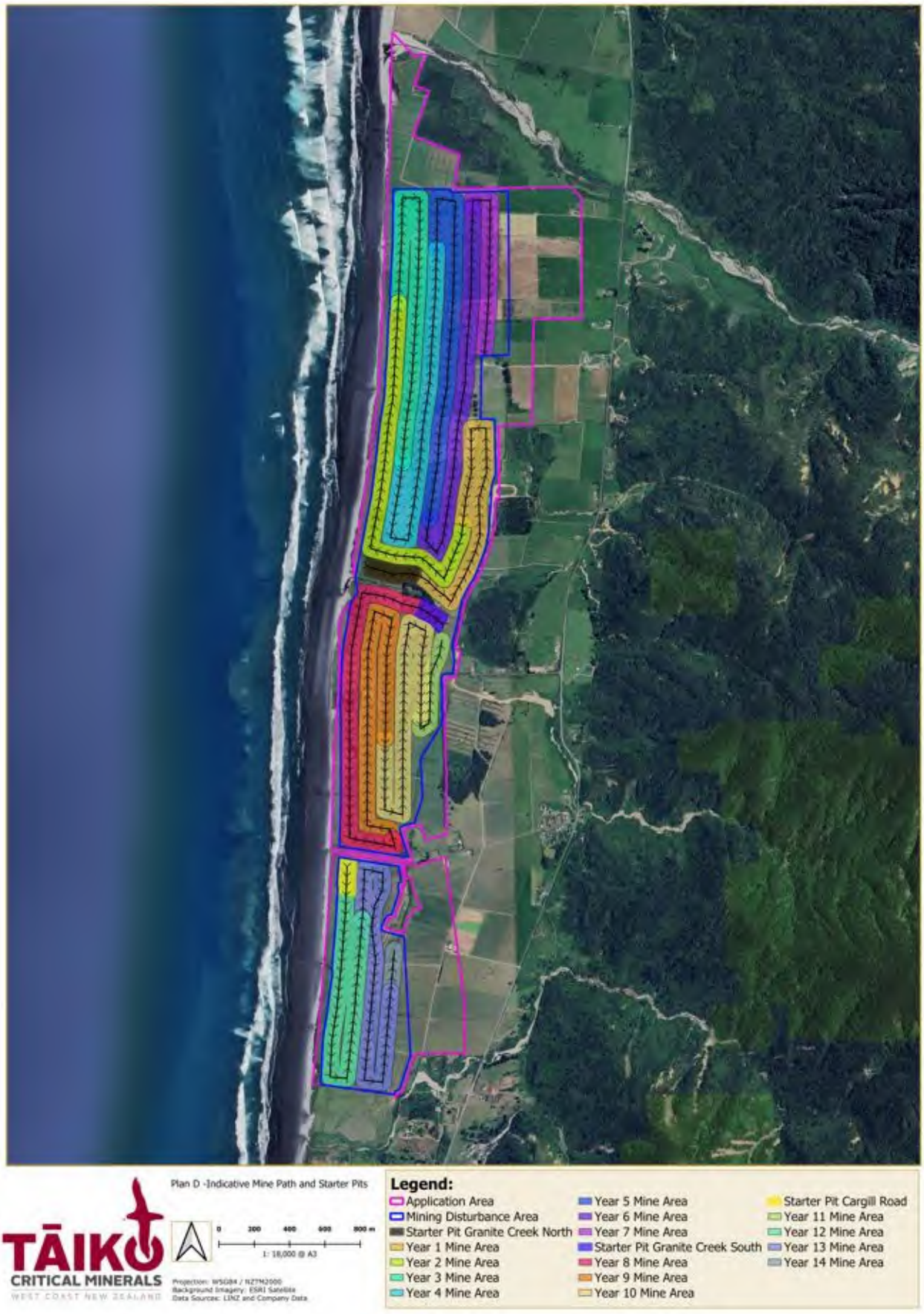
Plan B: Southern Block Application Area and Proposed Mining Disturbance Area



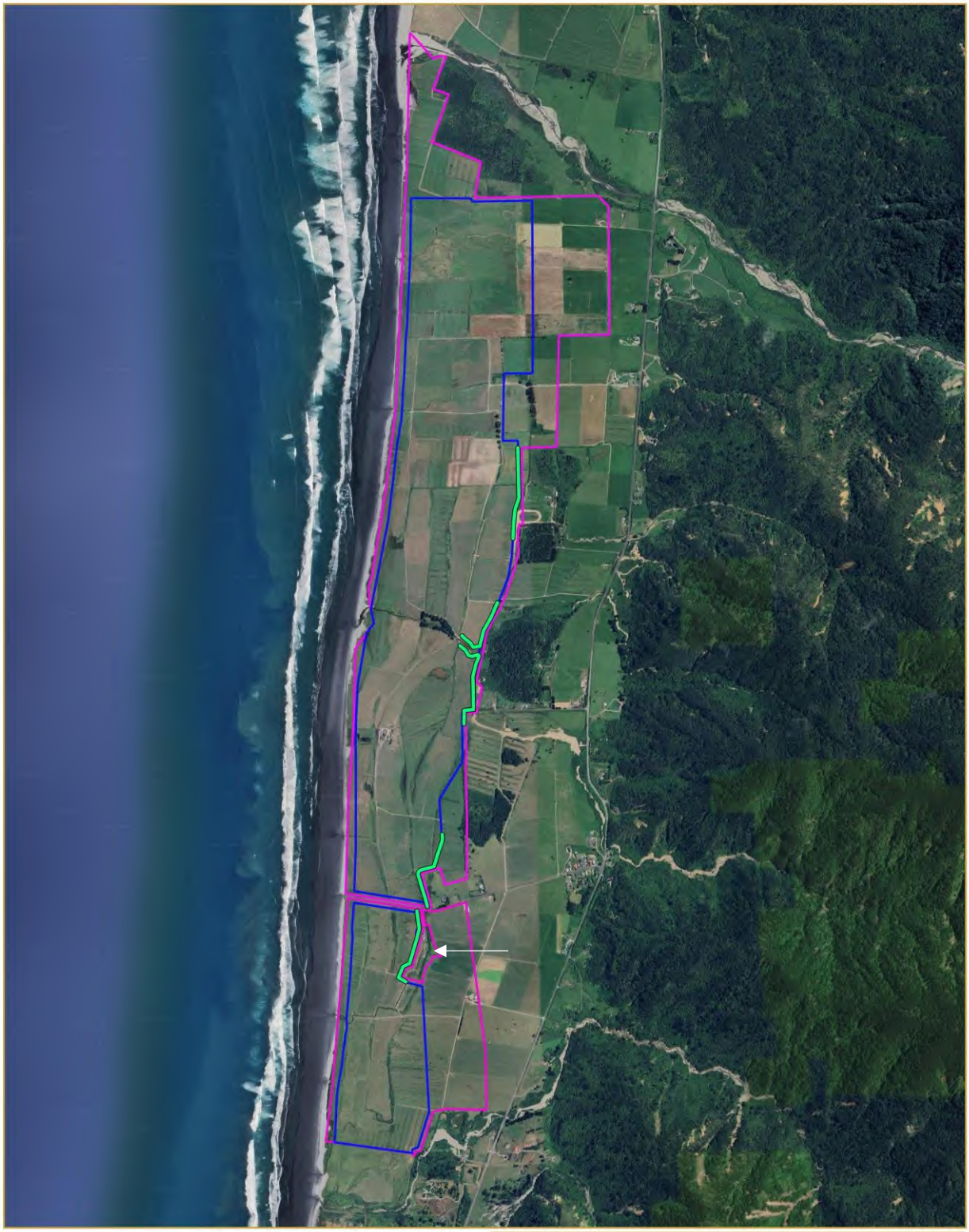
Plan C: Mining Sections within the Southern Block



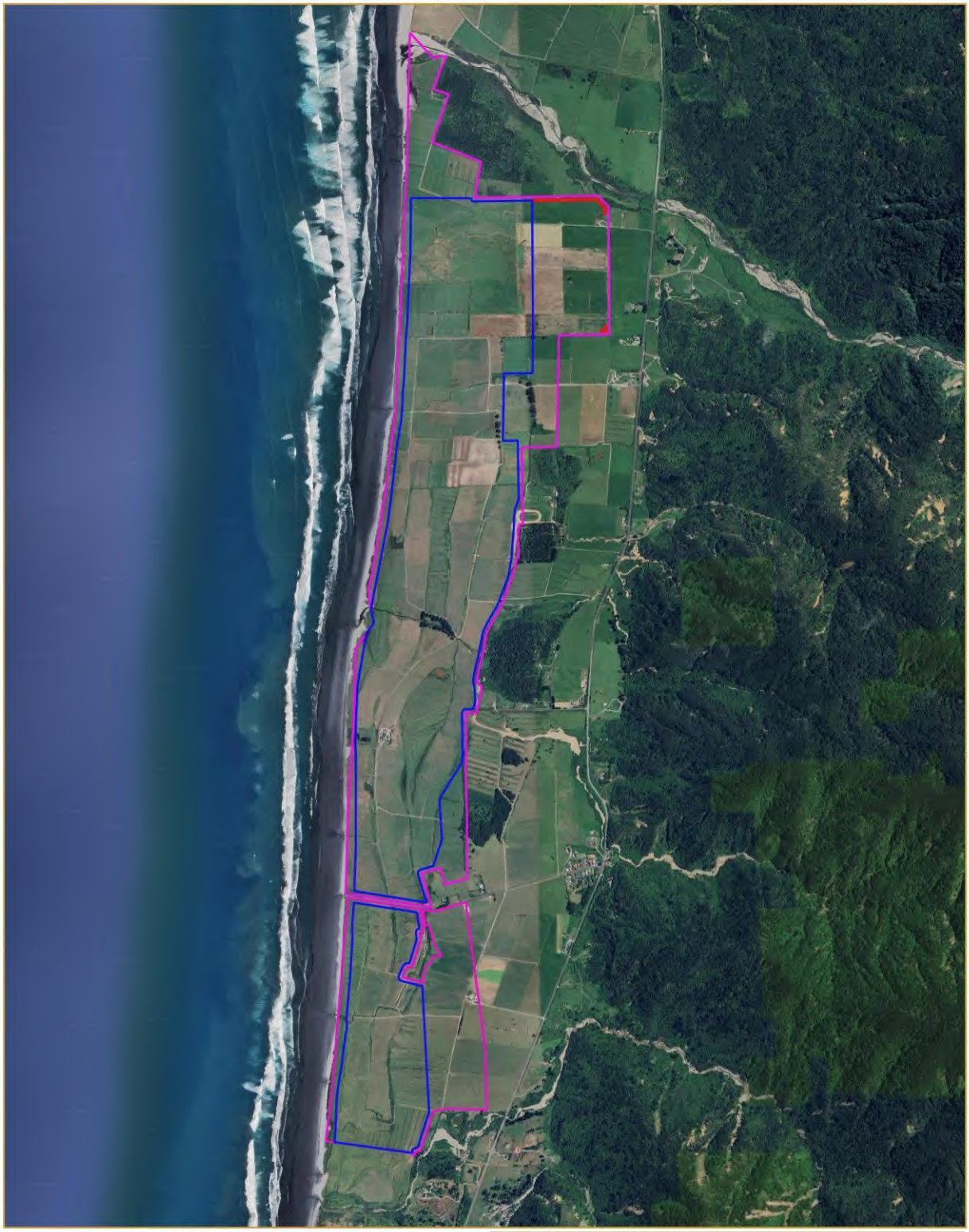
Plan D: Indicative Mine Path Including Mine Starter Pits



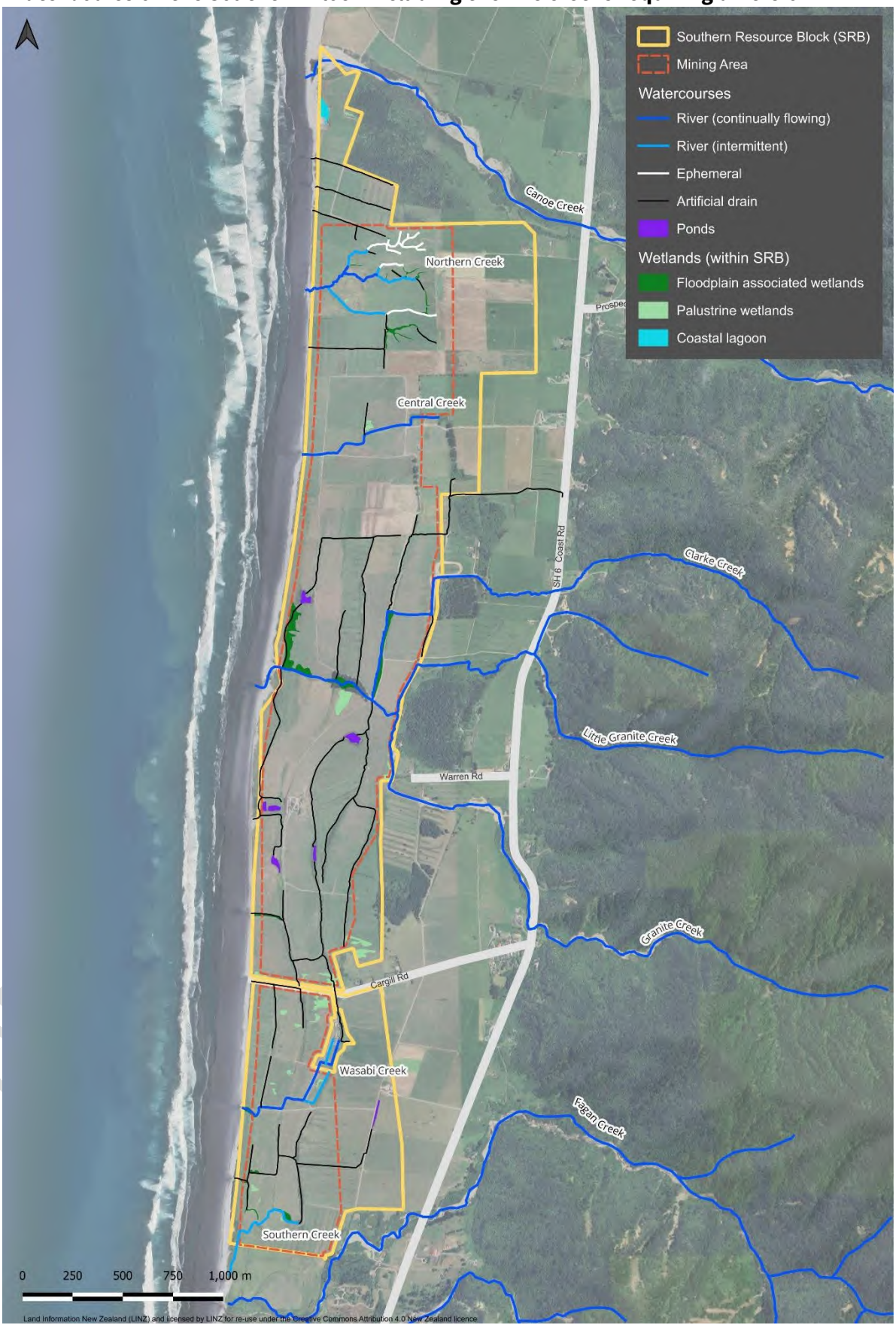
Plan E: Noise Bunds



Plan F: Setbacks From Key Environmental Features

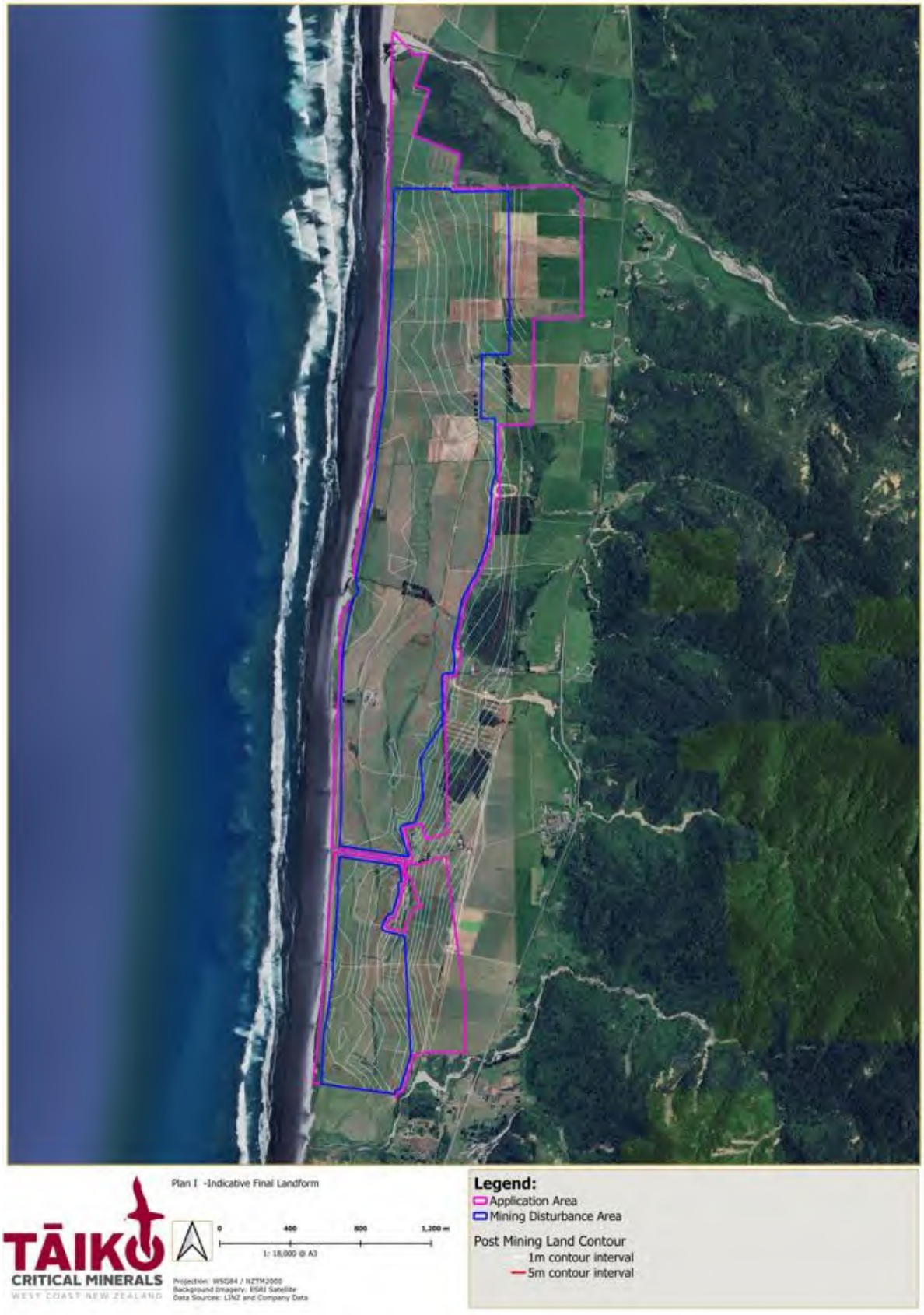


Plan G: Waterbodies on the Southern Block including the five creeks requiring diversion

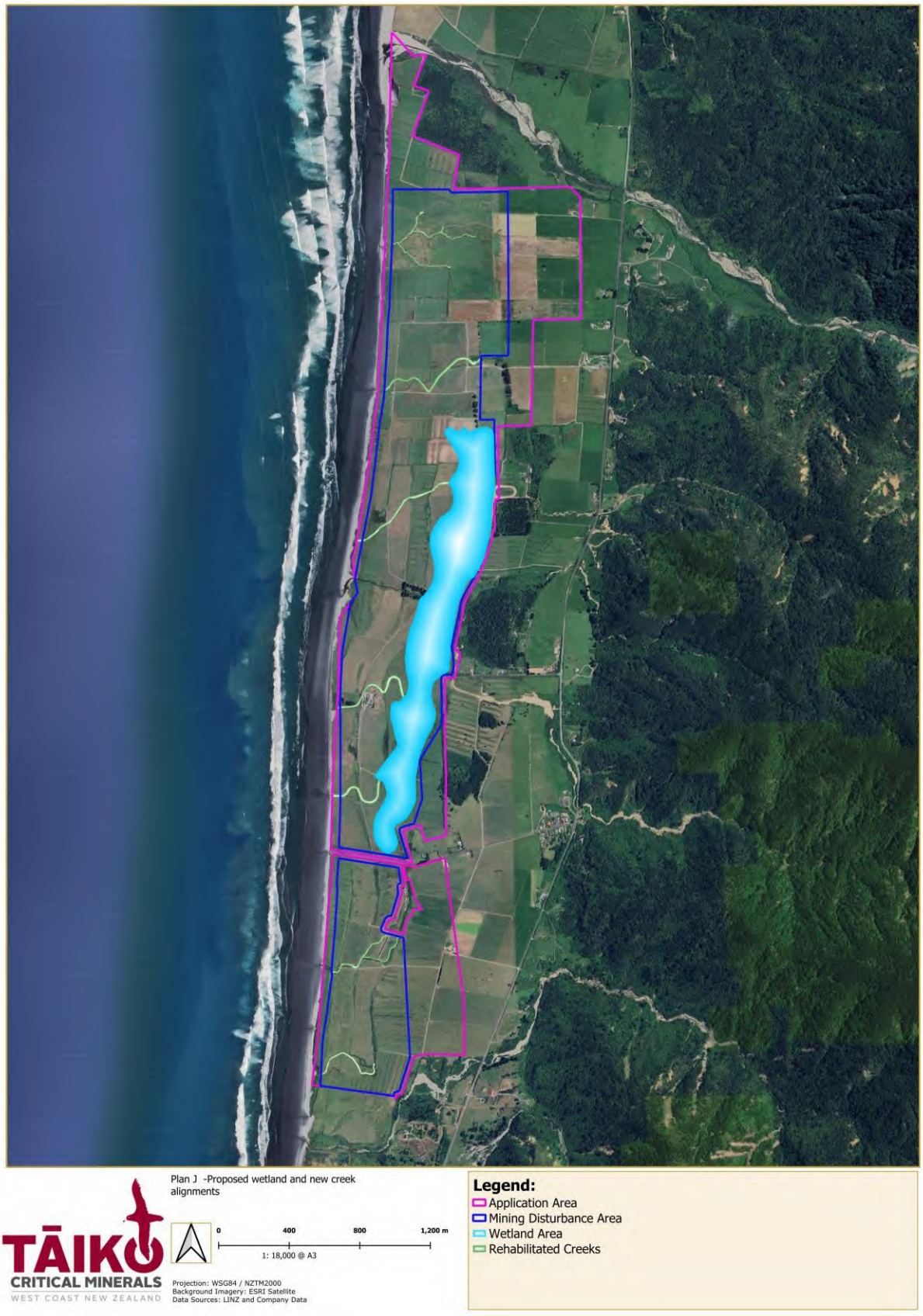


Plan H: Location of Water Take

Plan I: Indicative Final Land Contour



Plan J: Proposed Post-Mining Wetland and Watercourse Rehabilitation Layout



Appendix B
Archaeological assessment

DRAFT

New Zealand
Heritage Properties Ltd
Investing In Our Heritage

Barrytown Mineral Sands Project – Southern Resources Block

An Archaeological Assessment for the Southern Resource Block (SRB)

Report Prepared for TiGa Minerals and Metals Ltd
c/-Tai Poutini Resources Ltd
Author: Bree Wooller
Reviewed by: Dr Naomi Woods

Barrytown Mineral Sands Project – Southern Resources Block

An Archaeological Assessment for the Southern Resource Block (SRB)

Prepared by New Zealand Heritage Properties Ltd
Dunedin | Invercargill | Christchurch & Wellington (trading as Underground Overground Archaeology Ltd)
+643 477 3933 | www.heritageproperties.co.nz

Project Details

Archaeological Site No.	K31/11, K31/12
Site Address	Mining disturbance area within the Southern Resource Block, Barrytown, Greymouth. Encompassing 20 land parcels: Section 7, Block V, Waiwhero SD Part Section 5 Block IX Waiwhero SD Lot 1 DP 406050 Part RS 2634 Part RS 2635 Part RS 2639 Part RS 2928 RS 2929 RS 2930 RS 2931 RS 2932 RS 2933 RS 4033 RS 3316, Lot 1 DP 3548 Lot 1 DP 2719 Road reserve parcel ID 3700202 Road reserve parcel ID3702892 Road reserve parcel ID 3699494 RS 2927
Client	TiGa Minerals and Metals Ltd c/- Tai Poutini Resources Ltd
Client Contact	Luke McNeish, Tai Poutini Resources Ltd
Client Address	100 Mackay Street, Greymouth 7805
Report Authors	Bree Wooller
Reviewed By	Dr Naomi Woods, Megan Lawrence, Victoria Ross
Nominated s45 Approved Person	Bree Wooller
Report Submitted To	TiGa Minerals and Metals Ltd c/- Tai Poutini Resources Ltd, Grey District Council, and Heritage New Zealand Pouhere Taonga
Document Control ID	J012014_AA_REV D

Document Control

Revision No.	Date Submitted	Description	Prepared By	Reviewed By
A	20/01/2025	Issued to client, client forwarded on to Ngāti Waewae.	BW	NW, ML
B	27/02/2025	Minor edits from the client, updating text and figures to reflect change in consent area	BW	NW, VR
C	16/06/2025	Minor edits following HNZPT pre-application meeting	BW	NW
D	13/02/2026	Edits after client legal review and refinement of project scope for FH application	BW	NW, DC

Ownership and Disclaimer

This report has been prepared for the sole use of the client in relation to a specific work program described in Section 1.2 of this assessment. This report and the information contained herein are subject to copyright. Ownership of the primary materials created in the course of the research remains the property of the named researchers and New Zealand Heritage Properties Ltd. This report remains the property of the client and New Zealand Heritage Properties Ltd. The professional advice and opinions contained in this report are those of the consultants, New Zealand Heritage Properties Ltd, and do not represent the opinions and policies of any third party. The professional advice and opinions contained in this report do not constitute

legal advice and are only current for the proposed work as described in Section 1.2. This report does not represent the views or cultural values of tangata whenua.

Cover Photo: Looking west down Cargill Road, towards the project area before dredging. West Coast Recollect (1930) 'Barrytown Hotel 1930s'. Available at: https://westcoast.recollect.co.nz/nodes/view/20884?type=all.

Executive Summary

TiGa Minerals and Metals Ltd are proposing to undertake mineral sand mining activities across 411.69ha at Barrytown, Grey District, West Coast. New Zealand Heritage Properties Ltd (NZHP) has been commissioned by Luke McNeish of Tai Poutini Resources Ltd on behalf of the clients to undertake an archaeological assessment of the mining disturbance zone within the Southern Resource Block (SRB), Barrytown, Greymouth (encompassing 20 land parcels, see project detail table above) for an archaeological authority application and resource consent application. The area outside of the mining disturbance zone is not covered by this assessment. This assessment considers the impact that the proposed works will have on any archaeological sites that are present within the project area.

This assessment identified that the project area was traversed by an ara tawhito, with manawhenua travelling through the area. The wetland areas in the east of the project area likely provided sources of mahinga toi and kai, while the dune systems along the western perimeter may have provided nohoanga. The two archaeological sites in the project area (K31/11, K31/12) were both find spots possibly relating to wetland artefact caching behaviours. The site survey found no evidence to suggest either find spot was related to other archaeological features in the vicinity of the recorded site, and therefore neither site will be affected by the proposed works. The site survey identified an area of raised dunes on the western perimeter of the site which might have been a suitable spot for a nohoanga. The coastal margin of the site may contain midden/oven sites, while other findspots may be encountered across the project area including in areas previously disturbed by dredging activity and hump and hollowing.

Later nineteenth century occupation of the project area centred on miners' blacksanding along the foreshore and squatting nearby. The historical record identified several mining claims and hut sites along the foreshore as well as the first Barrytown School. The first school site is in the dredge zone so no archaeology will remain in situ. There is reasonable cause to suspect that unrecorded gold-mining and historic-domestic sites will be encountered along the coastal margin. The location of these sites cannot be identified with certainty due to nature of early transient occupation in the area.

Although the project area has undergone a large amount of surface modification, the dredged areas may contain redeposited archaeological material not in situ. Hump and hollowed areas may have intact archaeology under the humps. As the history of the area records largely transient and ephemeral occupation across the project area, archaeology could be encountered anywhere across the site. NZHP has identified areas where there is a higher potential for archaeological remains to be encountered. Due to the scale of the mining operation, there is no scope for earthworks within the mining disturbance area to avoid archaeology.

This archaeological assessment has identified that there is reasonable cause to suspect that unrecorded artefact find spots, midden/oven sites, mining-gold and historic-domestic sites are present within the project area and will be affected by the proposed mineral sand mining. The unrecorded sites are considered to have **medium** archaeological value. Due to the nature of the proposed works the overall impact of the works on the archaeological values of unrecorded sites will be moderate to major.

For the purposes of the FTAA, NZHP has also considered the significance of any adverse impact of the proposed works on the archaeological landscape more broadly. Given the archaeological monitoring of high-potential areas, recording, analysis and reporting on any archaeological or heritage features modified by the proposed works (as set out in more detail below) NZHP supports approvals being granted under the FTAA, including a resource consent application and archaeological authority to modify the sites and considers in the wider context of the sites (i.e. private farmland) that the adverse impacts will be **low in significance.**

On the basis of this assessment, NZHP supports this application with the following recommendations:

1. **Authority Application:** As the proposed works described in Section 1.2 could affect unrecorded archaeological sites, an archaeological authority under Section 44 of the HNZPTA 2014 must be obtained from HNZPT prior to any modification of the site.
    a. The previously recorded sites (K31/11, K31/12) are destroyed so will not be impacted.
    b. If development plans are altered from those reviewed for this assessment, then HNZPT and NZHP must be alerted, as any changes may alter the assessment of effects or invalidate the authority.

2. **Protection of sites/features:** As a first principle, every practical effort must be made to avoid damage to any archaeological site, whether known, or discovered during any redevelopment of the site.
    a. **Drystone structure under Cargills Road -** To avoid damaging the structure the Cargill Road bund should not be built up against this structure. The use of heavy machinery should by limited or monitored in proximity to the structure, to limit the potential damage from vibrations. Dust and vibration plans, when finalised by the client, should be provided to NZHP to inform future protections for the structure as necessary.

3. **Site Instruction:** All works must be carried out in accordance with a site instruction. Any amendments to the site instruction will require prior written approval from HNZPT. The site instruction will include the points outlined in Section 10.2.2.

4. **Contractor Briefing:** All contractors working on the project must be briefed by the s45 approved person (or person nominated on their behalf) on the possibility of encountering archaeological evidence, how to identify possible archaeological sites/features during works, the archaeological work required by the conditions of the authority, and contractors' responsibilities with regard to notification of the discovery of archaeological evidence to ensure that the authority conditions are complied with. NZHP recommends that the briefing be undertaken in an office space to best enable the briefing to be presented digitally, thus maximising engagement.

5. **Archaeological Monitoring:** All earthworks that may affect an archaeological site must be monitored by the s45 approved person (or person nominated on their behalf) in accordance with the site instruction.
    a. Any archaeological features and material encountered shall be recorded, analysed, and interpreted in accordance with current archaeological practice and as outlined in the site instruction.

6. **Archaeology of Māori origin:** If archaeological material of Māori origin is discovered at any stage, all work must stop within 20m of the find. NZHP will assist the authority holder in contacting all relevant parties including tangata whenua via Ngāti Waewae and HNZPT in accordance with the site instruction.
    a. Any taonga tūturu are *prima facie* the property of the Crown who will be notified of the find. Taonga tūturu will be registered with the Ministry for Culture and Heritage. NZHP, in collaboration with manawhenua, shall notify the Ministry of Culture and Heritage and establish the most appropriate temporary storage, management and care for taonga tūturu, until such time as traditional or actual ownership is determined, with an appropriate institution or kaitiaki.

7. **Kōiwi (human remains):** Should kōiwi be encountered, all work must stop within 30m of the find. NZHP will assist the authority holder in contacting all affected parties as soon as practicable, including tangata whenua via Ngāti Waewae, HNZPT, and the police. The Ngāi Tahu policy for kōiwi tangata shall also be followed (Te Rūnanga o Ngāi Tahu, 2019).

8. **Reporting:**
    a. Within 20 working days of the completion of on-site archaeological work, the site record forms must be updated or submitted to ArchSite.

b. Within 12 months of the completion of on-site archaeological work, a final report on any archaeological material that is found must be prepared in accordance with *ASG12 Archaeological Report Guideline* (HNZPT, 2023) and submitted to HNZPT for inclusion in the digital library, Ngāti Waewae and to the Grey District Council.

Abbreviations

Abbreviation	Definition
HNZPT	Heritage New Zealand Pouhere Taonga
HNZPTA 2014	Heritage New Zealand Pouhere Taonga Act 2014
NZAA	New Zealand Archaeological Association
NZHP	New Zealand Heritage Properties Limited
RMA 1991	Resource Management Act 1991
SRB	Southern Resource Block

Glossary

The following terms were sourced from the Kāi Tahu Ki Otago Natural Resources Management Plan (Kāi Tahu Ki Otago, 2005) and Heritage New Zealand Pouhere Taonga (HNZPT, 2014).

Te Reo Māori	English
Hapū	Sub-tribe, extended whānau
Iwi	Tribe
Ngāi Tahu ki Otago	The four Papatipu Rūnaka and associated whānau and rōpū of the Otago Region
Kāika/Kaik/Kāinga	Settlement, place of residence
Karakia	Prayer, incantation
Kaumatua	Respected elder
Kōiwi / kōiwi	Human remains
Mahika kai/ Mahinga kai	Places where food is produced or procured
Mahika toi/ Mahinga toi	Places where non-food resources were gathered
Manawhenua	Those who exercise customary authority or rakātirataka
Papatipu	Original/traditional Māori land
Rakātira/Rangatira	Chief
Rakātirataka/Rangatiratanga	Chieftainship, decision-making rights
Rohe	Boundary
Rōpū	Group
Rūnaka/Rūnanga	Local representative group or community system of representation
Takata whenua/Tangata whenua	The iwi or hapū that holds mana whenua in a particular place
Takiwā	Area, region, district
Taoka/Taonga	Treasured object
Tapu	Sacred
Te Tai o Poutini	West Coast
Tikaka/Tikanga	Lore, customary values and practices
Tūpuna/Tīpuna	Ancestor
Umu	Earth oven
Umu-tī	Earth oven used for cooking cabbage tree (tī)
Urupā	Burial place
Wāhi Tapu	Places sacred to takata whenua
Whakapapa	Genealogy
Whānau	Family

Acknowledgements

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- Luke McNeish, Nichola Costley, Mike Meehan Tai Poutini Resources Ltd
- All the landowners who assisted with the survey
- Leah Harding (survey), John Parker (maps), Naomi Woods (project management), Victoria Ross (QC) from NZHP

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1 Introduction

TiGa Minerals and Metals Ltd are proposing to undertake mineral sand mining activities across 411.69 ha at Barrytown, Grey District, West Coast (Figure 1-1). New Zealand Heritage Properties Ltd (NZHP) has been commissioned by Luke McNeish of Tai Poutini Resources Ltd on behalf of TiGa Minerals and Metals Ltd to undertake an archaeological assessment of the mining disturbance area in the Southern Resource Block at Lot 1 DP 406050 SEC 1 4 4034 PT SEC 5 BLK IX Waiwhero SD, located on Cargill Road, Barrytown, Greymouth. This archaeological assessment has been prepared to assess the archaeological potential of the project area and to consider the impact that the proposed works will have on any archaeological sites. Archaeological sites are areas that witnessed human occupation prior to the year 1900 and can provide information on the history of New Zealand through archaeological investigation; archaeological sites are protected under the Heritage New Zealand Pouhere Taonga Act 2014 (HNZPTA 2014).

1.1 Project Area

The project area is defined as the mining disturbance area located in the Southern Resource Block, Cargill Road, Barrytown, Greymouth, encompassing 20 land parcels, including three road reserves. The area of the Southern Resource Block outside of the mining disturbance zone is not covered by this assessment. A summary of the project area is provided in Table 1-1 and the location of each land parcel is shown in Appendix A. There have been two archaeological sites previously recorded in the project area and the entire project area is in the Pounamu Management Area overlay under the proposed Te Tai o Poutini Plan (TTPP).

Table 1-1. Summary of project area.

Legal Description	Southern Resource Block, Barrytown, Greymouth. Encompassing 20 land parcels: **S**ection 7, Block V, Waiwhero SD Part Section 5 Block IX Waiwhero SD Lot 1 DP 406050 Part RS 2634 Part RS 2635 Part RS 2639 Part RS 2928 RS 2929 RS 2930 RS 2931 RS 2932 RS 2933 RS 4033 RS 3316, Lot 1 DP 3548 Lot 1 DP 2719 Road reserve parcel ID 3700202 Road reserve parcel ID3702892 Road reserve parcel ID 3699494 RS 2927
Landowner	Newall Brothers Limited, Cargill Rd Barrytown Limited, Nikau Deer Farm Limited, Barrytown Farms Limited, Charles Nelan Cabraal, Kim Denise Burnett, Stephen Rex Burnett, Land Information New Zealand, Grey District Council.
Territorial Authority	Grey District Council
Archaeological Site No.	K31/11, K31/12
Previous Archaeological Authorities	NA
New Zealand Heritage List/Rārangi Kōrero	NA
Covenant or Heritage Order	NA
Scheduled on District Plan	Pounamu Management Area overlay under the proposed TTPP
Reserve Status	NA
Statutory Acknowledgement Area	NA
Customary Marine Title	NA

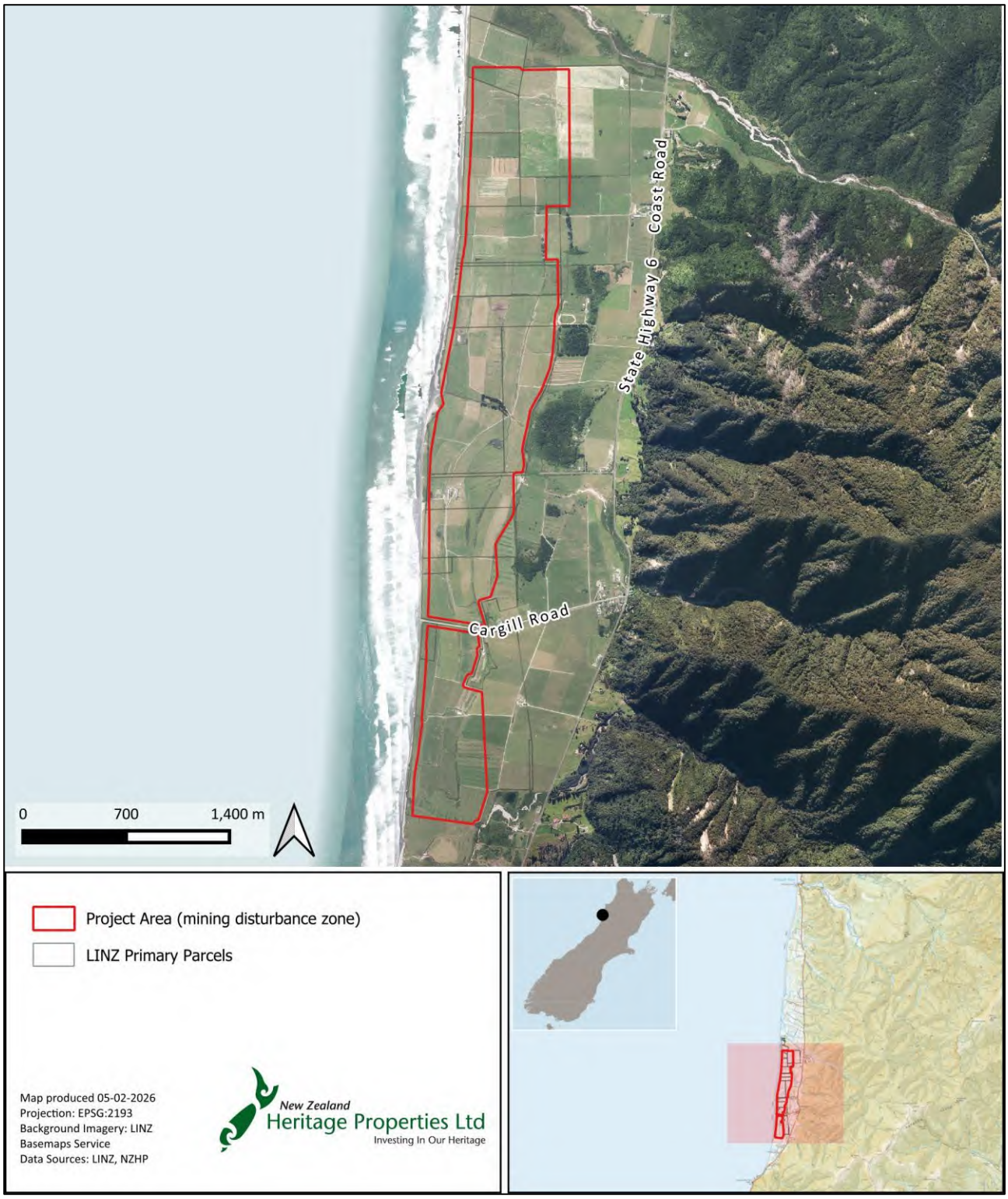

Figure 1-1. Project area in Barrytown, Greymouth.

1.2 Proposed Activities

TiGa Minerals and Metals Ltd are proposing to undertake mineral sand mining on the Barrytown Flats. The project will seek to mine both previously mined and unmined areas across the consent area. The sand mining and processing aims to obtain ilmenite, garnet, and other minerals. The proposed plans for the project are provided in the Project Description of the Application with the location of the project area as shown in Figure 1-1. The following proposed activities have the potential to affect archaeology:

Pre-mining activities

- The excavation of the starter pit area (100m x 100m)

- The excavation of the mine settling pond and water management infrastructure (Mine Water Facility) (**MWF**)
- Removal of topsoil on the site of the Wet Concentrator Plant (WCP)

Mining activities

- Removal of vegetation and topsoil within the mining areas. Earthworks to remove the vegetation and topsoil across the project area will be required to a depth of approximately 0.2 – 0.6m below surface.
- Initiation of mining across approximately 280ha area. Earthworks will be required to a depth of up to 10m below surface to extract the sand ore.
- The removed materials will be either returned to the mined areas or used to build bunding.

2 Statutory Requirements

The legislative requirements relating to archaeological sites and artefacts are detailed in the following sections. While this application is being made under the Fast Track Approvals Act 2024, the two main pieces of legislation that provide protection for archaeological sites are the Heritage New Zealand Pouhere Taonga Act 2014 (HNZPTA 2014) and the Resource Management Act 1991 (RMA 1991). Artefacts are further protected by the Protected Objects Act 1975.

2.1 Heritage New Zealand Pouhere Taonga Act 2014

HNZPT administers the HNZPTA 2014, and the purpose of this Act is to promote identification, protection, preservation, and conservation of New Zealand's historical and cultural heritage. The HNZPT Act outlines the archaeological authority process for any work affecting archaeological sites, where an archaeological site is defined as

(a) any place in New Zealand, including any building or structure (or part of a building or structure), that--:
  (i) was associated with human activity that occurred before 1900 or is the site of the wreck of any vessel where the wreck occurred before 1900; and
  (ii) provides or may provide, through investigation by archaeological methods, evidence relating to the history of New Zealand; and
(b) includes a site for which a declaration is made under section 43(1)

Additionally, HNZPT has the authority (under section 43(1)) to declare any place to be an archaeological site if the place

(a) was associated with human activity in or after 1900 or is the site of the wreck of any vessel where that wreck occurred in or after 1900; and
(b) provides, or may be able to provide, through investigation by archaeological methods, significant evidence relating to the historical and cultural heritage of New Zealand.

Any person who intends carrying out work that may damage, modify or destroy an archaeological site, or to investigate a site using invasive archaeological techniques, must first obtain an archaeological authority from Heritage HNZPT. The process applies to sites on land of all tenure including public, private and designated land. The Act contains penalties for unauthorised site damage or destruction.

The archaeological authority process applies to all sites that fit the HNZPTA definition, regardless of whether

- the site is recorded in the New Zealand Archaeological Association (NZAA) Site Recording Scheme (ArchSite), listed by HNZPT, or scheduled under a district plan;
- the site only becomes known about as a result of ground disturbance, and/ or;
- the activity is permitted under a district or regional plan, or a resource or building consent has been granted.

HNZPTA also maintains the New Zealand Heritage List/ Rārangi Kōrero (the List) of Historic Places, Historic Areas, Wāhi Tapu, and Wāhi Tapu Areas. The List includes some significant archaeological sites. The purpose of the List is to inform members of the public about such places and to assist with their protection under the Resource Management Act 1991 (RMA).

2.2 Resource Management Act 1991

The RMA 1991 defines historic heritage as those natural and physical resources that contribute to an understanding and appreciation of New Zealand's history and cultures, derived from archaeological, architectural, cultural, historic, scientific, or technological qualities. Historic heritage includes historic sites historic sites, structures, places, and areas; archaeological sites; and sites of significance to Māori (including wahi tapu); and surroundings associated with the natural and physical resources. These categories are not mutually exclusive, and some archaeological sites

may include above ground structures or may also be places that are of significance to Māori. It should be noted that this definition does not include the 1900 cut-off date for protected archaeological sites as defined by the HNZPTA 2014. Any historic feature that can be shown to have significant values must be considered in any resource consent application.

The RMA requires city, district, and regional councils to manage the use, development, and protection of natural and physical resources in a way that provides for the well-being of today's communities while safeguarding the options of future generations. The protection of historic heritage from inappropriate subdivision, use, and development is identified as a matter of national importance (section 6f).

The RMA 1991 requires local authorities to develop and operate under a district plan. Te Tai o Poutini Plan is a proposed combined district plan for the West Coast. The proposed plan identifies important heritage buildings and sites, and important trees and sites of significance to Poutini Ngāi Tahu. Part 2 of the Proposed Te Tai o Poutini Plan encompasses Historical and Cultural Values, Ngā Uara ā-Ahurea, ā-Hītori Hoki.

Iwi/hapu management plans are planning documents that are recognised by an iwi authority, relevant to the resource management issues, including heritage, of a place and lodged with the relevant local authority. They have statutory recognition under the RMA 1991. Iwi management plans set baseline standards for the management of Māori heritage and are beneficial for providing frameworks for streamlining management processes and codifying Māori values. Iwi management plans can be prepared for a rohe, heritage inventories, a specific resource or issue or general management or conservation plans (NZHPT, 2012).

The hapū who hold mana whenua in Te Tai o Poutini are Ngāti Waewae. Under section 74(2A) of the RMA, territorial authorities, in preparing or changing a district plan, must take into account planning documents recognised by iwi. Ngāti Waewae have been involved in the preparation of Pounamu Management Plans which have been recognised by Te Rūnanga o Ngāi Tahu as planning documents. These iwi management plans have been taken into account in the Te Tai o Poutini Plan through participation of Poutini Ngāi Tahu representatives during development of the plan.

2.3 Protected Objects Act 1975

The Protected Objects Act 1975 was established to provide protection of certain objects, including protected New Zealand objects that form part of the movable cultural heritage of New Zealand. Protected New Zealand objects are defined by Schedule 4 of the act and includes archaeological objects and taonga tūturu. Under Section 11 of the Protected Objects Act 1975, any newly found Māori cultural objects (taonga tūturu) are automatically the property of the Crown if they are older than fifty years and can only be transferred from the Crown to an individual or group of individuals through the Māori Land Court. Anyone who finds a complete or partial taonga tūturu, accidentally or intentionally is required to notify the Ministry of Culture and Heritage within:

(a) 28 days of finding the taonga tuturu; or

(b) 28 days of completing field work undertaken in connection with an archaeological investigation authorised by HNZPT.

3 Methodology

This archaeological assessment has been prepared in accordance with HNZPT's (2019) guideline on preparing an archaeological assessment. Presented below are the methods used to gather information to identify the archaeological potential of the project area, determine the archaeological significance, and assess the effects of the proposed work on archaeological values.

3.1 Research to Identify Archaeology and Inform Archaeological Values

The first half of this report provides the information gathered to inform on the archaeological values of the project area, including the setting, historical background, archaeological context, and the site visit. Documentary research was undertaken to inform the background research sections of this assessment. The physical environment section documents the setting of the project area, its land use, and considers environmental factors that may influence how the site was occupied through time. The historical background first provides an overview of human history for the wider area before narrowing down on evidence that is specific to the project area itself to determine the nature and significance of the archaeology. Previous archaeological research and investigation for the project area provide an understanding of research results, areas of modification, and informs on the potential for the proposed works to affect archaeology. This section also considers the wider archaeological context, including the consideration of sites recorded near the project area and how artefact find spots, midden/oven sites, gold mining sites, and historic-domestic sites are represented in the archaeological record at the local, regional, and national level. Sources utilised for this research include:

- Published primary and secondary sources for the West Coast and gold mining,
- Kā Huru Manu,
- Historic newspaper articles through PapersPast,
- Historic photographs on West Coast Recollect
- Historic maps accessed via Prover and from Archives New Zealand,
- ArchSite,
- The HNZPT archaeological reports digital library,
- New Zealand Heritage List/Rārangi Kōrero,
- Retrolens aerials
- LINZ LiDAR imagery

3.2 Survey Methodology

Three key sources of information were compiled and analysed as part of the archaeological surveys. These included aerial imagery, LiDAR and a physical survey of the survey area. Where sites could not be identified or accessed due to health and safety constraints, vegetation, or topography, during the pedestrian survey, the recent LiDAR and historical imagery, alongside information from previous archaeological investigations, were used to inform an understanding of site location and spatial extent.

3.2.1 Aerial Imagery

Historic aerial imagery, dating to the 1950s and 1980s of the survey area was accessed via Retrolens. The aerial imagery was compared with features identified during the physical survey, the 2020-2022 LiDAR data, and the drone photos supplied by Tai Poutini Resources. By comparing the historical images with more recent data, it was possible to recognise archaeological potential, and identify features established in the 1950s or onwards and the extent to which mining from the 1950s onwards has impacted archaeological sites throughout the survey area.

3.2.2 LiDAR

LiDAR is a useful in identifying points of interest (POI), establishing site extents and spatial relationships of sites and features that are not identifiable or obvious when on the ground. In recording and heritage management of

archaeological sites Jones & Bickler (2018) have identified that while New Zealand archaeologists are proficient and better at detecting individual sites at a local level, "visual manual detection at larger scaler is both time consuming and costly" (Jones & Bickler, 2018). In contrast LiDAR data can generate terrain models for larger areas covered in heavy and dense vegetation, as well as areas of rough terrain that are difficult to physically survey. Not only does LiDAR offer the ability to identify previously unrecorded sites in such areas, it also helps to map previously recorded sites as well as refine data collected prior to GIS and GPS. Even where archaeological sites have in the past been well drawn and mapped these are predominantly not georeferenced and frequently not to scale. LiDAR can be used to refine site extents and boundaries with geographical precision (Jones & Bickler, 2017).

LiDAR data from 2020-2022 was accessed via LINZ. Visual inspection of the LiDAR data provided included examination of raster-derived surfaces (i.e. hillshade) and high-resolution contours in order to identify unrecorded archaeological sites and define recorded archaeological sites. Details attained from the LiDAR data included location, extent and types of possible archaeological sites, which contributed to interpretation of individual sites as well as wider archaeological landscapes throughout the survey area. The LiDAR data also displayed distinguishable evidence of twentieth century dredging, ploughing, and hump and hollowing and its potential impact on archaeological sites.

3.2.3 Pedestrian Surveys

A survey of the project area was undertaken in December 2024 by NZHP archaeologists Bree Wooller and Leah Harding.

A GPS unit loaded with previously recorded sites was carried and the survey paused when previously recorded or unrecorded features were encountered to allow for closer inspection. The locations of previously recorded sites were inspected and photographed noting any evidence of in situ archaeology as well as the potential condition of any subsurface material, while features that may be indicative of an unrecorded archaeological site were recorded in detail and plotted on the GPS.

All areas of known pre-1900 activity and areas without extensive twentieth century modification were surveyed by paddock in 20m transects (Figure 7-1). The boggy terrain and non-traversable waterways of the area did not allow for standardised transects to be adhered to in some paddocks. Fields which had been humped and hollowed were surveyed along the humps as the hollows were generally filled with water and foliage. Due to the extent of modern surface modification, after no evidence of archaeology was encountered in fourteen heavily modified paddocks (i.e. humped and hollowed areas), no further modified paddocks were transected. Instead, these were viewed from the perimeter only. Extensive stretches of the project area were dredged in the twentieth century. Eight dredged paddocks were surveyed to determine the extent of the modification and sections of the coastal margin of the dredge zone were transect surveyed to determine the condition of the edge of the project area. Additionally, fields with livestock or without safe access points were not transacted but viewed from the perimeter. Areas that could not be accessed or viewed were studied through the LiDAR imagery and aerial photographs, which went some way to offset these limitations.

3.3 Assessment of Archaeological Values

Section 46 of the HNZPTA 2014 requires an assessment of archaeological values as well as Māori and other relevant values to the archaeological site. The assessment of archaeological and other values is based on criteria established by HNZPT (2019):

- The **condition** of the site(s).
- Is the site(s) unusual, **rare or unique**, or notable in any other way in comparison to other sites of its kind?
- Does the site(s) possess **contextual value**? Context or group value arises when the site is part of a group of sites which taken together as a whole, contribute to the wider values of the group or archaeological, historic or cultural landscape. There are potentially two aspects to the assessment of

contextual values; the relationship between features within a site, and the wider context of the surroundings.

- **Information potential**. What current research questions or areas of interest could be addressed with information from the site(s)? Archaeological evaluations should take into account current national and international research interests, not just those of the author.
- **Amenity value** (e.g. educational, visual, landscape). Does the site(s) have potential for public interpretation and education?
- Does the site(s) have any special **cultural associations** for any particular communities or groups (e.g., Māori, European, Chinese.)

The criteria outlined above help to build an overall assessment of significance of a site, and NZHP have adopted the following levels of overall archaeological value (Table 3-1). These levels of significance follow the recommendations proposed by Department for Transport (2008); although, this steers away from the use of local, regional, and local importance, which Kerr (2013) argues is irrelevant to the assessment process. It is important to note that it is not possible to fully understand the archaeological significance of subsurface sites, and that the significance of a site may change on the basis of what is found during the work programme.

Table 3-1. Levels of overall archaeological value (adapted from DoT, 2008).

Level of Significance	Criteria
Very High	• World Heritage Sites (and proposed sites) • An archaeological site of acknowledged international importance
High	• Listed archaeological sites, including those of listing quality and importance o Category 1: places of special or outstanding historical or cultural heritage significance or value; o Category 2: places of historical or cultural heritage significance or value; and • Scheduled archaeological sites, including those of scheduling quality and importance • Archaeological sites with exceptional values
Medium	• Archaeological sites that can be shown to have moderate values
Low	• Archaeological sites with limited value, including those that are highly represented, have low information potential, have poor preservation, and/or poor survival of contextual association
Negligible	• Sites with very little surviving archaeological interest
Unknown	• The importance of the site is not yet known

3.4 Assessment of Effects

After determining that there is evidence that archaeology is present within the project area and evaluating its archaeological value, an assessment of the effects of the proposed work on those values was completed. Specifically, consideration was given to the following matters as outlined by HNZPT (2019):

- How much of the site(s) will be affected, and to what degree, and what effects this will have on the values of the site(s).
- Whether the proposed work may increase the risk of damage to the site(s) in future. For example, change from farming to residential use may make sites vulnerable to increased pedestrian and vehicular activity.
- Whether a re-design may avoid adverse effects on the site(s). It is recognised that detailed evaluation of alternatives may be beyond the scope of the archaeological assessment, however, some consideration of alternatives should be considered where possible.
- Possible methods to protect sites, and avoid, minimise or mitigate adverse effects should be discussed. These will form the basis of any recommendations in the final section.

The magnitude of impact on archaeology is defined below with a scale ranging from no impact to major impact. In most instances these impacts are adverse; however, there may also be positive impacts on the site.

- **Major** - impact to the archaeological site, such that the site is totally altered (*e.g.*, a site is totally destroyed).
- **Moderate** - impact to the archaeological site, such as the asset is significantly modified (*e.g.*, at least half of a site is affected)

- **Minor** - impact to the archaeological site, such that the asset is slightly different (*e.g.*, a small portion of the site is affected).
- **Negligible** - slight changes to archaeological site that hardly affect it.
- **No impact** - the works will not affect the site.

4 Physical Environment and Setting

The project area is located in Barrytown, Grey District on the West Coast of the South Island (Figure 4-1). Barrytown is a small farming settlement approximately 25km by road north of Greymouth. Barrytown flats is situated on a narrow strip of land to the west of the Paparoa Range. The project area is bounded by Pakiroa Beach (17 Mile Beach) on the western side and the Canoe Creek Scenic Reserve to the north. State Highway 6 runs to the east, albeit not adjacent, of the project area.

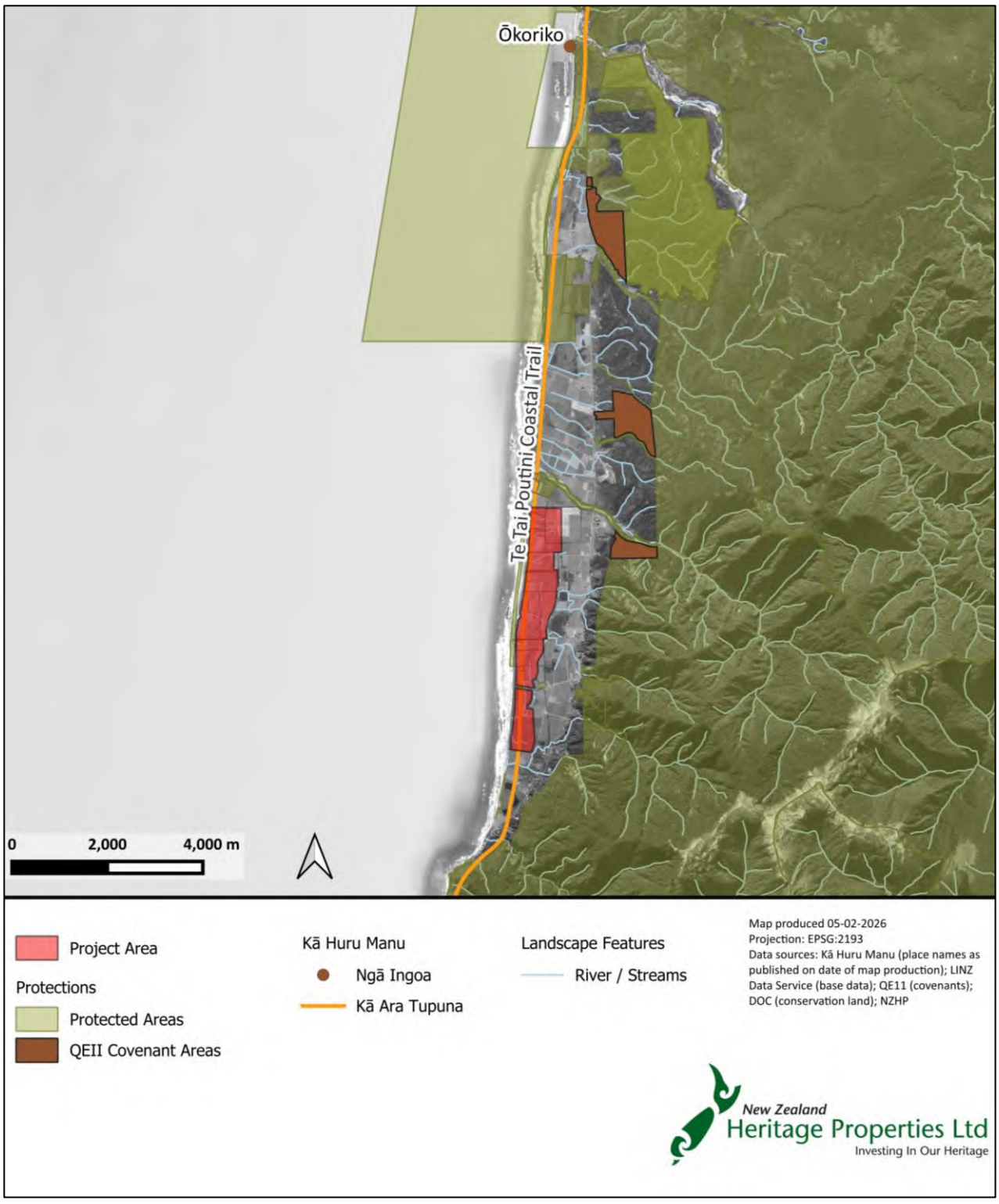

Figure 4-1. The broader geographical setting of the Barrytown Flats.

4.1 Geomorphology

Te Tai o Poutini, the West Coast of Te Waipounamu, lies along the boundary between the Pacific and Australian tectonic plates, with the plate boundary being clearly marked by the Alpine Fault, forming the western edge of the Southern Alps. To the east of the Alpine Fault, the most commonly found type of rock is greywacke, a hard, grey muddy sandstone that contains bands of shale. Closer to the Alpine Fault, the deeply buried greywacke has metamorphosed into schist, while pounamu can be sourced from small areas of schist north-east of Hokitika. The project area is within the Pounamu Management Area overlay under the proposed Te Tai o Poutini Plan (TTPP). To the west of the Alpine fault, the rocks are more varied, with the oldest rock type being greywacke, containing intrusions of several types of granite. These are overlaid by layers of softer sedimentary rocks, including mudstone, sandstone, conglomerate, and limestone. Coal-bearing rocks are widespread, with coal having been mined at a number of locations (Nathan, 2012). Mesothermal gold is contained within the greywacke, which is predominant on Te Tai o Poutini, and is incorporated into the faulted areas of the hard rock source, known as shear zones. When the hard rock sources, such as the West Coast greywacke, are eroded away, it becomes auriferous gravels (Karoro Formation). Alluvial gold is the result of rivers or glaciers having flowed over auriferous gravels, washing, and sorting the gold, which then allows for the formation of concentrations of heavy gold deposits in certain layers. This often meant that alluvial gold deposits were much richer than their hard-rock sources (Walrond, 2012). The majority of gold deposits within the Grey District are alluvial, consequently, the area hosts a dynamic timeline of mining activities throughout recent history which have left irreversible scars across the landscape.

The wider landscape surrounding Barrytown Flat is largely public conservation land with forest and scrub coverage, with three QEII Covenant Areas to the northeast of the project area (Figure 4-1). The native bush is a mix of coastal podocarp, broadleaf, and lowland hardwoods. An area of significant indigenous biodiversity (PUN-49), situated to the west of the boundary of the site is identified as a potential Significant Natural Area (SNA) under the proposed Te Tai o Poutini Plan (TTPP). To the north of the project area, Ōkoriko (Razorback Point) is situated at the outlet of the Punakaiki River (Te Rūnanga o Ngāi Tahu, 2025). To the south, the Motukiekie Rocks are located off the coastline near Waiāniwaniwa (Ten Mile Creek). The island was likely utilised for resource procurement, as kiekie (Freycinetia banksii) was highly valued for weaving (Te Rūnanga o Ngāi Tahu, 2025). The Te Tai Poutini Coastal Trail runs through the project area (Figure 4-1).

The project area is crossed by a series of little creeks that originate from the Paparoa Ranges and drain into Tasman Sea (Figure 4-1). Granite Creek and Little Granite Creek flow through the project area, as well as lots of smaller tributaries particularly along the westerns coastal margin. The coastal margins would have originally consisted of sandy loam dune formations; however, these have largely been eroded or modified by twentieth century activities. The terrain is very waterlogged, with peaty sediments noted in the tributaries. The project area is all in pasture with the exception of areas of wetland planting along the margins and in the waterlogged areas. The nature of the pasture varied by paddock with some areas having short grass coverage with a large amount of stock trampling, through to other fields with long, reedy growth, obscuring the ground surface.

4.2 Landscape Transformations

A vast amount of the project area has previously been modified with extensive dredging and hump and hollowing taking place in the twentieth and twenty-first centuries. The waterways running through the site have been modified for drainage and stock supply with most having been straightened to align with the farm layouts. Over the last 50 years some vegetation clearance has been undertaken, primarily gorse removal for farming purposes. The project area is currently being utilised for dairy farming.

5 Historical Background

The following sections give an overview of Māori and Pākehā settlement in Te Tai o Poutini and the Grey District to provide context to understand the history of the area. Through this research it is possible to begin to identify what type of physical, cultural, and social processes have shaped the form and distribution of archaeological material. This chapter then moves on to outline the history of the project area, situated in Barrytown.

5.1 Māori Occupation of Te Tai o Poutini

From the snowy maunga to the sea waters of the taniwha Poutini, Te Tai o Poutini is of immense significance to Poutini Ngāi Tahu. From the earliest times, pounamu was the main reason for settlement on Te Tai o Poutini, with the central region near the project area being at the heart of Poutini Ngāi Tahu legends, customs, and traditions. Te Tai o Poutini lies within the traditional boundaries of Ngāi Tahu, who are the largest iwi in Te Waipounamu (the South Island), comprised of people descended from the tribe's five primary hapū (Ngāti Kurī, Ngāti Irakehu, Ngāti Huirapa, Ngāi Tūāhuriri and Ngāi Te Ruahikihiki) along with earlier Rapuwai, Hawea, Waitaha, and Ngāti Mamoe ancestors. The hapū who hold mana whenua in Tai o Poutini are Ngāti Mahaki o Makaawhio and Ngāti Waewae; together they are known as Poutini Ngāi Tahu. The rohe of Poutini Ngāi Tahu extends over the entire West Coast Region from Kahurangi Point to Piopiotahu (Milford Sound) and inland to Ngā Tiritiri o te Moana (the Southern Alps).

In the eighteenth century, Raureka, a Ngāti Wairangi rangatira was the first person to find a way across Ngā Tiritiri-o-Te-Moana, the Southern Alps. Raureka, who was born at Lake Kaniere to the south of the project area, arrived in the Arowhenua region and was taken in by a party of Ngāi Tūhaitara, who were amazed by her pounamu toki. Word of Raureka's journey, and the pounamu that could be gathered *en route*, soon spread (Madgwick, 2024; Te Rūnanga o Ngāi Tahu, 2022; Te Rūnanga o Ngāi Tahu, Te Rūnanga o Ngāti Waewae, & Te Rūnanga o Makaawhio, 2018).

5.1.1 Pā and Kāinga

A lot of what is known of the settlement of Te Tai o Poutini comes from traditional oral histories and later nineteenth century ethnographic accounts recorded by Pākehā. By the nineteenth century, kāinga (villages) were largely permanently occupied and were situated near the mouths of the major rivers. However, during summer, kāinga could often be sparsely populated as groups dispersed to undertake a range of seasonal activities. When Pākehā arrived in Te Tai o Poutini, Māori settlements were concentrated along the central coastline, although, archaeological evidence also suggests that kāinga and nohoanga (seasonal camps) stretched along the western seaboard (Anderson, 1982). Later Pākehā noted the presence of small, isolated settlements in these areas, where Māori communities stayed while procuring pounamu (Anderson & Prickett, 1982; Ngāi Tahu, 2021). To the south of the project area the closest kāinga was Kararoa, which had been occupied by Ngāti Rārua and Te Āti Awa who had married into Poutini Ngāi Tahu (Madgwick, 2024). To the north, a small seasonal pa, Kawatiri, was occupied near modern day Westport (Madgwick, 2024).

5.1.2 Mahinga Toi

Mahinga toi refer to places where non-food resources were gathered. Pounamu (greenstone) is of particular importance to Māori, with the stone manufactured into tools such as adzes, chisels, and knives, as well as items of ornamentation such as hei tiki (pendant) (Te Rūnanga o Ngāi Tahu, 2022). The major sources for pounamu along Te Tai o Poutini are along the Arahura and Taramakau Rivers (Figure 5-1). Raw pounamu was also traded for other resources, and spread throughout both Te Waipounamu and Te Ika-a-Māui (the North Island) (Jacomb *et al* 2010). There were a number of ara tawhito (traditional routes) that were used to transport pounamu, and those seeking it, over Kā Tiritiri-o-te-moana (the Southern Alps), with the major routes crossing the Haast and Harper's Pass (Figure 5-1). The project area is within the Pounamu Management Area overlay under the proposed Te Tai o Poutini Plan (TTPP).

There are plentiful legends associated with the central region of Te Tai o Poutini, from the hills of Ōhonu (Hohonu Range) to Turiwhate, the entire Arahura and environs, including Kawhaka, Tuhua, Timuaki, Raparapahoe, Mt Tara o Tama (the great mountain of the pounamu explorer Tama Ahua) and as far as Mt Kaniere (Mt Harman), named for sawing the pounamu. Historic sources (West Coast Times, 1903) note a large amount of harakeke (flax) growing across the project area prior to it being cleared. Harakeke was a valued resource to Poutini Ngāi Tahu with it being recognised as a taonga species in the Ngāi Tahu Claims Settlement Act 1988 (Tumahai, 2010).

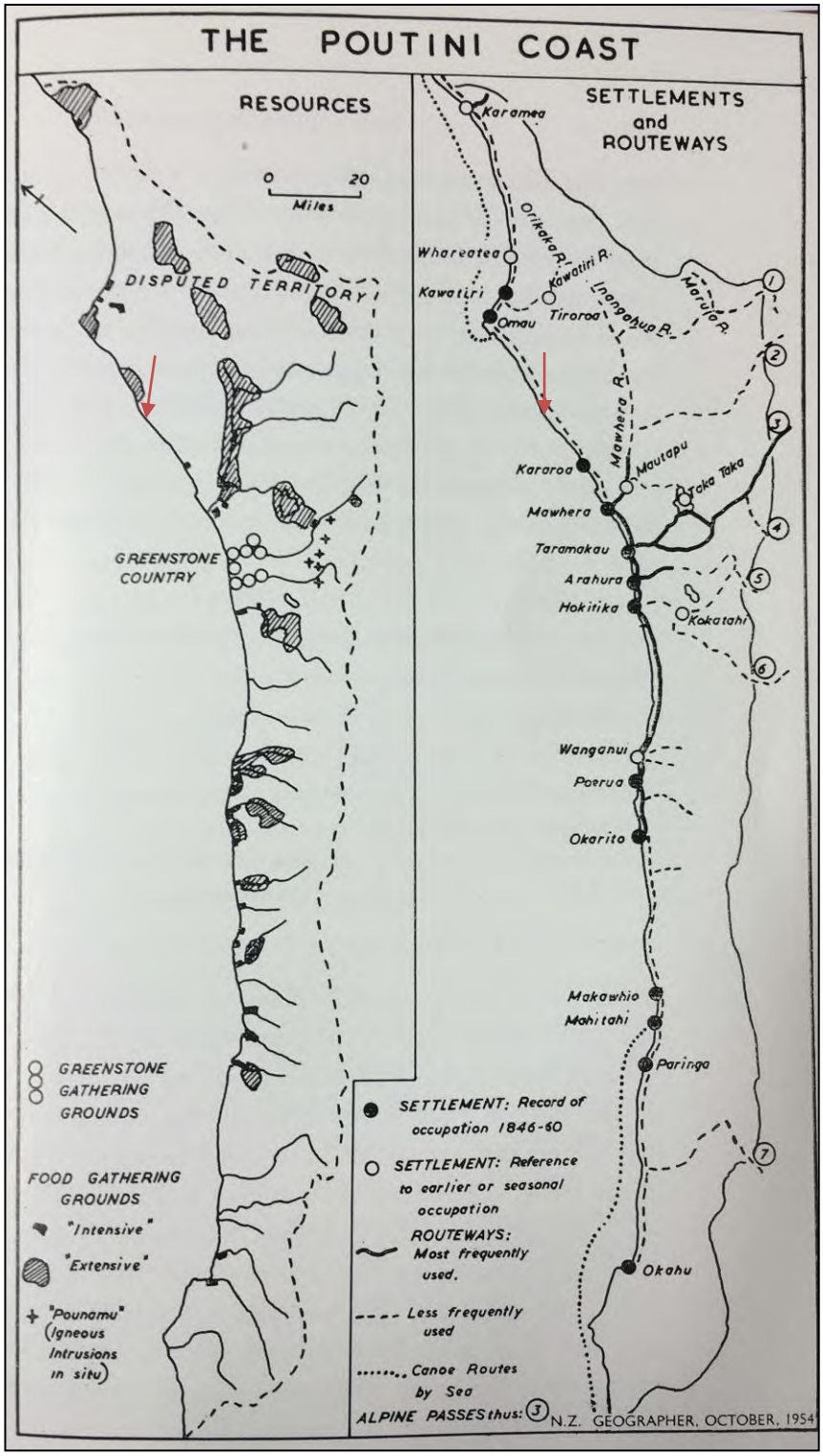

Figure 5-1. Map showing kāinga, mahinga toi and kai areas, and ara tawhito in Te Tai o Poutini at the time of Pākehā contact (1840s). Note: the project area is indicated by the red arrows (McCaskill, 1954).

5.1.3 Mahinga Kai

Te Tai o Poutini was also associated with mahinga kai (food gathering places) utilised by people living in the region, as well as travelling parties. Freshwater sources were fished for tuna (eel), grayling, and īnanga (whitebait), while forested areas were fowled for kiw, weka, kākāpō, kākā, kōkō (tūī) and kūkupu (kererū) (Madgwick, 2024). In the vicinity of the project area, tītī were lured into Pakiroa (Barrytown) and disorientated by the lighting of large fires at dusk, before being caught and clubbed (Madgwick, 2024). Berries and vegetables, such as tree fern pith, kōareare (the edible rhizome of raupō), mamaku, podocarp berries, and rarely, bracken fern root and nikau palm, were also gathered. Historic sources note copious amounts of harakeke and raupō in the area during the nineteenth century (SO 7873, SO 7948), which are both valued mahinga kai plant sources to Poutini Ngāi Tahu (Tumahai, 2010). Kokopu, koura, and tuna would have been gathered from the streams in the project area, with bird species such as putakitaki and weka found grazing in the wetlands within the project area (Tumahai, 2010).

Kūmara and Taro were reported to have been grown by Poutini Ngāi Tahu throughout the Poutini coastline, with the temperate climate and less severe winters than the eastern regions allowing for horticulture (Madgwick, 2024). Ethnographic accounts record the use of rocks to keep the crops warm and the tubers were wintered in rua (Madgwick, 2024).

5.1.4 Ara Tawhito and Nohoanga

Ara tawhito are traditional travel routes, and these criss-crossed Te Tai o Poutini, connecting the pā of Arahura, Taramakau, and Māwhera with the great Ngāi Tahu trading centre of Kaiapoi Pā. The Te Tai Poutini Coastal Trail traverses the coastline from Māwhera (Greymouth) to Mohua (Golden Bay), including through the western extent of the project area. Madgwick (2024), notes that the section of the ara tawhito which ran along the long smooth beach of pakiroa adjacent to the project area was a stark contrast to the particularly treacherous steep cliffs to the north. As noted, the nearby Taramakau was a major ara tawhito, which was often difficult to traverse, but which did provide a route over Kā Tiritiri o te Moana (Southern Alps) through Nōti Taramakau (Harper Pass). This route, one of the lowest and easiest to traverse, was valued as part of the wider lifeways cycle for access to pounamu.

Nohoanga, literally meaning 'a place to sit', traditionally refers to seasonally occupied sites. Nohoanga were an integral part of the mobile lifestyle of tīpuna (ancestors) as they moved around Te Waipounamu undertaking various seasonal expeditions for resource procurement, trade and maintaining social relationships. No inland settlement sites or nohoanga have been investigated in Te Tai o Poutini, although secondary information inferred from artefact findspots suggests that nohoanga would have been close to inland rivers or streams (Department of Conservation, 2010). A cave site in the Razorback Ridge, to the north of the project area, was noted in Nicholl's 1990 survey of Barrytown Flat (Nichol, 1990) and might have been evidence of a nohoanga.

Figure 5-2. Beachcombing black sand for gold (West Coast New Zealand History, 2014)

5.2 Contact and Post-Contact Period Occupation of Te Tai o Poutini

The settlement of Barrytown begun with the Canoe Creek gold rush in 1867 with miners digging on the beach and in the stream for gold (May, 1962). Canoe Creek is just to the north of the project area, with early mining claims extending into the proposed mining disturbance zone (SO 3682, SO 3687). The first gold seekers moved into the Seventeen Mile beach area to work the black sands of the foreshore; an activity known as "blacksanding" (Mines Department, 1906). Sand was put through a sluice boxes and gold collected (Figure 5-2). Beach mining came to be practised extensively at Barrytown, Brighton, and Charleston (between Cobden and Cape Foulwind), but while several rich pockets were found, the deposits proved exceedingly patchy (Westport Times, 1879). Miners extended their searches to gold to the terraces to the east of the beach flat with mining undertaken in the foothills well into the twentieth century (Harris, 1916). The settlement came into being at the height of the rush in 1879, which at the time there was 2000 residents in the area (Cyclopedia Company Ltd, 1906). The settlement was initially named Barryville after a particularly respectable miner who was among the party that first discovered gold in the area (Grey River Argus, 1880d). Later contention arose when officials tried to rename the settlement Fosberry, resulting in a petition from the locals to retain its original name in 1880 (Grey River Argus, 1880c). The settlement became known as Barrytown from December that year (Grey River Argus, 1880a). By the beginning of the twentieth century there were 64 permanent residents in the township with 60 more in the wider vicinity, with the town containing a hotel, school, post office, and church (Cyclopedia Company Ltd, 1906) (Figure 5-3).

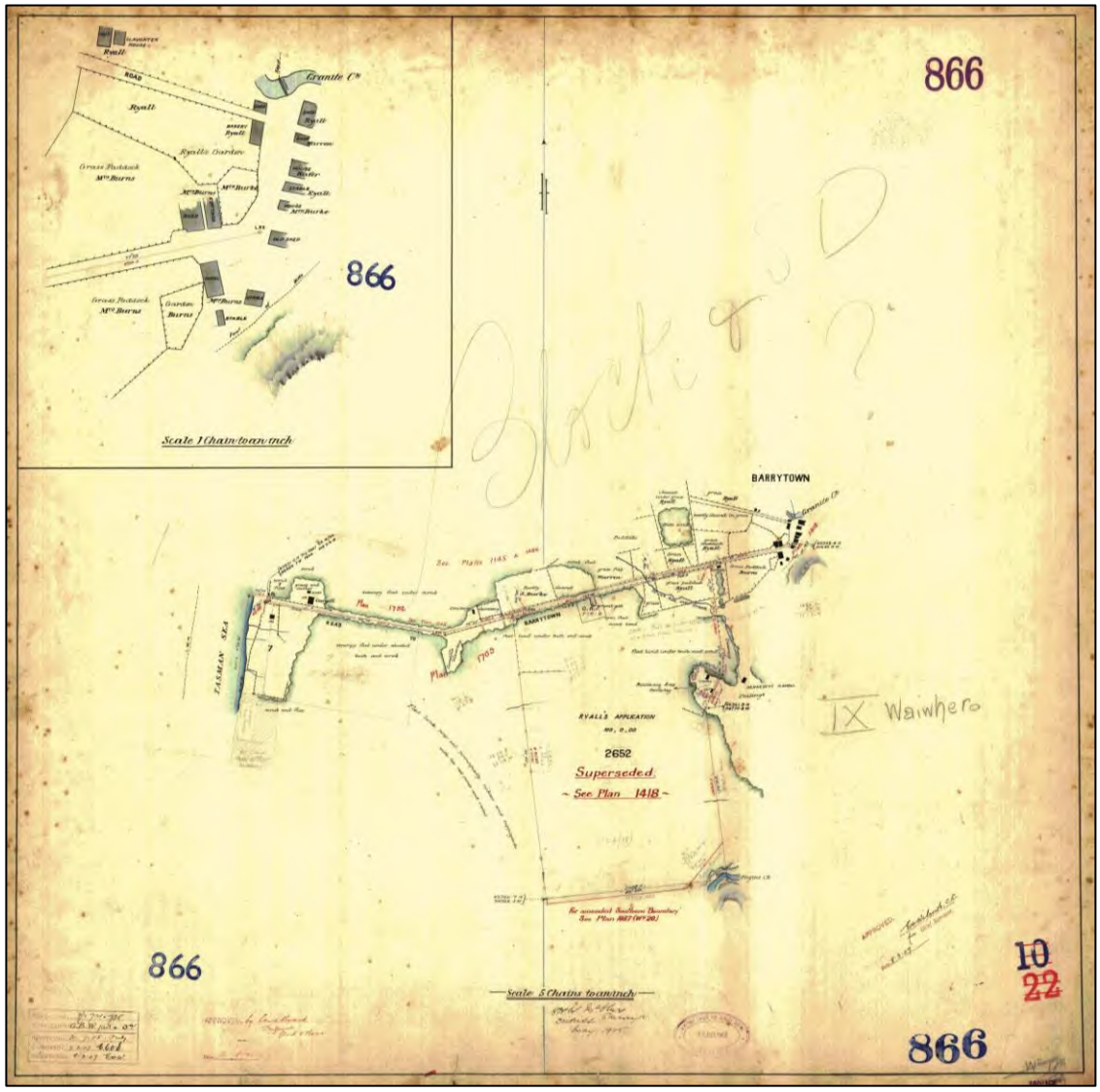

Figure 5-3. Extent of the township in proximity to the project area illustrated in 1907 (SO 866).

5.3 History of the Project Area

The project area is located on the Barrytown Flats on the foreshore of Pakiroa Beach. The Te Tai Poutini Coastal Trail traversed the coastline in the vicinity of the project area. The wetland environment of the project area would have had important mahinga kai and mahinga toi resources for Poutini Ngāi Tahu passing through. Historic sources note copious amounts of harakeke and raupō in the area during the nineteenth century (SO 7873, SO 7948), which are both valued mahinga kai plant sources to Poutini Ngāi Tahu (Tumahai, 2010). Kokopu, koura, and tuna would have been gathered from the streams in the project area, with bird species such as putakitaki and weka found grazing in the wetlands within the project area (Tumahai, 2010).

Following the arrival of Pākehā and the signing of the Arahura Deed, the project area was surveyed as Crown Land, with the project area located in Block V and IX of the Waiwhero Survey District (Mackay, 1860). Early pākehā settlement in the project area was largely transient and associated with the gold rush at Canoe Creek and blacksanding activities along the foreshore (Cyclopedia Company Ltd, 1906). Settlement was primarily focussed along the foreshore with the old coast road running along the western extent of the project area (Figure 5-7). The eastern project area remained as wetland with dense scrub cover until the twentieth century (SO 866, SO 1145, SO 1789). Legal land boundaries were not of significance in early phases with huts and mining activities frequently located in Crown Land (SO 866, SO 3687, S0 7948). The majority of the land parcels in the project area were subdivided in the twentieth century with flax milling, land clearance, and grazing activities taking place (SO 1145, SO 1789, SO 1944).

The largest transformation in the project area occurred from the 1930s after the northern project area was included in the Barrytown Gold Dredging Ltd claim and the southern area in McKechnie's claim (SO 3059, SO 3109). The landscape was permanently altered from 1937 by large scale dredging, with the land being converted back into farms from 1945 (Figure 5-4, Figure 5-5, Figure 5-6, Figure 5-7). Further modification took place with the construction of irrigation ditches, access tracks in the following years with large scale hump and hollowing taking place after 1981 (Retrolens, 1981).

Figure 5-4. Dredging in the southern portion of the project area for the Barrytown dredge in 1936 (West Coast Recollect, 1936).

Figure 5-5. Dredged area (blue line) in the project area (red line) in 1951 (Retrolens, 1951).

Figure 5-6. Barrytown Flats showing dredge ponds and the road along the beach (West Coast Recollect, 1940).

The following sections will detail the history of the project area, and a summary of key events is provided in Table 5-1. Histories have been organised by block in the following sections.

Table 5-1. Summary of key events and land transactions in the project area. Events directly related to archaeological features or deposits are highlighted in blue.

Year	Event	Source
Pre-1860	Māori ara tawhito and nohoanga in use nearby	Te Rūnanga o Ngāi Tahu, 2022
1860	Arahura Deed was signed, project area surveyed as Block V and IX, Waiwhero Survey District	Mackay, 1860
Block V Waiwhero, SD		
1880	Education reserve (Res. 1339) subdivided from Block V. Construction on School started.	Grey River Argus 1880b, SO 3687
1881	School opened in Education reserve (Res. 1339)	Grey River Argus 1881
1881	Section 6 (later becomes Section 7, Block V) in the northern corner of the project area is subdivided by this date and occupied by Raymond Poschich, a miner.	SO 3687
1901	Settlement and old water races illustrated along the foreshore adjacent to the school reserve.	SO 7948
1901	James Trent & George Davies apply for Special Claim G.26 along the foreshore from modern section RS2933, crossing Warren Road, to midway up RS 2932.	SO 7948
1905	Cargill has a home, shed, fence in a cleared area at southern edge of project area.	SO 866
1909	Section 2639 surveyed and occupied by D. Dennehy. Dennehy's Drain cutting through vacant land to the west. Warren Road (ID 3700202) formed.	SO 1145
1916	Remaining land subdivided into RS 2931, 2930, 2929, 2928, 2927, 3316, 3255. Road ID 3702892 also surveyed at this time	SO 1944
1934	All the above land parcels, except for RS 3255, are Surveyed as Part of Special Claim G. 157 for C. McKechnie.	SO 3109
1939	School moved from education reserve to a new site outside of the project area.	
1940	Eastern part of section part of Special Claim No G178, Barrytown Gold Dredging Ltd. Described as swampy with bush.	SO 8611
1952	Education reserve (Res. 1339) re-surveyed as Section 4033, Block V Waiwhero.	SO 4574
Block IX Waiwhero SD		
1875	Evan H. Lewis leases section 7, Block IX Waiwhero. The surrounding land is shown to be unsubdivided and owned by the Crown, with road reserves on the northern and western aspects.	SO 3683, SO 3687
1881	E.H. Lewis occupying northern part of property with a claim in the northwestern corner of the site along Cargill Road.	SO 3687
1889	M. Hannah & others shown as having a claim along the foreshore for the extent of the project area	SO 7873
1905	Section 7 occupied by Lewis has a dwelling house and fences in a clearing in the northwestern area of the property.	SO 866
1905	Several claims are shown along the foreshore, including P.(?) Warren and MacKays. However, these appear to not have been occupied but not subdivided.	SO 865
1913	Section 3201 subdivided along Cargil Road, where Cargill's clearing illustrated in 1905 is sectioned off.	SO 1709
1931	Sections 1657 and 1656 to the south are subdivided.	SO 2881
1934	All land in Sections 3201, 1656 and 1657 are surveyed as part of Special Claim G. 157 for C. McKechnie. The eastern portion of Section 7 is included in Special Claim G. 157. The western portion is not part of the claim and becomes Part Section 5 Block IX Waiwhero.	SO 3109

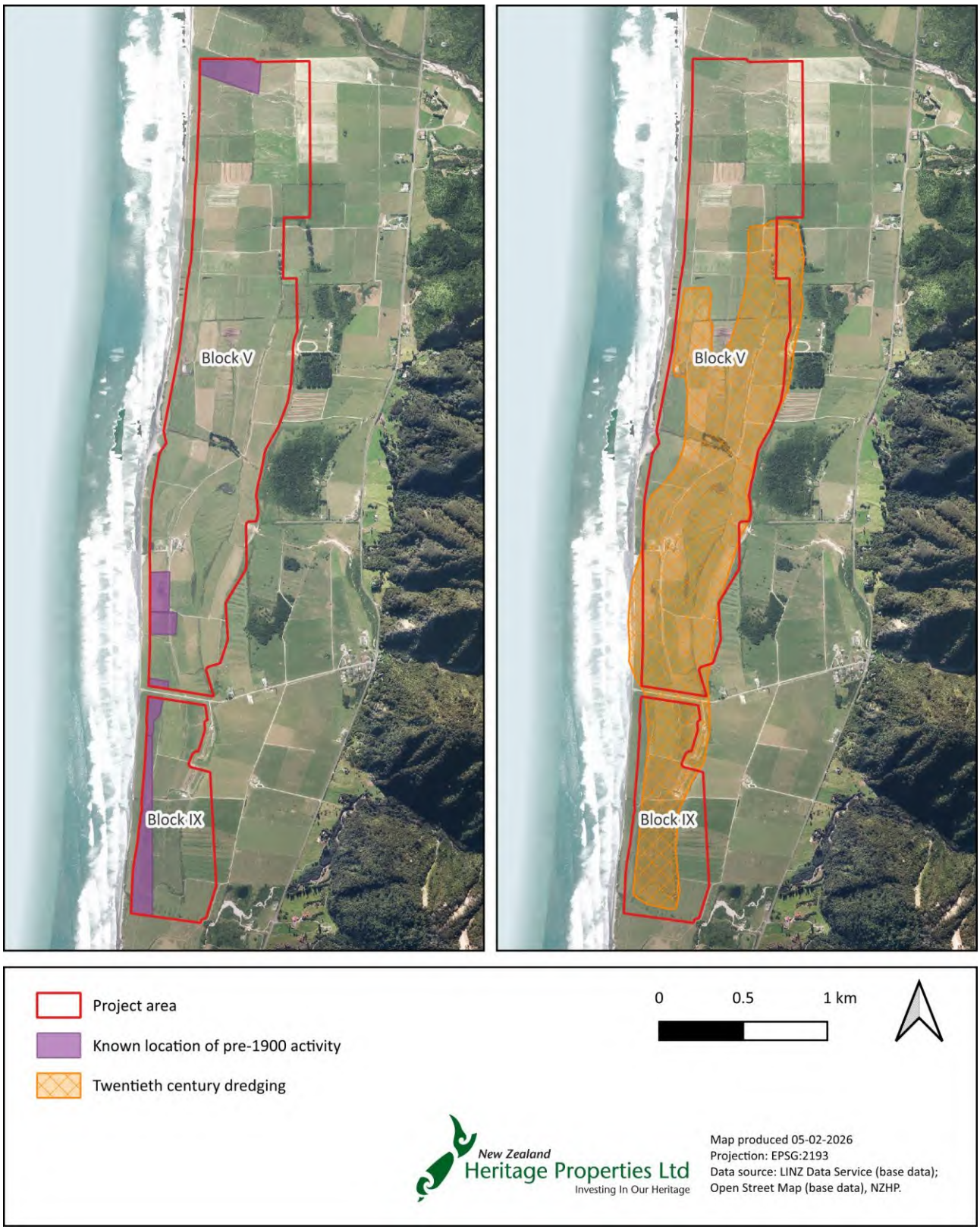

Figure 5-7.The known location of historically recorded pre-1900 activity (left). Twentieth century dredging within the project area (right). Dredge shapefile supplied by the client.

5.3.1 Block V Waiwhero Survey District

The section of the project area to the north of Cargill Road was originally part of Block V Waiwhero Survey District. Pre-1900 occupation occurred at the northern end of the block, at the southern end of the block adjacent to Cargill Road, and in an education reserve just north of Cargill Road (Table 5-1). As mining activities were taking place in the vicinity, such as the early Canoe Creek claims which extend into the northern project area, it is possible

that transient mining occupation, or other associated activities, were taking place within the project area prior to 1900 for which there is little information in the historical record.

The first school in Barrytown was located on the foreshore, approximately 310m north of Cargill's Road (Figure 5-8, Figure 5-9). Construction began in 1880 with the school opening in 1881 (Grey River Argus, 1880b, 1881). From later photos, the school appears to be a single room timber structure with an A-frame roof and sash windows, with a lean-to on its northern end (Figure 5-8). The opening of the school was considered an important milestone within the Barrytown community with one local remarking '*…it was quite a treat to see boys and girls wending their way to the seat of knowledge, instead of roaming about the bush as they did formerly'* (Grey River Argus, 1881).

By 1881, the land south of Canoe Creek, including at the northern aspect of the project area, was occupied by Raymond Poschich (SO 3687, Figure 5-9). Poschich was listed as living in Canoe Creek in the 1878 electoral roll (Grey River Argus, 1878) and along with his sons, was involved with gold mining in the area with several claims and mentions of water races and dams involved with their workings (Grey River Argus, 1881, 1885). Section 7, Block V, was still under the occupation of the Poschich family by 1916, with landscape changes seen in the form of a lagoon crossing into the section (SO 1944).

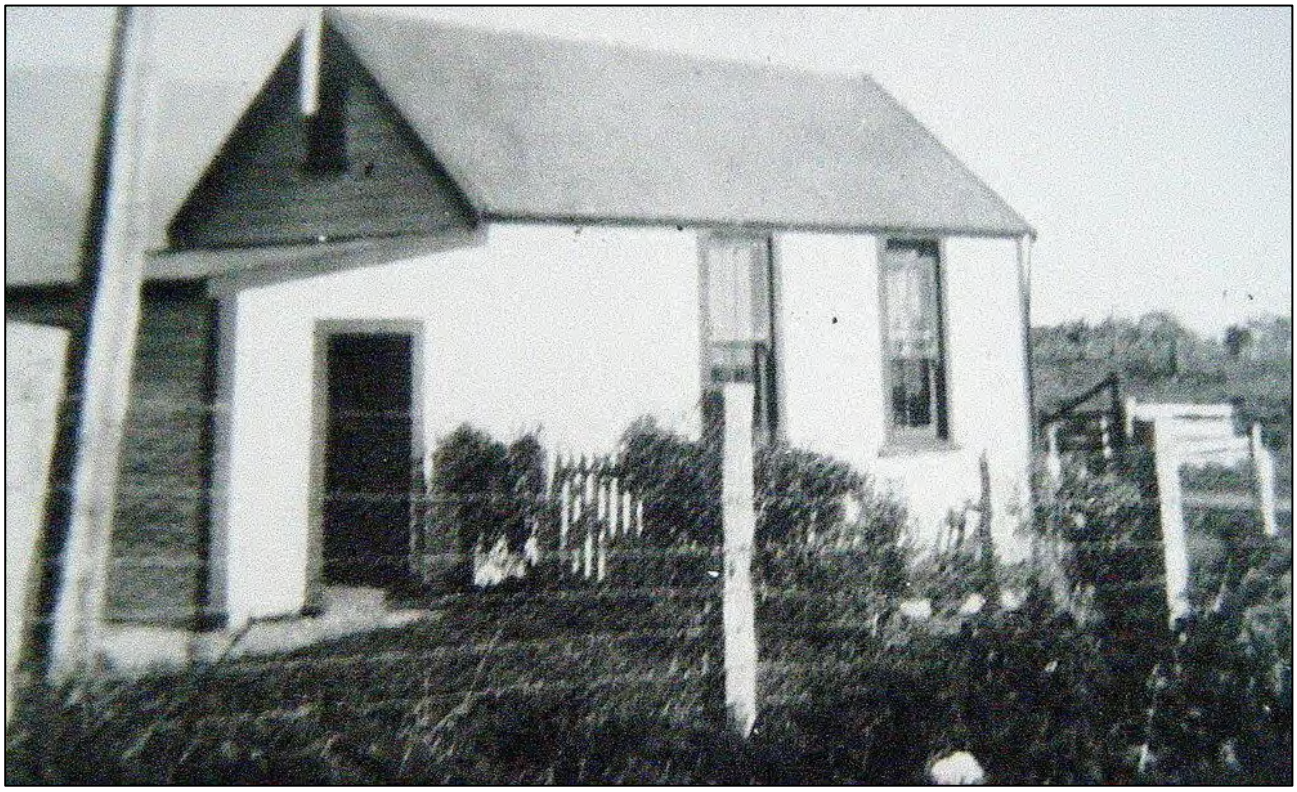

Figure 5-8. Barrytown School, situated in the education reserve Block V, in 1917 (West Coast New Zealand History, 1917).

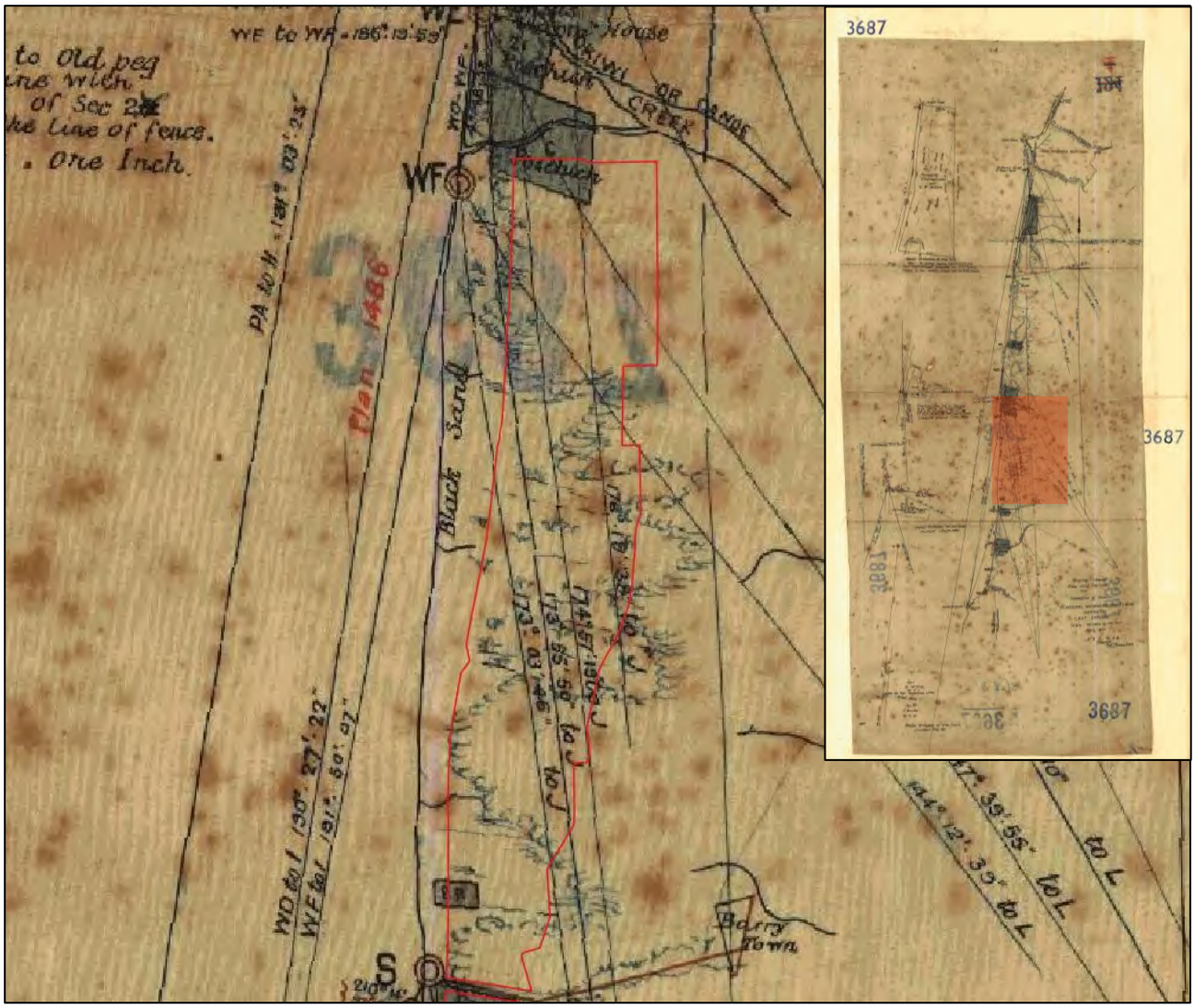

Figure 5-9. Claims of Poschich (north) in Section 6, and the education reserve in Block V, Waiwhero SD in 1881 (SO 3687). Approximate extent of PA in Block V outlined in red.

Additional pre-1900 activity in Block V was recorded outside of the formal land divisions. A 1901 survey plan of Special Claim G.26 shows a small mining settlement just north of the education reserve with a hut and several water races (SO 7948, Figure 5-10). A hut on the foreshore is labelled as being occupied by 'Millar', as well as two water races, one belonging to Cargill, both labelled as being 'old' (Figure 5-10). The identity of Millar could not be established; however, it is highly likely that these features were present prior to 1900. Peter Cargill was recorded to be living at Seventeen Mile Beach and working as a miner by 1878 (Ancestry.com, 1878). A 1905 survey map shows he had a house, shed, and fence in a cleared area to the north of Cargills Road (SO 866, Figure 5-11). The surrounding land is shown to be swampy flat under flax.

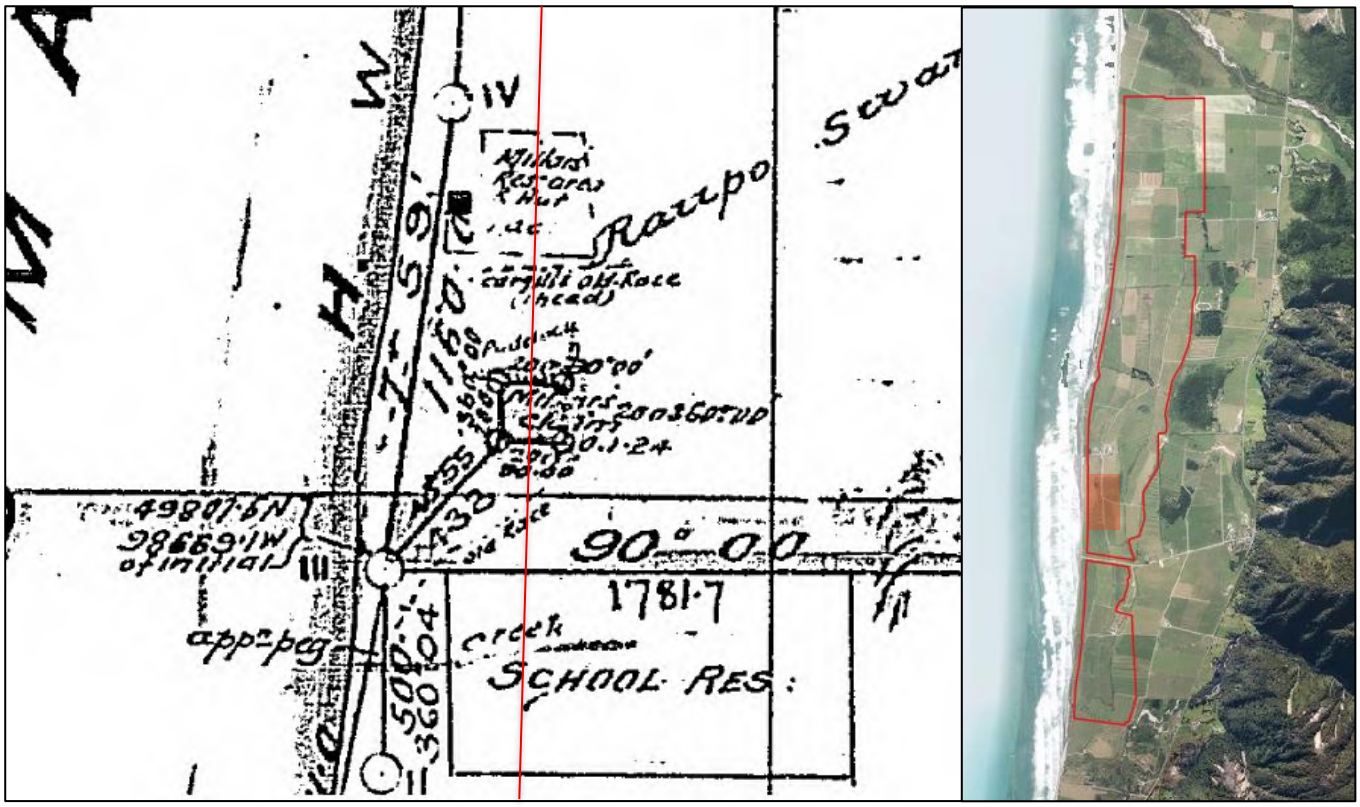

Figure 5-10. The small mining settlement adjacent to the school (SO 7948). Approximate western border of the project area in red. Location indicated in inset of the PA.

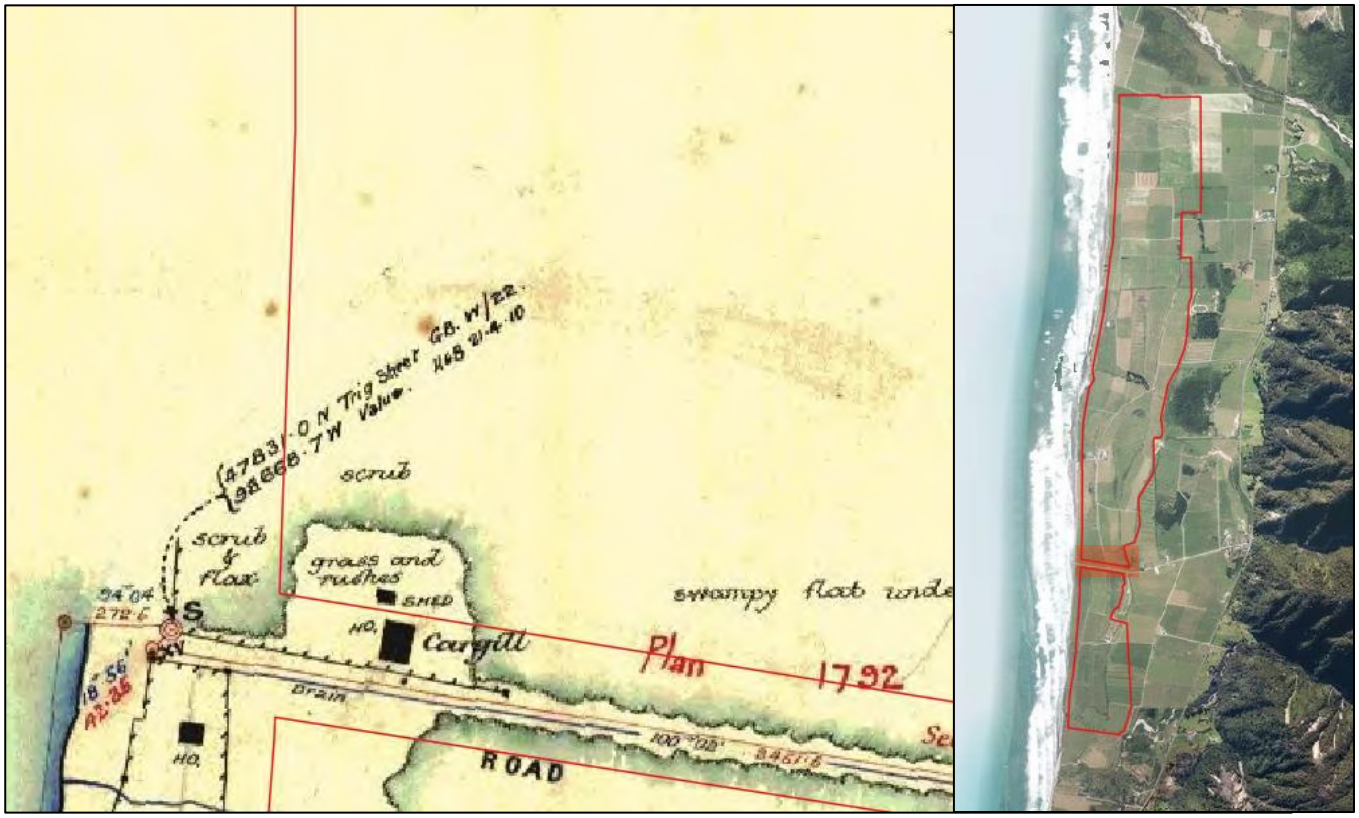

Figure 5-11. Cargill's house and shed just to the north of Cargill Road in 1905 (SO 866) Project area in red. Location indicated in inset of the PA.

The rest of Block V, Waiwhero District was subdivided in the early twentieth century. Section 2639 was surveyed in 1909 and occupied by Dennehy who was undertaking flax milling in Barrytown from 1903 (West Coast Times,

1903). He excavated a drain to the west through what would become RS 2932, to drain the swampy land to gather flax (Greymouth Evening Star, 1914). The initial track, underlying the modern Warren Road (Road ID 3700202) was created to transport flax from the harvesting areas to the mill in Barrytown (Grey River Argus, 1924). The remaining land parcels and road reserves were surveyed to their modern appellations in 1916 (SO 1944), prior to being incorporated into C. McKechnie's Special Claim G. 157 in 1934 (SO 3109). The northern sections of the project area, previously occupied by Poschich, were included as part of Special Claim No G178, Barrytown Gold Dredging Ltd in 1940.

The school was relocated to the eastern end of Cargill Street in 1939 after the old school became too small (Greymouth Evening Star, 1939). Additionally, the surrounding land was surveyed as part of Special Claim G.157 in 1934, with widescale dredging activities taking place around the school thereafter. The old school site was surveyed as Section 4033, Block V, Waiwhero SD in 1952. Although the section was not originally part of Special Claim G.157, 1950s aerials indicate dredging activity across the section (Retrolens, 1951). In the aerials only the foreshore to the west, outside of the project area remains intact and there is no indication of a surviving school building on the site (Figure 5-12).

Figure 5-12. Education reserve (red rectangle) within the dredged zone in 1951 (Retrolens, 1951). The yellow rectangle indicates the dredged area which once contained the small mining settlement adjacent to the school.

5.3.2 Block IX Waiwhero Survey District – encompassing Lot 1 DP 406050, Part Section 5, Block IX Waiwhero SD

The section of the project area to the south of Cargill Road was originally part of Block IX Waiwhero Survey District. Pre-1900 settlement in the project area was centred along Seventeen Mile Beach, with several special

claims and dwellings established along the coast (Figure 5-13, Figure 5-14). The surrounding land moving inland was described as a mix of swampy flat under stunted bush and shrub, and flat land with poor soil, with nikau, supplejack, with a few rimu and rata (Figure 5-14).

Evan H. Lewis had a claim in the northwestern corner of Block IX by 1881 fronting Cargill Road which was subdivided off to become Section 7, Block IX, Waiwhero Survey District (later became Part Section 5) (Figure 5-13). By 1905, Lewis had a cleared section with a dwelling house and fencing just outside of the project area (Figure 5-14). M. Hannah & others had a claim along the foreshore, which had been transferred to Warren and Mackay by 1905, however the land was not further subdivided at this time (Figure 5-15).

Most of Block IX Waiwhero encompassed by the project area was included as part of the Special Claim G.157 for C. McKechnie in 1934 (SO 3109), with the exception of the southern extent which was originally part of McIlroy's claim and the parcel encompassed by Part Section 5, Block IX Waiwhero SD, which was the eastern portion of Lewis' original claim.

Figure 5-13. Claims of E.H. Lewis (Section 7) in Block IX, Waiwhero SD in 1881 (SO 3687). Extent of PA in Block IX outlined in red.

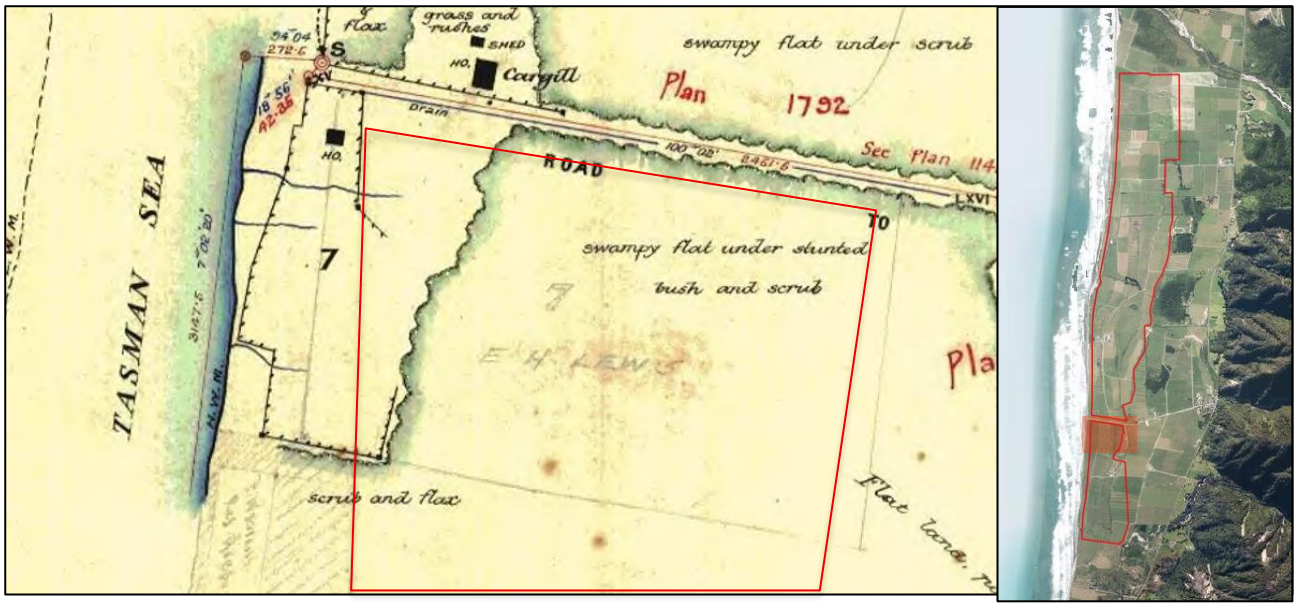

Figure 5-14. Section 7 occupied by E.H. Lewis in 1905 (SO 866). Approximate project area encompassing Block IX, Waiwhero SD in red.

Figure 5-15. McKay's claim along the western edge (SO 865).

6 Previous Archaeological Investigations and Archaeological Context

This section examines the broader archaeological and heritage context of the project area, considering the previously recorded archaeological sites as well as other archaeological and heritage sites within the vicinity. The locations of previously recorded sites near the project area are detailed in Section 6.2. However, please note that the recorded sites only reflect those identified to date and thus may not be a true representation of the distribution of sites in the area.

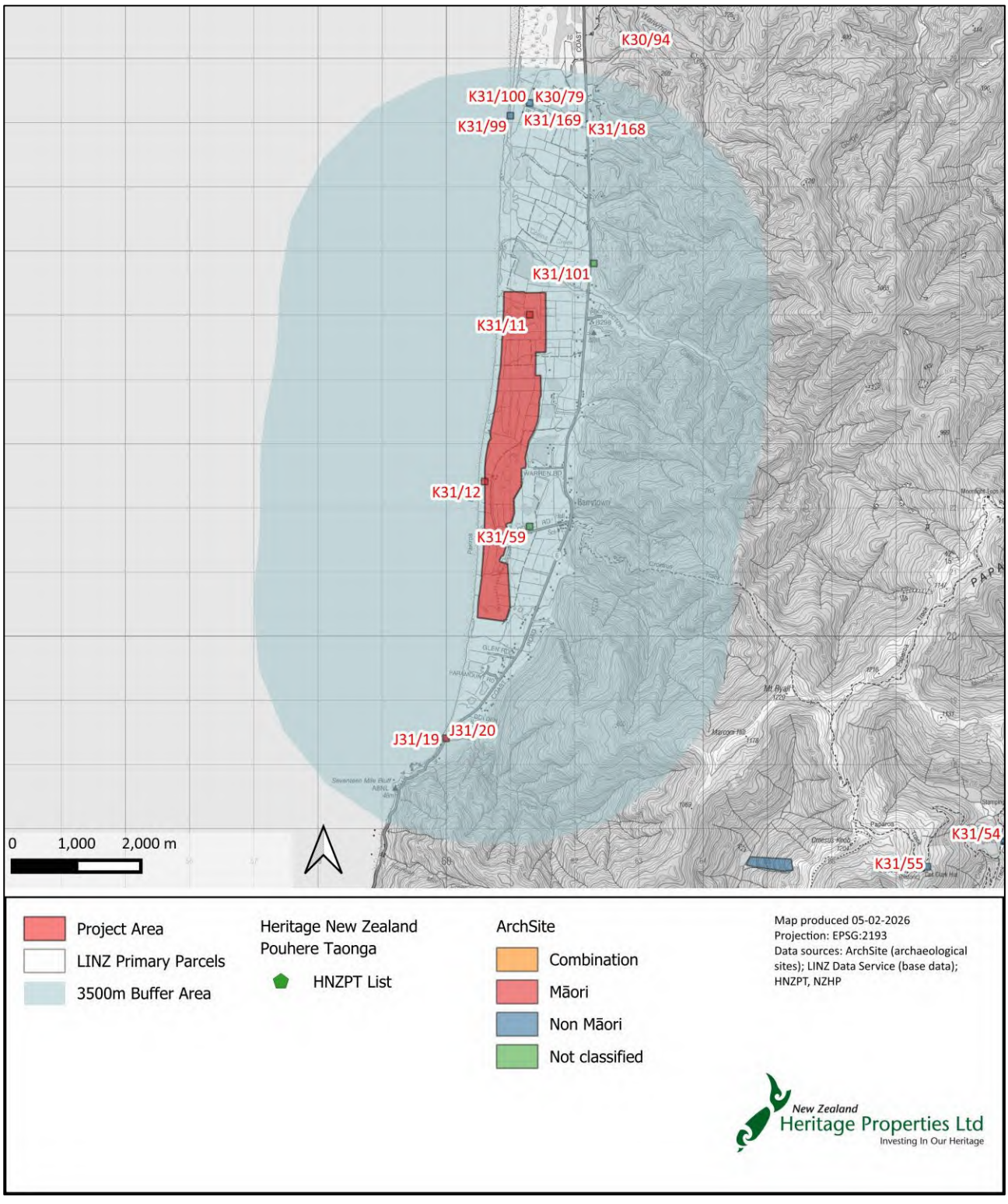

Figure 6-1. Previously recorded archaeological sites within the vicinity of the project area.

6.1 Previous Research and Investigations within the Project Area

There are two archaeological sites recorded within the project area: K31/11 and K31/12. The site records document artefact findspots that were reported in 1981 by a local landowner; neither site has been visited by an archaeologist (Voight, 1981a, 1981b).

Part of a shaped patu and a small greenstone chisel were recorded as K31/11 and a shaped greenstone pendant as K31/12. Additionally, the forms note other pieces of greenstone pebbles from Canoe Creek to Cargill Road (Voight, 1981a, 1981b). Both sites were described as located along the beach. K31/11 is located in the northern part of the project area, to the south of Canoe Creek. The site has been recorded inland, which does not match the description on the context form. The second find spot, K31/12, is further to the south in proximity to Warren Road. The presence of these findspots on the beach suggests that they may have eroded out of the foreshore and therefore increases the potential for other material to be present in the area.

There is no evidence to suggest that archaeological investigations have previously taken place in the project area.

6.2 The Wider Archaeological Context

There are nine recorded sites within a 3.5km radius of the project area (Table 6-1) (Figure 6-1). Only two sites are directly associated with Māori occupation, with two midden/oven site types (J31/19, J31/20) recorded to the south of the project area. The other seven sites are three mining-gold site types, three historic-domestic sites associated with gold mining occupation, and one burial/ cemetery.

It must be noted that these only represent the extent of recorded archaeology and are not representative of the full extent of possible archaeological remains in the area. Just 5km to the north of the project area where extensive surveys were carried out in 1977 and 1990, a large number of archaeological features associated with Māori occupation were encountered including midden, stone working areas, fireplaces, find spots, pits, terraces, and a cave shelter (Nichol, 1990). The lack of sites in proximity to the project area is a result of the area not having been previously surveyed and of extensive disturbances rather than a reflection of the distribution of pre-1900 activity. Nichol (1990) argues that that the distribution of sites and findspots in the vicinity of Canoe Creek may suggest the presence of a major unrecorded site in the area, and that the most likely spots for features to be encountered would be along the dune ridges and in the drier areas. Nichol (1990) reasons that due to the large populations inhabiting and traveling through the area it is inevitable that burials will be encountered during any large scale mining work on the Barrytown Flats, however no further evidence has been found to support the presence of burials within the project area.

The midden/oven sites (J31/19, J31/20) were recorded to have eroded out of the dune system at the southern end of Pakiroa Beach. Both noted the presence of mussel and charcoal. The gold mining sites were located to the north of the project area with trenches (K30/79), pits (K31/99), as well as the subsurface remnants of buildings (K31/169) recorded. The hut sites are located to the east of the project area close to Coast Road. The huts have been recorded based on the presence of stone rubble in rectangular arrangements (K31/100, K31/168) and on historical information with further evidence from domestic plant patterning. The cemetery (K31/59) is immediately to the east of the project area; it is noted to largely be derelict with only 21 graves still visible.

Table 6-1. List of recorded archaeological sites within 2.5km radius of the project area

ArchSite	Brief Description	Site Type	Ethnicity
J31/19	Shell midden	Midden/Oven	Māori
J31/20	Midden	Midden/Oven	Māori
K30/79	Curvilinear depression - mining trench	Mining - gold	Non- Māori
K31/100	Hut site	Historic- domestic	Non- Māori
K31/101	Hut sites	Historic- domestic	Non- Māori
K31/168	Possible stone hut site	Historic- domestic	Non- Māori

K31/169	Building remains	Mining - gold	Non- Māori
K31/59	Cemetery	Burial/cemetery	Non- Māori
K31/99	Depressions - possible prospectors' pits	Mining - gold	Non- Māori

6.3 Potential Unrecorded Archaeological Sites

Based on the documentary evidence and previous archaeological investigations in the vicinity, this assessment has identified the possibility of encountering unrecorded artefact find spots, midden/oven, mining-gold, and historic-domestic site types within the project area.

6.3.1 Artefact Find Spots

This assessment has found that unrecorded findspots may be encountered in the project area. Find spots are the only previously recorded site types within the project area. Due to the presence of the nearby ara tawhito, Poutini Ngāi Tahu would have ventured across the project area to procure resources while travelling. Artefacts caches have frequently been found in wetland areas across Aotearoa with highly valuable material often cached for safe-keeping or for functional purposes (Gumbley, Johns, & Law, 2004; Phillips, Johns, & Allen, 2002). Additionally, early Pākehā occupation in the area was transitory with little permanent settlement, there is the possibility of finding discarded artefacts from the early gold miners in the project area.

Across Aotearoa there are 1913 find spots recorded in total with 44 of these being in Te Tai o Poutini. The find spots predominantly record adzes and other lithics, while three record the presence of canoe/waka and one records a glass bottle cache.

6.3.2 Midden/oven Sites

Unrecorded midden/oven sites may be encountered within the project area. Midden/oven sites are common around the coast of Aotearoa with 3477 recorded in Te Waipounamu, 131 of which are found within Te Tai o Poutini. They are the most common site type in the previously surveyed area of the northern Barrytown Flats with just over half of all sites recorded in the area being midden/oven site types. Several have been recorded in proximity to the project area in the coastal dune system. These sites are common throughout coastal New Zealand. It is not surprising that multiple midden sites have been identified on Barrytown Flats and along Pakiroa Beach due to the ara tawhito crossing the project area and the abundant mahinga kai which would have once been present in the area.

6.3.3 Gold Mining Sites

This assessment has determined that there is the potential for encountering unrecorded mining sites. Given that the documentary resources have identified that the project area was occupied by miners with several mining claims within the project area, and that the beach was an area used for blacksanding, there is the potential that mining evidence may be encountered in the project area.

Across Te Waipounamu, there are more than 3800 mining – gold sites and a further 191 sites associated with other forms of mining that have been previous recorded in the ArchSite database. As of December 2024, there were 1721 recorded archaeological sites within Te Tai o Poutini, 810 of which are classified as gold – mining, accounting for 47% of all sites in the district. However, it should be noted that this number will be much higher as this only includes the sites that have been recorded to date. This number does also not consider related sites, such as miner's huts, ancillary structures, etc. which may be classified differently on ArchSite. The previously recorded sites are largely concentrated in Te Tai o Poutini, Central Otago, and in smaller pockets in the Marlborough, Tasman, and Southland Districts. The nature of gold mining sites is varied as features relate to different working aspects of the gold fields and trace chronological differences in mining technology and equipment. For example, many features relate to the storage and movement of water required for sluicing and hydraulic elevating (e.g., water races, reservoirs, ponds, aqueducts, dams), others relate to the physical remains of mining activities (e.g., sluice faces,

tailings, prospecting pits) or the specific equipment and machinery that was utilised (e.g., dredges, stamper batteries, machinery). In addition, there are also often features and materials associated with the domestic lives of miners living near workings (e.g., stone and sod huts, hut floors, artefacts).

6.3.4 Historic-Domestic Sites

This assessment has determined that there is the potential for encountering unrecorded historic-domestic sites. Given that the documentary resources have identified several small huts in the project area as well as indicating that there were many miners blacksanding along the foreshore and squatting nearby, there is the potential that historic-domestic site types may be encountered in the project area.

Historic-domestic sites are common around Aotearoa but underrepresented in Te Tai o Poutini, with 13376 recorded in Te Waipounamu, only 103 of which are found within the West Coast. Recorded historic-domestic sites in the district primarily relate to mining settlements, with small transitory structures such as hut sites and camp sites being the most common historic-domestic site type.

7 Results of the Site Survey

A site visit was carried out on 10 to 12 December 2024 by Bree Wooller and Leah Harding to record the extent and condition of visible archaeology and to identify areas of modification within the project area that may affect the condition of subsurface archaeology (Figure 7-1). Based on the twentieth century history of the site, large extents of the area were dredged as well as heavily modified for agricultural activities. Both activities involved extensive earthworks which would have modified any archaeology that would have been detectable on the surface, although deeper archaeology may still be present. Sample areas of heavy modification were surveyed, to establish the improbability of identifying archaeology through a transect survey, before they were excluded. Areas of known pre-1900 activity were still surveyed regardless of modification. The following section will describe the results of the site survey, documenting the site setting and condition of potential pre-1900 features.

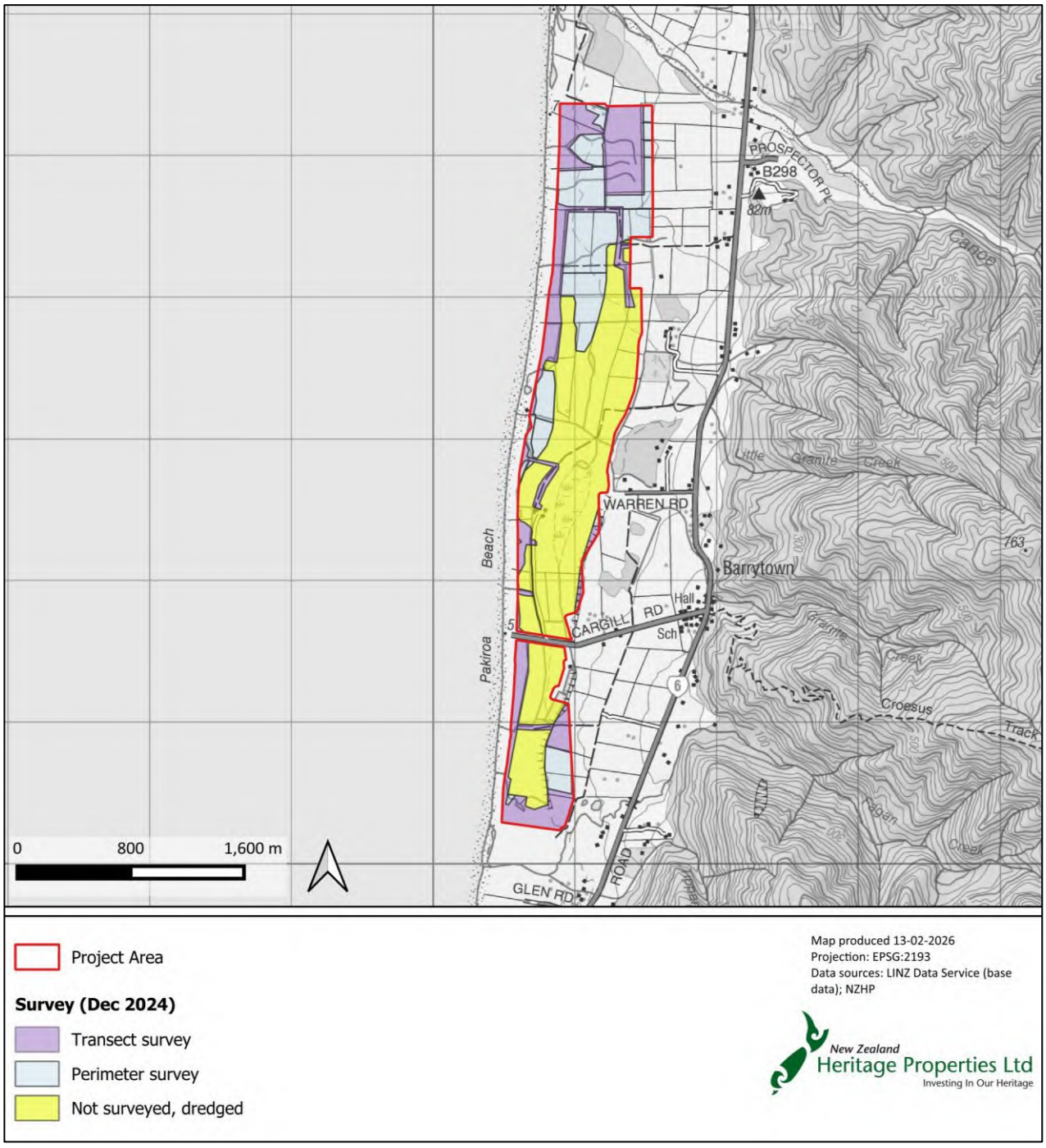

Figure 7-1. Map of project area showing areas surveyed. A map of the transects walked is provided in Appendix A.

7.1 Setting

The project area is situated to the west of the settlement of Barrytown on the flats adjacent to Pakiroa Beach (Seventeen Mile Beach). The land is primarily used for farming and consists of fenced paddocks, with access ways, and drainage ditches transecting the landscape.

The site survey found a large portion of the surface area has previously been disturbed through ploughing, dredging, and hump and hollowing (Figure 7-2). Approximately a third of the project area had been humped and hollowed. In the hollows the deposits were waterlogged and boggy, and at times were overgrown with foliage (Figure 7-3). A large portion of the project area has previously been dredged. A sample of dredged sections were transacted; the terrain was undulating, boggy, and covered in tussock and short grasses.

The terrain and foliage cover varied across the project area. Numerous creeks and tributaries criss-cross the landscape, resulting in large swaths of uneven, boggy terrain covered in long 300-500mm grass and tussocks (Figure 7-4). Some areas were waterlogged to the extent that they were not traversable. Elsewhere the terrain was gently undulating to flat and covered with short tussocky grass (Figure 7-4, Figure 7-5). Some fields appeared to have been extensively grazed and heavily rutted by stock, while others had deep plough lines. No evidence of pre-1900 material was visible in the surveyed disturbed areas.

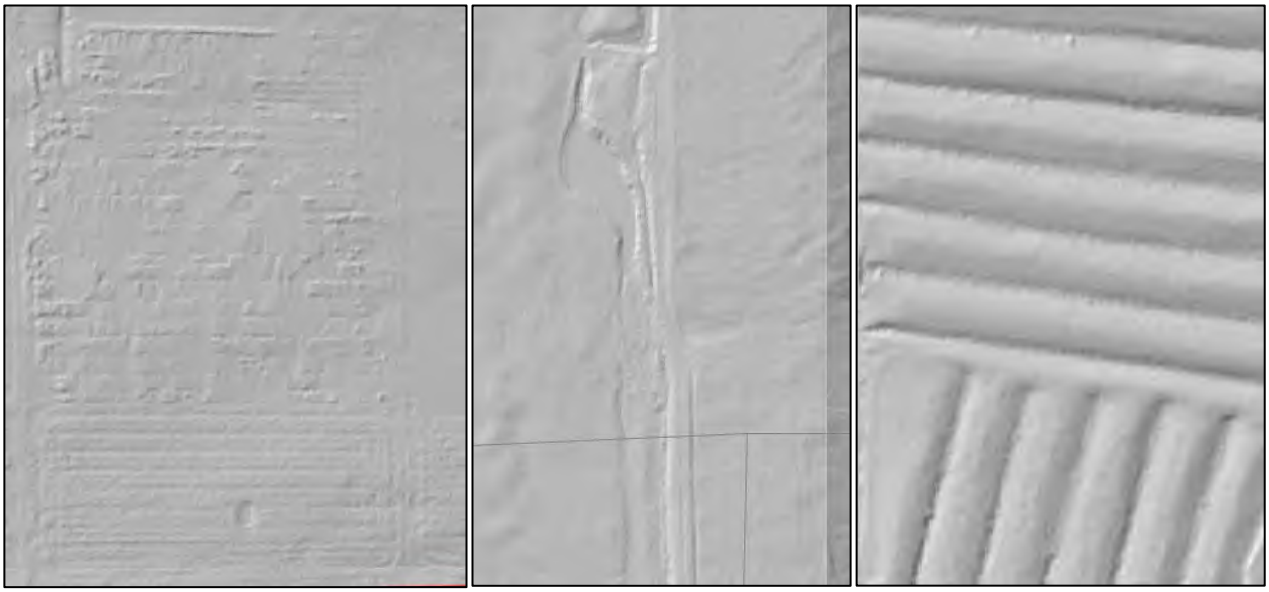

Figure 7-2. Ploughing (left), dredging (centre), and hump and hollowing (right) in the project area as seen in the LiDAR imagery.

Figure 7-3. Hump and hollowing in the eastern fields, looking northeast (Wooller, 2024).

Figure 7-4. Tributaries in RS 2927, looking north. Note the tussocky grass in the foreground and the grazed pasture in the background (Wooller, 2024).

Figure 7-5. Foreshore with cobbled beach, looking south (Wooller, 2024).

Figure 7-6. Eroded bank along the foreshore adjacent to Lot 5, looking east, scale bar = 500mm (Wooller, 2024).

7.2 Results

Three points of interest (POI) were identified and recorded during the pedestrian survey of the project area, while the recorded locations of the archaeological sites (K31/11 and K31/12) were revisited with no evidence of archaeology found. The following sections will discuss the survey results by historic block.

7.2.1 Block V Waiwhero Survey District

No archaeological features or material was found in Block V, Waiwhero District. The locations of known activity and recorded archaeological site were revisited and are discussed below.

7.2.1.1 Find Spot K31/11

No evidence of archaeological features or deposits were found in the recorded location of K31/11. The findspot is located in a boggy paddock between two creeks with small tributaries crossing through the vicinity of the

recorded archaeological site (Figure 7-7). The surface was covered in long tussocky grass that obscured the surface; however, sections of eroded creek and stock rutting showed no evidence of archaeological material. A survey of the LiDAR imagery and aerials show no evidence of archaeological features in the vicinity (Figure 7-8).

Figure 7-7. Vicinity of K31/11, looking west (Harding, 2024).

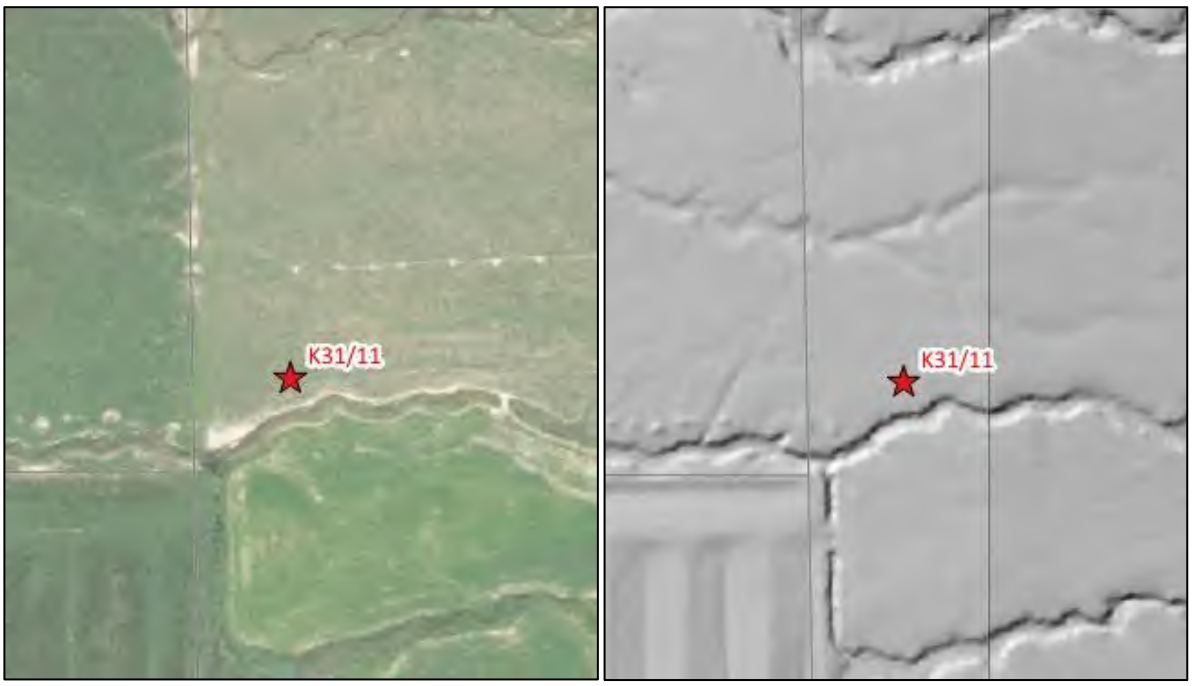

Figure 7-8. Modern aerial (left) and LiDAR imagery (right) showing the approximate location of K31/11. Note the site location is an approximation based on an oral account.

7.2.1.2 Find spot K31/12

No evidence of archaeological features or deposits were found in the recorded location of K31/12. The findspot is on the margin of the dredged zone, with only a small coastal strip and a section of wetland which had not been

dredged. Harakeke, umbrella sedge, and tussock were growing along the foreshore, while the shoreline was covered in cobbles, so visibility was poor (Figure 7-9, Figure 7-10). A survey of the LiDAR imagery and aerials show no evidence of archaeological features in the vicinity (Figure 7-11).

Figure 7-9. Foreshore in proximity of findspot K31/12, that has not been dredged, looking north (Wooller, 2024).

Figure 7-10. Foliage growth and stone coverage in proximity to find spot K31/12. Looking east, scale bar 500mm (Wooller, 2024).

Figure 7-11. The vicinity of find spot K31/12 shown in the 1951 aerial (left) and the LiDAR imagery (right). Note the site location is an approximation based on an oral account.

7.2.1.3 Poschich's Claim

South of Canoe Creek, gold mining activities were undertaken in the northern part of the project area by 1881. The primary occupant was Raymond Poschich who had several claims in the area with historical sources noting water races and dams in relation to the Poschich's workings in Barrytown Flats. Only the southern edge of Poschich's claim is within the project area. No evidence of archaeological deposits or features associated with Poschich's claim were located within the project area. The area was extensively humped and hollowed, which presumably would have destroyed any archaeological evidence, such as water races or hut sites, within the project area (Figure 7-12). However, depending on the mechanism used, pockets of features may remain under the humps, while find spots relating to his occupation and mining activities may be present subsurface.

Figure 7-12. Hump and hollowing in what was Poschich's Claim. Looking southwest. The extent of the ground disturbance can also be seen on the LiDAR, right (Poschich's claim in purple).

7.2.1.4 Educational Reserve and the Adjacent Mining Settlement

No evidence of archaeological deposits or features were located at the site of the former school, and the pre-1900 settlement consisting of Millar's hut and Cargill's water races. The area was recorded to have been previously

dredged, and this was supported by the survey results (Figure 7-13, Figure 7-14). The surveyed area was gently undulating, likely the result of redeposited dredge material. The boundary between the dredged zone and the coastal margin was not visible. An irrigation channel ran along the southern perimeter. The field had been ploughed previously, and although there was modern concrete chunks and metal noted along the coastal margin, there was no evidence of pre-1900 material relating to the school on the property.

Figure 7-13. Looking northwest across the former Educational Reserve (Wooller, 2024).

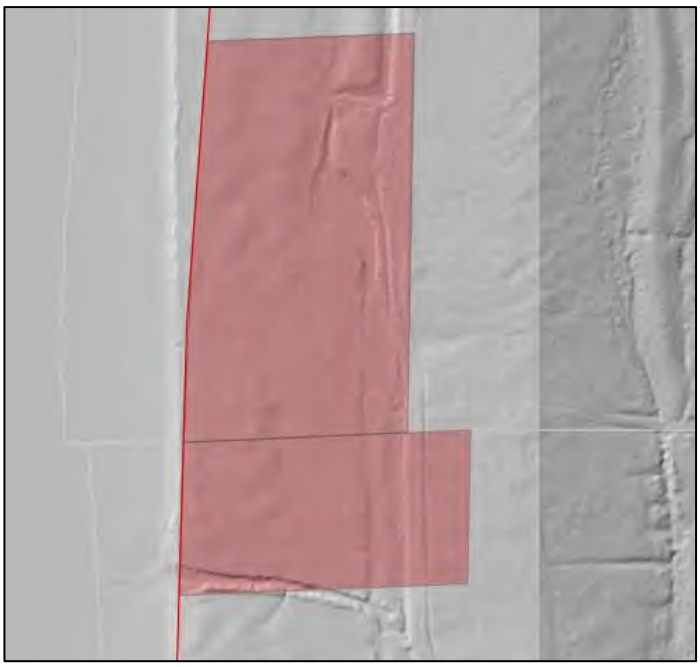

Figure 7-14. LiDAR imagery showing the area of pre-1900 activity (red) as dredged.

7.2.1.5 Cargill's Hut Site

No definite evidence of archaeological deposits or features were located at Cargill's hut site. However, the site visit noted that the boundary of the dredging appeared to be further to the east than previously thought, indicating that subsurface remains relating to Cargill's settlement may be present within the project area. Based on historic plans,

the hut site appears to be just outside the project area; however, potential remains for posts or foundations relating to out buildings including the shed, fence posts, or artefacts relating to Cargill's occupation (Figure 5-11). A large cluster of arum lilies were observed just outside the project area in this location. The plants were of interest as arum lilies were not noted elsewhere on the survey and were a common ornamental garden plant favoured by early European settlers in New Zealand. A discrete cluster may be indicative of historic planting.

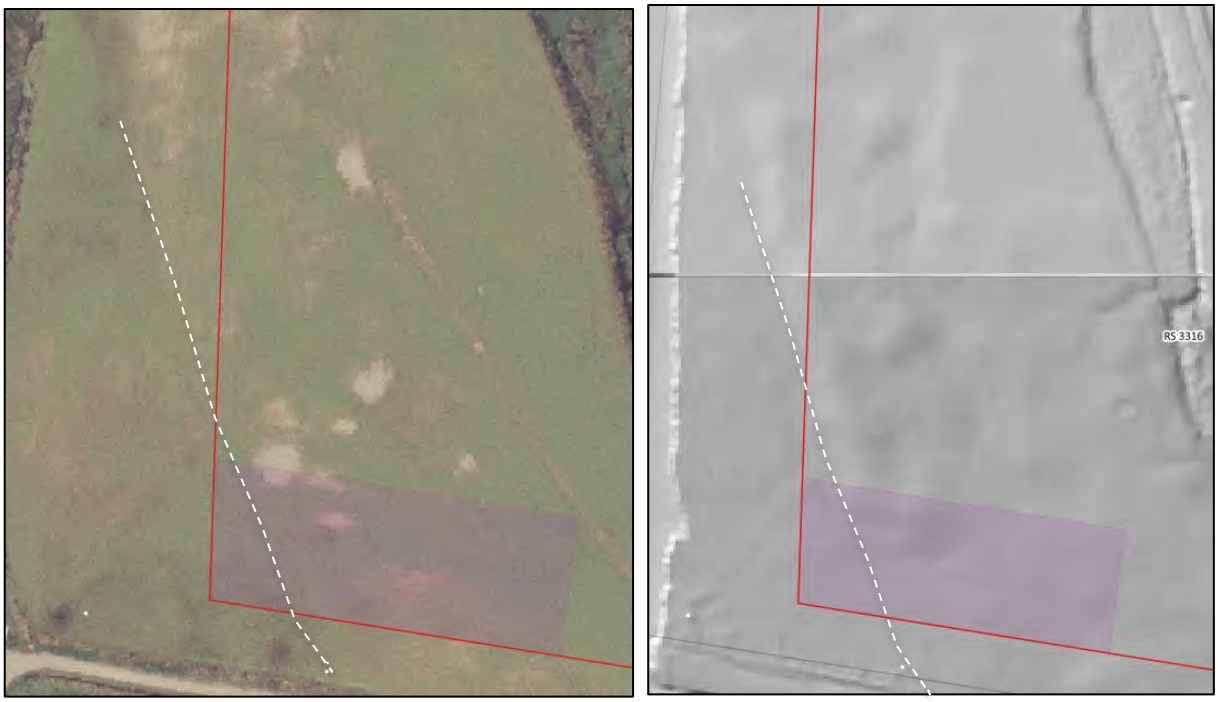

Figure 7-15. The location of Cargill's settlement (purple) and the suspected edge of dredging (white dotted line), pictured overlaying the 1981 aerial (left)and the LiDAR imagery (right).

Figure 7-16. Arum lily patch, looking west (Wooller, 2024).

7.2.1.6 Dune Ridge System (POI 001-002)

Along the foreshore in the northwestern corner of RS 2932, there are two high ridge formations within the project area which appear to have been a somewhat unmodified part of the original dune landscape (Figure 7-17, Figure 7-18, Figure 7-19). However, a drain and a pond were excavated directly to the east of the ridges sometime between 1951 and 1981 (Retrolens, 1951, 1981) and there is the possibility the ridges are formed from the spoil from the drain (Figure 7-20). This could not be de determined from aerial imagery or historic photos of Barrytown Flats.

If the ridges were dune formations they would be of interest as they may have formed a high point in the surrounding wetland environment, making them a prime spot for a nohoanga for manawhenua travelling up and down the coastline. The dunes are approximately 870m north of the findspot K31/12. However, the landscape to the south of the dunes has been highly modified by the excavation of Dennehy's drain in the early twentieth century, dredging, and then hump and hollowing. The dunes appear to be denser and more compact than the terrain of surrounding paddock which was boggy and heavily rutted from livestock. The area was planted in short grass. The high dune ridges stretch along an extent of approximately 300m, while smaller dunes continue north for a further 200m.

Figure 7-17. Looking north across the ridges (Harding, 2024).

Figure 7-18. Undulating slope looking northwest (Harding, 2024).

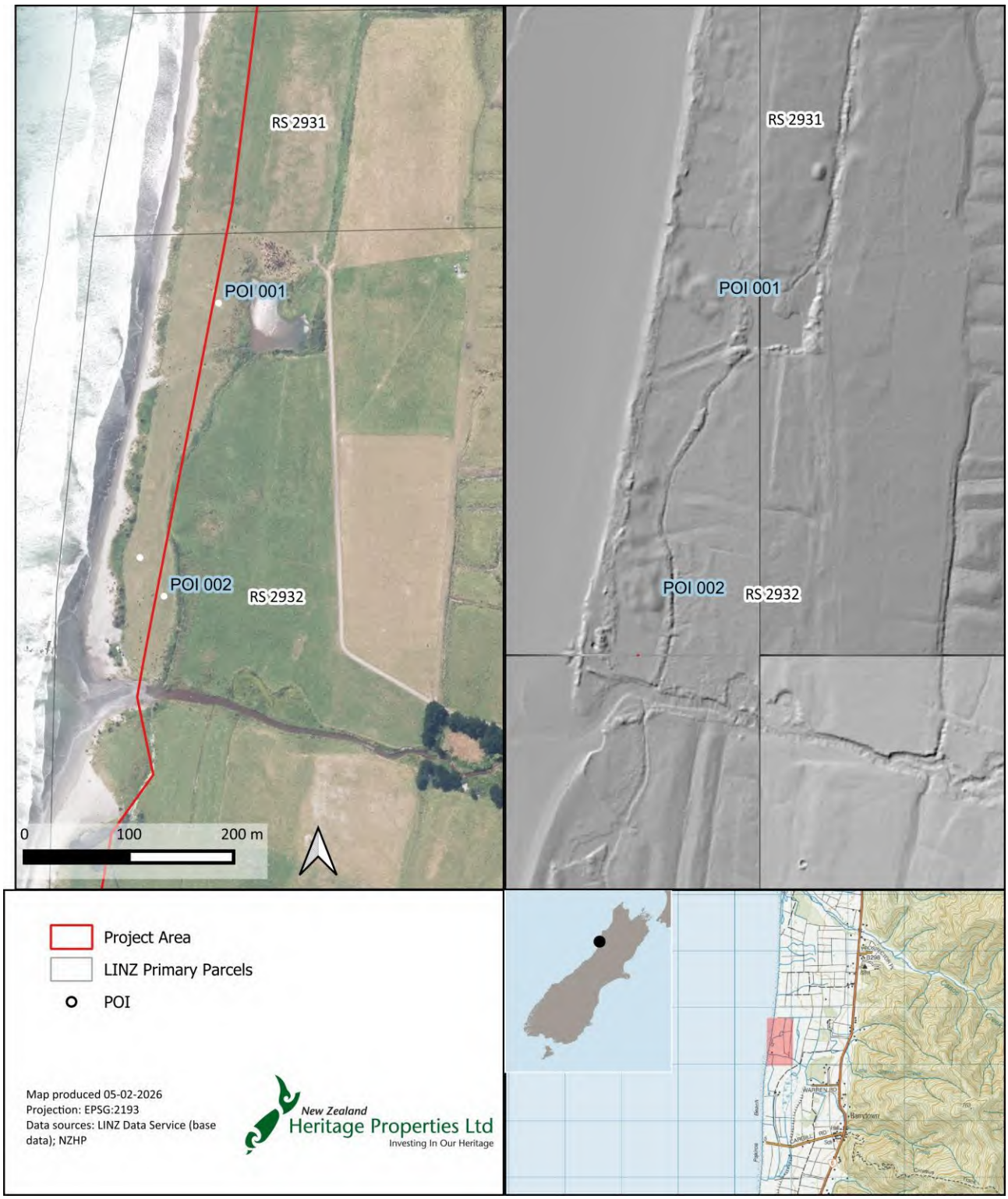

Figure 7-19. Points of interest in relation to modern property boundaries and as shown on shown on LiDAR imagery just within the project area

Figure 7-20. Aerial imagery 1951 (left) and 1981 (right). Ridge areas circled in red (Retrolens, 1951, 1981).

7.2.2 Block IX Waiwhero Survey District

No archaeological features or material was found in Block IX, Waiwhero District. One suspected archaeological feature, a drystone structure (POI 003) was identified. The locations of known activity were revisited and are discussed below.

7.2.2.1 Cargill Road Drystone Structure (POI 003)

Beneath Cargill's Road on its southern aspect the remnants of a stacked drystone masonry structure are visible (Figure 7-21). The feature consists of two walls extending up from the ditch and extending into the road reserve. Although the project area has a twenty-metre setback from Cargill Road and the drystone feature, the feature might inadvertently by modified by the creation of the Cargill Road bund, by vibrations, or dust accumulation.

Figure 7-21. Stacked drystone structure beneath Cargill Road (Wooller, 2024).

7.2.2.2 Lewis' Claim

No evidence of archaeological deposits or features were located at the site of Lewis' mining claim (Part Section 5, Block IX Waiwhero SD). The survey indicated that the project area intersecting with the historic claim had been heavily disturbed by hump and hollowing, and this was supported by LiDAR results (Figure 7-22). The surveyed area had regular flattened humps running east-west, with marshy hollows draining into an irrigation channel at the edge of the dredge zone. The margin between the disturbed area and the undisturbed coastal strip was clear, however, only the disturbed zone is within the project area.

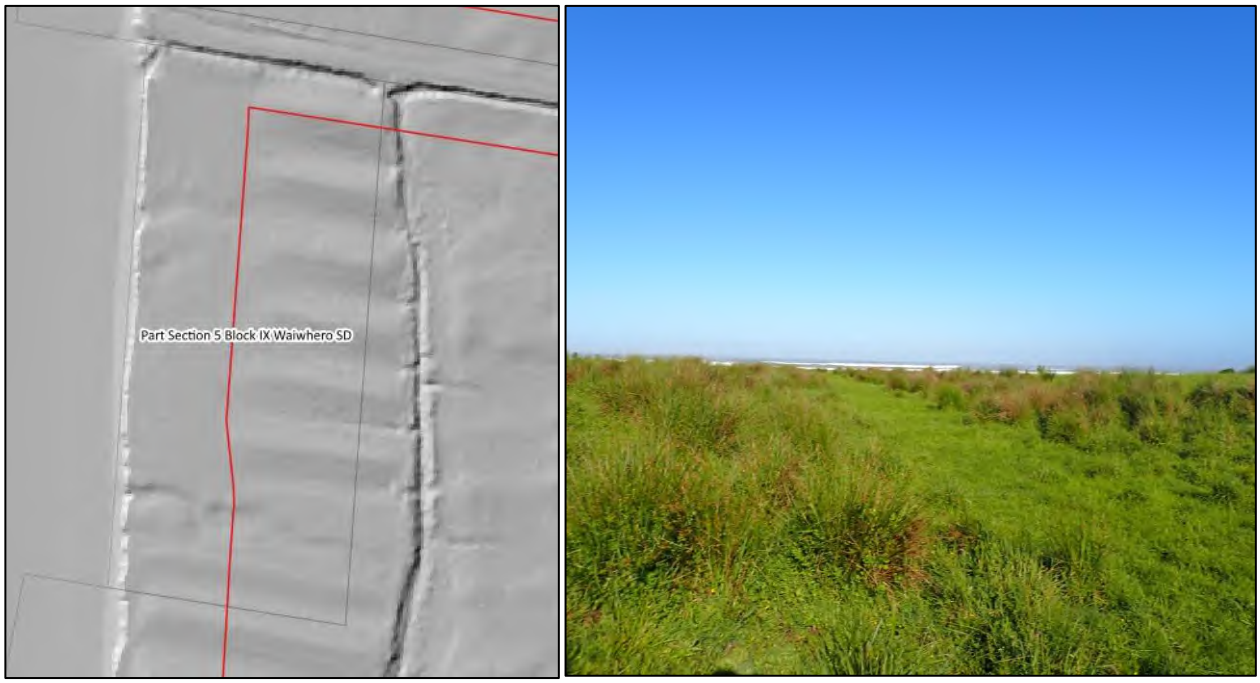

Figure 7-22. The eastern edge of Lewis' Claim shown to be humped and hollowed in the LiDAR data (left) and during the survey, looking west (right). The red line indicates the project area boundary.

7.2.2.3 Hannah's Claim

No evidence of archaeological deposits or features were located at the site of Hannah's mining claim (Lot 1 DP 406050, Block IX Waiwhero SD). The survey indicated that the project area intersecting with the historic claim had been heavily disturbed by dredging initially, then hump and hollowing (Figure 7-23, Figure 7-24). The extent of modern disturbance was supported by LiDAR results (Figure 7-24). The surveyed area had marshy undulating ground, associated with the dredging and overgrown waterways in the artificial linear hollows. The humped areas were narrow and steep forming dry high points running north south along the foreshore and along the southern edge of the dredge zone. The southwestern corner had modern irrigation channels excavated parallel to the foreshore but otherwise appears undisturbed. Likewise, a paddock along the western edge is recorded to have been on the margin of the dredge zone, however the site visit identified this area to be less undulating than the surrounding land and may have been undisturbed. This was also observed in the LiDAR imagery (Figure 7-24).

Figure 7-23. Hump and hollowing within Hannah's claim, looking southeast (Wooller, 2024).

Figure 7-24. LiDAR imagery of the project area (left). The red line indicates the project area, and the yellow dotted line is the eastern side of Hannah's claim. The southwestern corner of the project area (right), with irrigation channel running through. Looking south (Wooller, 2024).

8 Research Results

The historical and archaeological research, as well as the results of the archaeological survey, indicate that there is a high potential that pre-1900 archaeological features and deposits survive within the project area and will be impacted by the proposed works. Encountered archaeology will be associated with artefact find spots, midden/oven sites, mining-gold sites, and/or historic domestic sites.

Prior to Pākehā arrival in the area, the coastline was traversed by manawhenua travelling along an ara tawhito, with the dune ridges in the project area possible sites of nohoanga as well as mahinga toi and mahinga kai within the wetland inland area. During the survey the recorded locations of the two find spots (K31/11 and K31/12) in the project area were revisited and no further material was identified. This is not surprising given that the site locations were recorded based on oral reports from landowners in the 1980s, and the extent of land modifications and farming activities that have taken place since then. The sites of the two find spots (K31/11 and K31/12) are considered destroyed on the basis of the site record forms and the site visit, and they will not be further discussed. The site record forms have been updated to reflect the results of the survey. However, the presence of the findspots in proximity to each other is indicative that there is a high potential other subsurface sites are present in the vicinity. Although the project area has undergone a large amount of surface modification, in situ subsurface areas remain intact outside the dredged area, particularly in the northern project area, and may contain artefacts while the dredged areas may contain redeposited archaeological material. As the proposed works involve intensive earthworks within the project area, including in proximity to the coastal margins and historic wetland areas, **there is reasonable cause to suspect that Māori artefacts will be encountered within the project area.** POI 002 – 003 record what appears to be an area of intact dune surface which may have provided a dry sheltered spot with good visibility of the surrounding landscape and may have been utilised as a nohoanga. This is further supported by the presence of the nearby find spot K31/11, **suggesting there is reasonable cause to suspect Māori archaeology will be encountered and affected by the proposed work** along the western margin of the project area in RS 2932 (Figure 8-1).

Early Pākehā activity within the project area was transient and associated with the gold rush at Canoe Creek, with later beach mining activities taking place along the foreshore of Seventeen-Mile Beach. Early mining claims were recorded in the project area to the south of Canoe Creek in the northern project area (Porschich), and along the foreshore to the south of Cargill Road (Lewis, Hannah, Warren). No evidence of archaeological features or deposits were found during the survey of these areas, with a large amount of modern disturbance recorded. However, small sections of land along the western and southern margins of the project area, within the mining claims, appear relatively undisturbed. The surrounding archaeological landscape indicated that archaeological features such as water races, prospecting pits, and hut sites are located within areas of pre-1900 mining activity, with these not always being visible prior to excavation, so **there is reasonable cause to suspect that archaeology relating to mining may be present across the project area, with a higher chance of encountering these** in discrete patches in the western and southern portions of Lot 1 DP 406050, Block IX, Waiwhero SD (Figure 8-1).

With the development of Barrytown and more permanent occupation in the area there was the construction of a schoolhouse and several dwellings in the project area. The site of the first school was in the project area, however the area has been dredged, and it is unlikely any archaeology remains intact. Settlement at this time was along the foreshore, with the western part of the project area remaining as wetland which was not cleared or drained until well into the twentieth century. Formal subdivision was piecemeal and largely occurred in the twentieth century. However, early beach miners, such as Cargill, were squatting within the project area prior to settlement. Although Cargill's hut site appears to be on the boundary of the dredge zone, his shed and other structures may remain intact. The assessment has determined that **there is reasonable cause to suspect that archaeology related to historic-domestic site types may be present across the project area,** with a higher probability in the southwestern corner of RS 3316 (Figure 8-1).

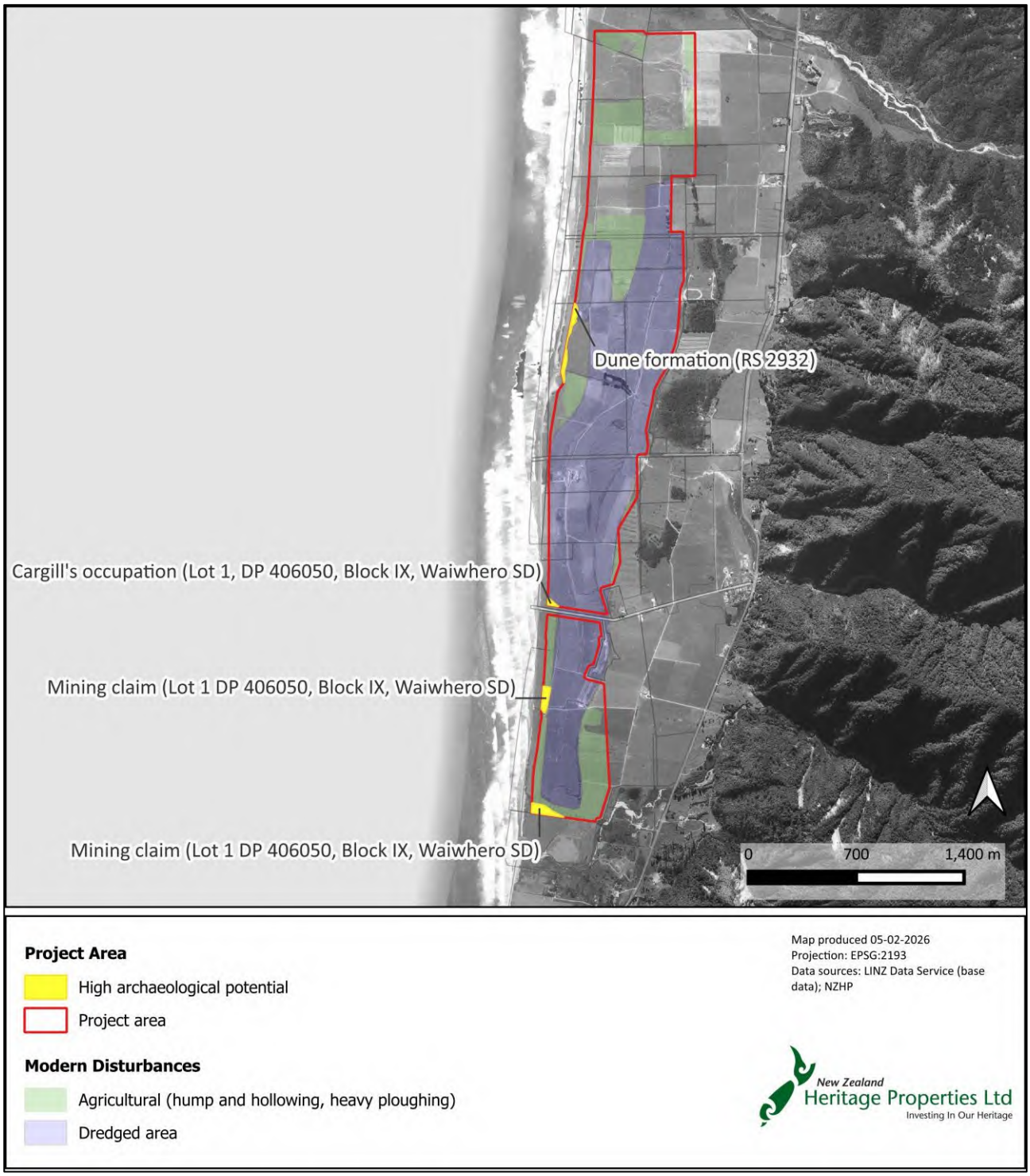

Figure 8-1. High archaeological potential areas and areas of modern disturbance.

8.1 Constraints and Limitations

During documentary research there was a limited number of sources available digitally, this limited the understanding of land transactions and property ownership. However, as most of the occupation was largely transitory during the nineteenth century, the unavailable land transaction data would have added little to the overall understanding of the history of the project area.

The site survey was constrained by a number of factors. Primarily, safe access to survey areas constrained the areas which were able to be transacted. Fields with livestock were not accessed, nor were those with only ponytail fencing separating the livestock from the rest of the paddock. Fields which were deemed to boggy to safely survey, or that

required deep creek crossings, were not accessed. Fields without safe entry points were also not accessed in accordance with NZHP's health and safety regulations. These fields were viewed from an access track or from the fence line. The ground cover in a number of fields had high tussocky grass or other shrub vegetation which limited visibility of archaeological deposits or features. In the first instance, the distance between transects was decreased, however the ground cover still impacted the survey. To minimise the limitations caused by the above factors a thorough desktop survey of LiDAR and aerial photographs was undertaken.

9 Archaeological and Other Values

The following sections summarise the values for unrecorded archaeological sites that may be encountered within the project area.

9.1.1 Unrecorded Artefact Find Spots

An evaluation of the archaeological values is provided for unrecorded artefact finds in Table 9-1. Overall, unrecorded find spots are considered to have **medium** archaeological value depending on their rarity, information potential, and amenity value.

Table 9-1. Summary of archaeological value for unrecorded artefact find spots.

Value	Assessment
Condition	**Subsurface/unknown**: The project area has undergone a vast amount of modification, as a result encountered findspots may not be in situ but redeposited in dredge fill or while excavating field drainage systems.
Rarity or Uniqueness	**Moderate:** This site type is relatively uncommon within the Grey District and nationwide in comparison to other site types.
Contextual Value	**Low-Moderate:** Artefact findspots are recorded as such as they are not found in relation to other features within the context of a wider site. However, Māori artefact find spots in this location would have a higher contextual value than a typical findspot as they would be associated with the ara tawhito that passed through this area. The presence of artefacts provides wider contextual value into the use of a landscape.
Information Potential	**Moderate**: Artefacts have information potential in revealing how people made use of their environment both through the manufacturing of the artefact as well as the purpose it was created for as well as temporal information for transient occupation in the area.
Amenity Value	**Low-Moderate**: Most artefact find spots are discrete and once disturbed they are gone and offer no amenity value in situ. Once retrieved, artefacts provide tangible links to the past, and depending on the artefact may be returned to iwi or displayed in the local museum. However, thus must be done under the direction of manawhenua and in accordance with tikanga.
Cultural Associations	**Māori and Pākehā**

9.1.2 Unrecorded Midden/Oven Sites

An evaluation of the archaeological values is provided for unrecorded midden/oven sites in Table 9-2. Overall, unrecorded midden/oven sites are considered to have **medium** archaeological value depending on their condition, context, and extent.

Table 9-2. Summary of archaeological value for unrecorded midden/oven sites.

Value	Assessment
Condition	**Subsurface/ unknown**: Midden and oven sites are found in a range of conditions, including destroyed, below ground, poor, fair, and good. It is probable many within the project area have been modified or damaged to some extent as a result of erosion as well as impacted by mining and dredging as well as activities as fossicking, ploughing and track cuttings. The presence of such sites near the proposed works, however, is indicative of heightened potential to encounter potentially intact archaeological remains.
Rarity or Uniqueness	**Low:** This site type is common along the adjacent coastline.
Contextual Value	**Moderate**: When considering wider interpretation sites of this type in comparisons to other recorded sites, they have a moderate contextual value as they provide insight into resource use on the wetlands, streams and coastline in this locality providing comparative information for changing patterns of such resource use. Additionally, midden/oven sites will have contextual value to as they would be associated with the ara tawhito that passed through this area.

Value	Assessment
Information Potential	**Low**: Midden/oven sites with single or few features provide limited information on how resources were used and exploited. **Moderate:** Midden/oven sites that form larger site complexes add to our understanding of occupation and activity, resource use and activity within the wider landscape.
Amenity Value	**Low**: Most midden/oven sites with single or few features are located below ground, and most others are eroding out of banks and cuttings or scattered and thus have a low amenity value. **Moderate:** While many larger midden/oven sites are still recorded below ground, they have higher potential to provide more information for public interpretation and education.
Cultural Associations	**Māori**

9.1.3 Unrecorded Mining-Gold Sites

An evaluation of the archaeological values is provided for unrecorded mining sites in Table 9-3. Overall, unrecorded mining sites are considered to have **medium** archaeological value based on their contextual value, information potential, and amenity value.

Table 9-3. Summary of archaeological values for mining sites.

Value	Assessment
Condition	**Subsurface/unknown**: Sites of this type are found in a range of conditions, including destroyed, subsurface, poor, fair and good. It is probable many within the project area have been modified or damaged to some extent as a result of erosion as well as impacted by mining and dredging as well as activities as fossicking, ploughing and track cuttings. The presence of such sites near the proposed works, however, is indicative of heightened potential to encounter potentially intact archaeological remains.
Rarity or Uniqueness	**Low:** This site type is common on the Barrytown Flats.
Contextual Value	**Moderate**: This site when compared to other mining sites in the surrounding area may provide an in depth look at mining strategies along Barrytown Flats.
Information Potential	**Moderate**: This site could provide information about mining strategies and provide spatial data about concerning mining locations.
Amenity Value	**Low-Moderate**: Some unrecorded mining sites may contain features or material that provide good opportunities for public interpretation or education, such as in situ features or artefacts. This will be dependent on their accessibility and condition.
Cultural Associations	**Pākehā and potentially Māori**

9.1.4 Unrecorded Historic-Domestic

An evaluation of the archaeological values is provided for unrecorded historic-domestic sites in Table 9-4. Overall, unrecorded historic-domestic sites are considered to have **medium** archaeological value based on their underrepresentation in Barrytown, contextual value, and information potential.

Table 9-4. Summary of archaeological values for historic-domestic sites.

Value	Assessment
Condition	**Subsurface/unknown**: Sites of this type are found in a range of conditions, including destroyed, subsurface, poor, fair and good. It is probable many within the project area have been modified or damaged to some extent as a result of erosion as well as impacted by mining and dredging as well as activities as fossicking, ploughing and track cuttings.
Rarity or Uniqueness	**Moderate:** Although historic-domestic sites are very common across New Zealand, this site type is underrepresented on the Barrytown Flats with only 5% of identified sites having this site type.

Value	Assessment
Contextual Value	**Moderate**: Although there are few historic-domestic sites recorded in Barrytown, there are many mining historic-domestic sites recorded in New Zealand. A historic-domestic site in the project area has potential to have contextual value on a regional and national level, as well as in association with the surrounding mining activities.
Information Potential	**Moderate**: This site could provide information about the physical structure of miners houses as well as information on coastal mining settlements and mining lifestyles.
Amenity Value	**Low-Moderate**: Some unrecorded domestic sites may contain features or material that provide good opportunities for public interpretation or education, such as in situ features or artefacts.
Cultural Associations	**Pākehā and Māori**

9.1.5 Other Values

Ngāti Waewae are best placed to comment on the cultural values within the project area and NZHP recommends TiGa Minerals and Metals Ltd provide this assessment to Ngāti Waewae for consultation.

No other relevant values (e.g. historic heritage sites) were identified during the assessment.

10 Assessment of Effects and Other Considerations

Section 46 (g)(ii) of the HNZPTA requires an assessment of the effects of the proposed works, as detailed in Section 1.2, on archaeological and other values, which were assessed in the previous section. The assessment of effects takes into account the criteria established by HNZPT (2019) as outlined in Section 3. Also considered here are methods to avoid, minimise, and mitigate any adverse effects to archaeology.

Ngāti Waewae are best placed to comment on the cultural values, and the effects of the proposed works on these values within the project area. As such, NZHP recommends TiGa Minerals and Metals Ltd provide this assessment to Ngāti Waewae for consultation. No other relevant values (e.g. historic) were identified during the assessment.

10.1 Assessment of Effects on Archaeological and Other Values

This assessment has identified that there is the potential to uncover unrecorded artefact find spots, midden/oven sites, mining-gold, and historic-domestic archaeological sites during the works. However, all archaeological remains across the project area are expected to be subsurface, and their location and condition are unknown. As stated in the research results, findspots K31/11 and K31/12 are destroyed, so will not be impacted by the proposed works. It is probable the condition of a vast number of encountered features will be poor due to natural coastal erosion, stock trampling, previous dredging, and environmental modifications (i.e. hump and hollowing). However, despite the likely poor condition of subsurface features, there is still the potential archaeology is present across the site. Unrecorded archaeology that may be encountered include artefact caches, midden and oven features, flumes or sluice boxes.

Although the project area has undergone a large amount of surface modification, the dredged areas may contain redeposited archaeological material not in situ. Hump and hollowed areas may have intact archaeology under the humps. As the history of the area records largely transient and ephemeral occupation across the project area, archaeology could be encountered anywhere across the site. Higher potential areas for encountering archaeology are addressed below.

Considering the large extent of the earthworks across the majority of the project area, **NZHP considers the magnitude of impact on any potential unrecorded archaeological sites will be moderate to major**, dependant on where the site is located. The complete or partial destruction of encountered sites removes them from the archaeological record, having a negative impact on their contextual value, information potential, and amenity value.

- The high archaeological potential zones are on the margins of the project area and likely extend outside of the mining disturbance zone, so encountered archaeology will only be destroyed within the project area, resulting in a **moderate impact.**
- Proposed works are anticipated to result in the complete destruction of any unrecorded archaeological sites encountered within the project area, resulting in a **major impact**.

NZHP recommends that that an archaeologist monitor all earthworks (stripping of topsoil,) that are likely to encounter archaeological remains (see areas of high archaeological, Figure 8-1) until it can be shown that no archaeology survives. NZHP recommends the investigation of all identified areas of archaeological potential to be undertaken in unison prior to the commencement of mining activity.

This assessment has identified that there is potential to encounter unrecorded archaeological sites with importance to mana whenua within the project area. **NZHP recommends that mana whenua should be engaged and have the opportunity to be actively involved.** This includes consultation at the archaeological assessment phase.

10.2 Recommendations to Avoid, Minimise and/or Mitigate Adverse Effects

Recording of archaeological features and deposits along with subsequent analysis and reporting will form a permanent record of the modification of each site. From this record we will increase our understanding of the site and mitigate, to some degree, the loss of contextual value between features and materials at the site level.

10.2.1 Sites and Features to be Avoided or Protected

While it is ideal to plan to avoid archaeological sites, there are no above ground sites in the project area, and it is not possible to plan to avoid the sites due to the scale of the required earthworks within the project area.

A drystone structure (POI 003) was noted under the southern side of Cargills Road, outside of the project area. To avoid damaging the structure the Cargill Road bund should not be built up against this structure. The use of heavy machinery should by limited or monitored in proximity to the structure, to limit the potential damage from vibrations. Dust and vibration plans, when finalised by the client, should be provided to NZHP to inform future protections for the structure as necessary.

10.2.2 Mitigation for Information Loss

NZHP recommends that that an archaeologist monitor all earthworks (stripping of topsoil,) that are likely to encounter archaeological remains (see areas of high archaeological potential Figure 8-1) until it can be shown that no archaeology survives. NZHP recommends the investigation of all identified areas of archaeological potential to be undertaken in unison prior to the commencement of mining activity.

Based on the historical and archaeological research, as well as the archaeological site survey, NZHP has identified areas where there is a higher potential for archaeological remains to be encountered and any earthworks within these zones should be monitored by an archaeologist (Figure 8-1). The high potential areas include features noted in historical maps and those identified during the archaeological survey, as well as a consideration of environmental features which may indicate an increased probability of archaeological material being encountered. Areas of extensive dredging in the twentieth century, as supplied to NZHP by the client, have been excluded from red zones, as the excavation depths of the twentieth century mining works extended into natural deposits. The exception to this is when the survey identified marginal areas within the dredge zone which appear to be intact. By having an archaeologist on site in high-potential areas, the features can be identified as they are exposed (rather than after they are truncated or heavily disturbed) and recorded following best practice. We consider that the on-call protocol alone is not sufficient to mitigate the information loss on site due to the high likelihood of encountering features, many of which are unlikely to be recognised by contractors in the field, such as water races, hut sites, oven features, and others. Beyond this area of high potential, NZHP recommend that work proceed under an on-call protocol (OCP). Find spots may be encountered anywhere on site, including outside of the red zone and in areas thought to have modern ground disturbance, however as artefacts are generally readily identifiable, OCP will be appropriate.

NZHP recommends that topsoil stripping, in high-potential areas where archaeological monitoring is required, be undertaken over consecutive days, at the beginning of each stage of works and prior to any other earthworks taking place in this stage. Within these zones, where archaeological monitoring is recommended, excavations should be undertaken with a hydraulic excavator (not a bulldozer) so that any features exposed are not immediately disturbed further by bulldozer tracks during the process of excavation. Excavations undertaken by hydraulic excavator should be done in systematic scrapes across the archaeological areas to be monitored until natural deposits are reached. As archaeological features are exposed, they will then be excavated by hand and recorded by the archaeologist(s). If archaeological features extend beyond the red zones, archaeological monitoring and recording should continue until the archaeologist is satisfied that no further archaeological material survives.

All archaeology that is encountered should be investigated and recorded to best practice. NZHP recommends that if structures are encountered, they should be recorded to a Level III standard as defined in HNZPT's guide,

Investigation and Recording of Buildings and Standing Structures (2018). Such structures may include hut remains, water races, fluming, and sluice boxes.

Beyond the recording during fieldwork, mitigation for information loss also includes analysis of all artefactual material recovered during the excavations and reporting on all archaeology in a final report. Where archaeology is encountered, further commensurate historic research will be required to provide context to the finds. Site record forms must be created or updated for all sites where archaeology has been encountered.

NZHP recommends that a site instruction be prepared to provide the practical steps for managing the archaeological requirements under the authority, defining the roles and responsibilities of the client, their contractors, and archaeologists. The site instruction will clearly define the areas when an archaeologist must be present, procedures for archaeological monitoring, protocols for the discovery of Māori archaeology and kōiwi, and OCP for the unexpected discovery of archaeology.

Briefings for contractors and project managers are recommended to ensure that all parties understand the conditions of the authority and their individual responsibilities. The briefing will outline when an archaeologist is required on site, the types of archaeology expected to be encountered, and the OCP. Such steps will ensure that archaeological values, such as information value and possible amenity purposes, are increased through appropriate archaeological investigation. NZHP recommends that the the initial briefing should be done in an office space to best enable the digital presentation of the briefing to maximise engagement. Though for those unable to attend in person, the briefing can be done via videoconference (i.e., Zoom, Microsoft Teams, Skype).

10.3 Summary of Effects on Archaeological Values

As discussed, in Section 9, NZHP has identified the potential archaeological values for unrecorded artefact find spots, midden/oven, mining-gold, and historic-domestic sites which may be encountered within the project area. The summary of these values and the impact of the works on these sites is provided here.

The archaeological value for unrecorded find spots, mining-gold, and historic-domestic sites are all considered to have **medium** archaeological value, while unrecorded midden/oven sites are considered to have **medium** archaeological value depending on their condition, context, and extent. Considering the large extent of the earthworks across the majority of the project area, as the works will significantly modify or completely destroy any remains encountered associated with these site types, the impact will be moderate to major.

NZHP considers that the overall impact of the proposed works on the archaeological landscape will be moderate to major. However, with the archaeological monitoring of high-potential areas, recording, analysis and reporting on any archaeological or heritage features modified by the proposed works NZHP supports approvals under the FTAA, including a resource consent application and archaeological authority to modify these sites.

11 Conclusions and Recommendations

This archaeological assessment has identified that there is reasonable cause to suspect that unrecorded artefact find spots, midden/oven sites, mining-gold and historic-domestic sites are present within the project area and will be affected by the proposed mineral sand mining. Therefore, an archaeological authority is required. The two previously recorded sites (K31/11 and K31/12) will not be impacted; however, their presence is indicative of other sites in the vicinity. Due to the presence of the ara tawhito, manawhenua would have ventured through the project area and procured resources from the wetland areas while travelling. Find spots are the only previously recorded site types within the project area and as artefacts caches have frequently been found in wetland areas there is reasonable cause to suspect that unrecorded findspots may be encountered and are considered to have **medium** archaeological value. Midden/oven sites are the most common site type in the vicinity, based on the abundance of mahinga kai which would have once been present in the area there is reasonable cause to suspect that unrecorded midden/oven sites may be encountered along the coastal margin. Unrecorded midden/oven sites are considered to have **medium** archaeological value. Historic era occupation of the project area centred on miners' blacksanding along the foreshore and squatting nearby. As a result, there is reasonable cause to suspect that unrecorded gold-mining and historic-domestic sites are encountered, both of which are considered to have **medium** archaeological value. Due to the nature of the proposed works the overall impact of the works on the archaeological values of unrecorded sites if encountered will be moderate to major. However, with the recommended mitigation outlined in Section 10.2, the overall impact of the works on the unrecorded sites if encountered would be reduced but will remain moderate to major.

On the basis of this assessment, NZHP supports this application with the following recommendations:

1. **Authority Application:** As the proposed works described in Section 1.2 could affect unrecorded archaeological sites, an archaeological authority under Section 44 of the HNZPTA 2014 must be obtained from HNZPT prior to any modification of the site.
    a. The previously recorded sites (K31/11, K31/12) are destroyed so will not be impacted.
    b. If development plans are altered from those reviewed for this assessment , then HNZPT and NZHP must be alerted, as any changes may alter the assessment of effects or invalidate the authority.

2. **Protection of sites/features:** As a first principle, every practical effort must be made to avoid damage to any archaeological site, whether known, or discovered during any redevelopment of the site.
    a. **Drystone structure under Cargills Road -** To avoid damaging the structure the Cargill Road bund should not be built up against this structure. The use of heavy machinery should by limited or monitored in proximity to the structure, to limit the potential damage from vibrations. Dust and vibration plans, when finalised by the client, should be provided to NZHP to inform future protections for the structure as necessary.

3. **Site Instruction:** All works must be carried out in accordance with a site instruction. Any amendments to the site instruction will require prior written approval from HNZPT. The site instruction will include the points outlined in Section 10.2.2.

4. **Contractor Briefing:** All contractors working on the project must be briefed by the s45 approved person (or person nominated on their behalf) on the possibility of encountering archaeological evidence, how to identify possible archaeological sites/features during works, the archaeological work required by the conditions of the authority, and contractors' responsibilities with regard to notification of the discovery of archaeological evidence to ensure that the authority conditions are complied with. NZHP recommends that the briefing be undertaken in an office space to best enable the briefing to be presented digitally, thus maximising engagement.

5. **Archaeological Monitoring:** All earthworks that may affect an archaeological site must be monitored by the s45 approved person (or person nominated on their behalf) in accordance with the site instruction.
    a. Any archaeological features and material encountered shall be recorded, analysed, and interpreted in accordance with current archaeological practice and as outlined in the site instruction.

6. **Archaeology of Māori origin:** If archaeological material of Māori origin is discovered at any stage, all work must stop within 20m of the find. NZHP will assist the authority holder in contacting all relevant parties including tangata whenua via Ngāti Waewae and HNZPT in accordance with the site instruction.
    a. Any taonga tūturu are *prima facie* the property of the Crown who will be notified of the find. Taonga tūturu will be registered with the Ministry for Culture and Heritage. NZHP, in collaboration with manawhenua, shall notify the Ministry of Culture and Heritage and establish the most appropriate temporary storage, management and care for taonga tūturu, until such time as traditional or actual ownership is determined, with an appropriate institution or kaitiaki.

7. **Kōiwi (human remains):** Should kōiwi be encountered, all work must stop within 30m of the find. NZHP will assist the authority holder in contacting all affected parties as soon as practicable, including tangata whenua via Ngāti Waewae, HNZPT, and the police. The Ngāi Tahu policy for kōiwi tangata shall also be followed (Te Rūnanga o Ngāi Tahu, 2019).

8. **Reporting:**
    a. Within 20 working days of the completion of on-site archaeological work, the site record forms must be updated or submitted to ArchSite.
    b. Within 12 months of the completion of on-site archaeological work, a final report on any archaeological material that is found must be prepared in accordance with *ASG12 Archaeological Report Guideline* (HNZPT, 2023) and submitted to HNZPT for inclusion in the digital library, Ngāti Waewae and to the Grey District Council.

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Appendix A Additional Maps

Transect survey map and labelled land parcels within the consent area, from north to south.

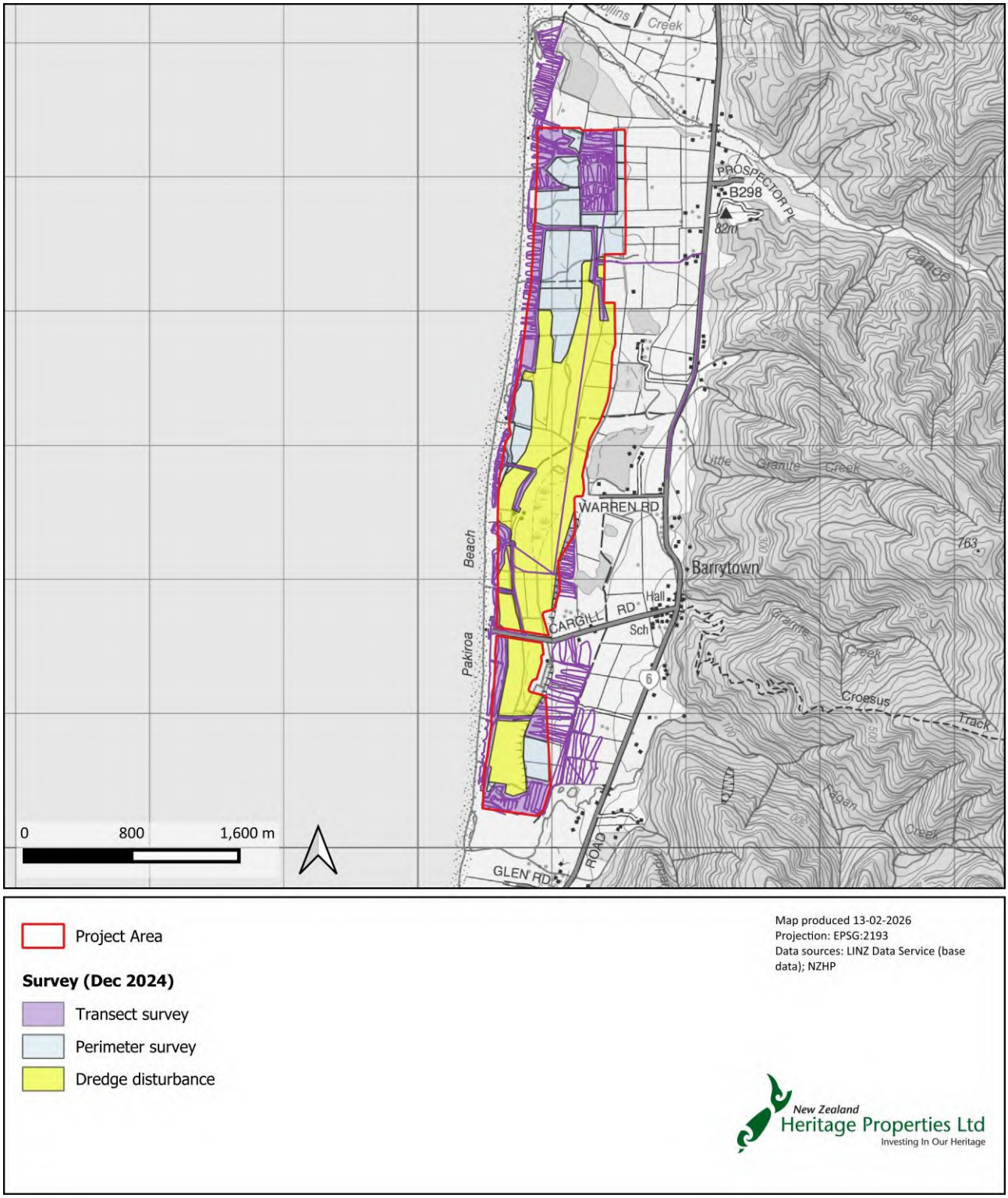

Figure 12-1. Survey map showing transects walked, Dec 2024. Note the survey covered the SRB beyond the scope of the current project area (mining disturbance zone).

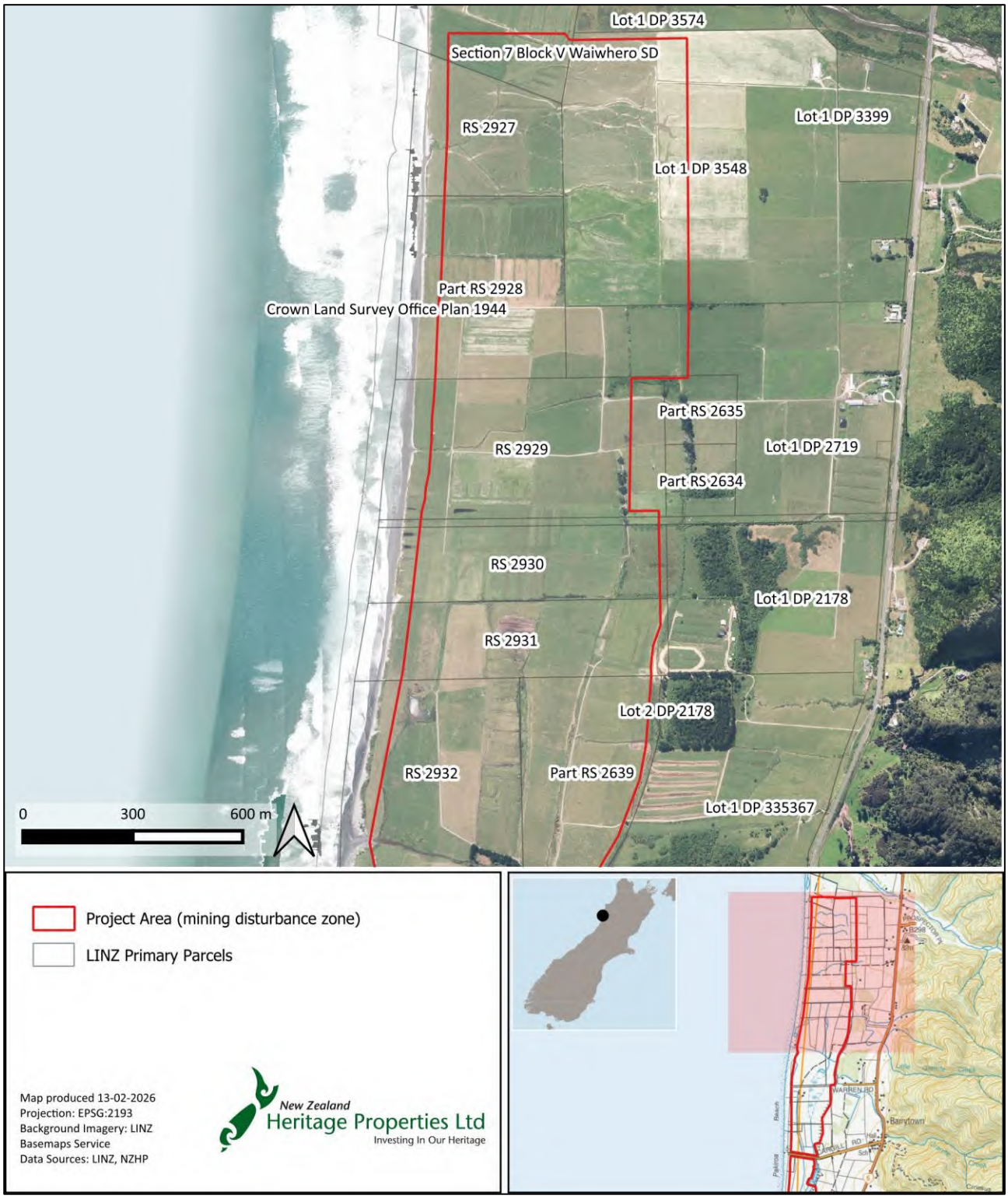

Figure 12-2. Land parcels in northern project area.

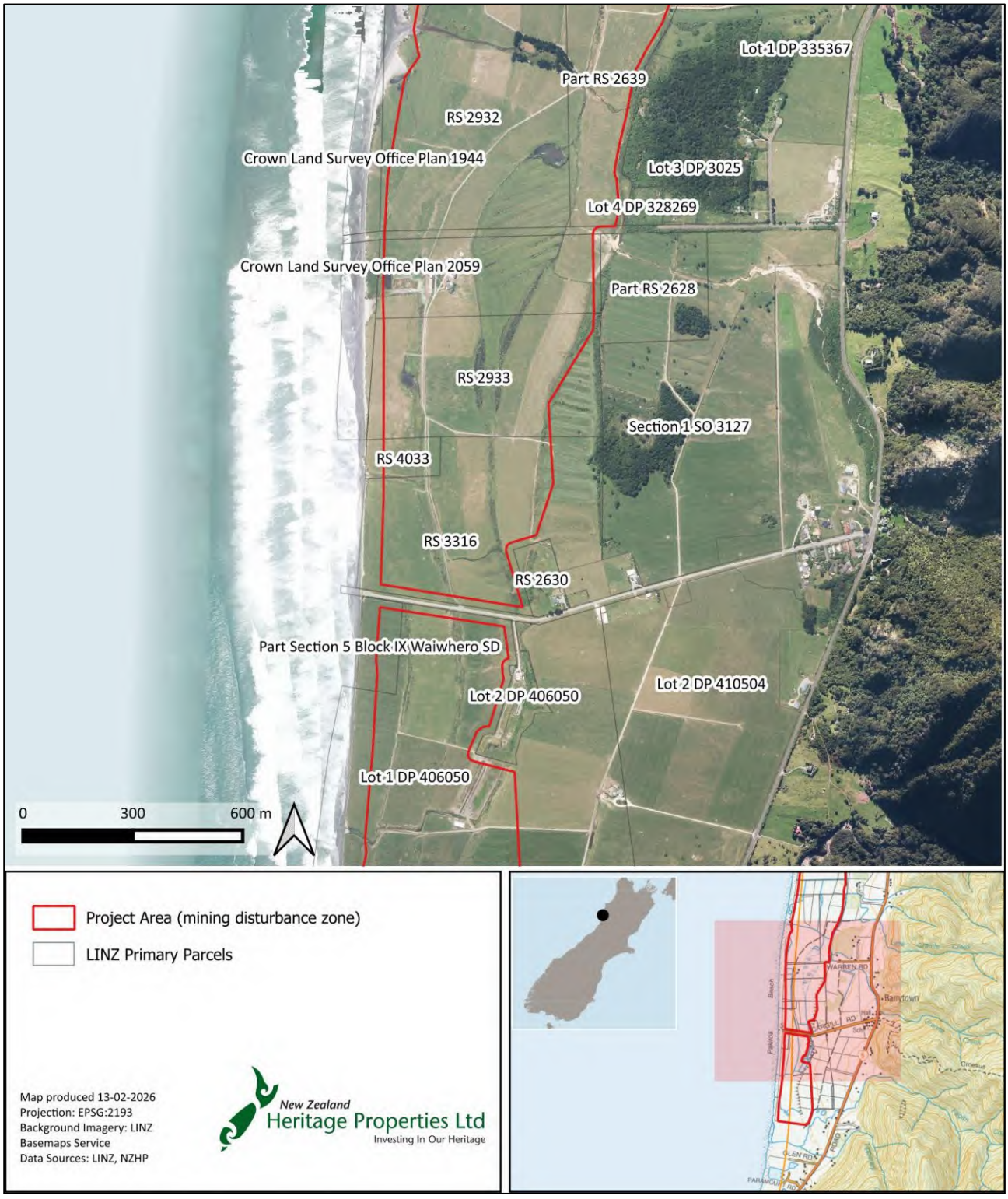

Figure 12-3. Land parcels in central project area.

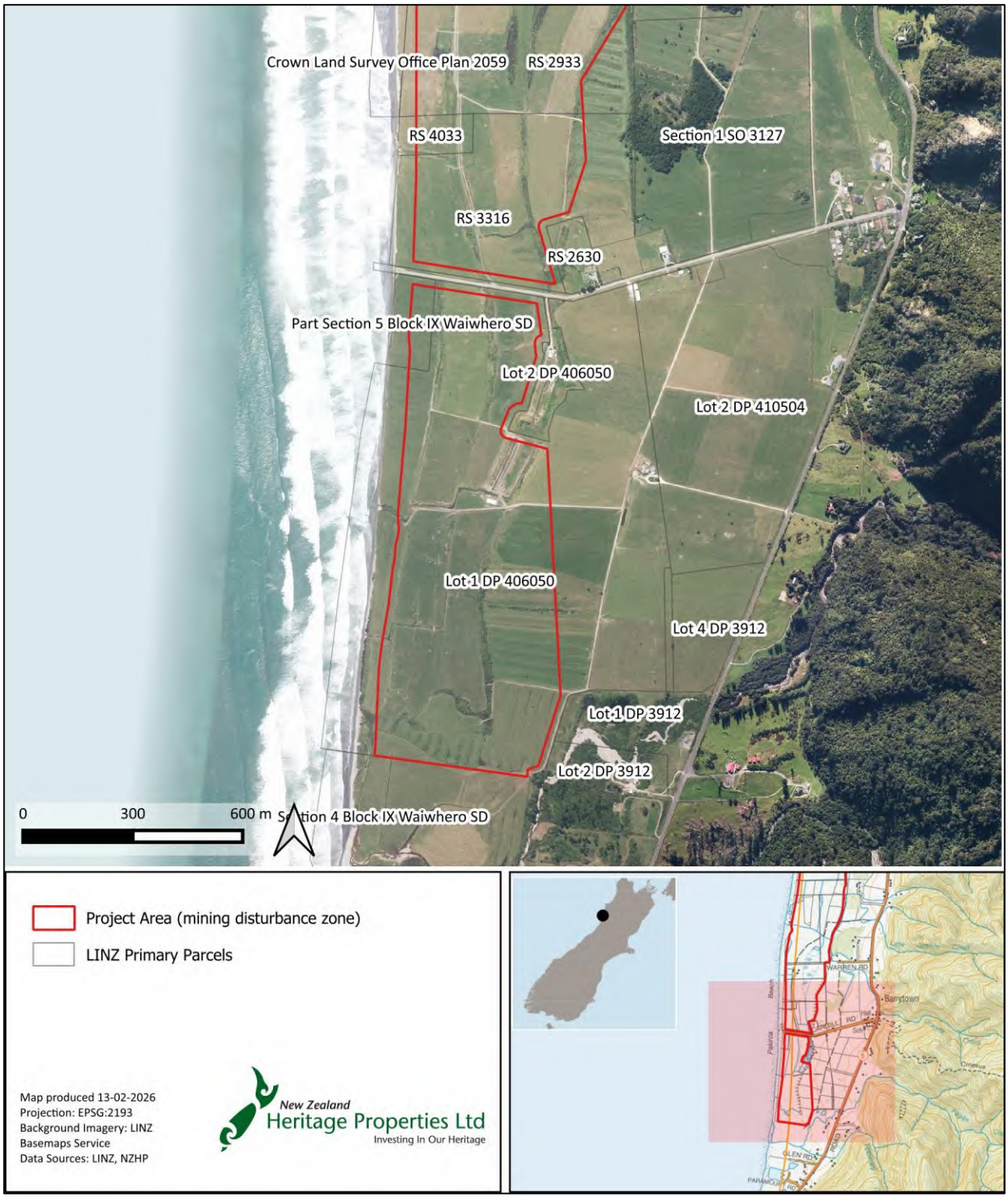

Figure 12-4. Land parcels in southern project area.

Appendix B Archaeological Site Record Forms

NEW ZEALAND ARCHEOLOGICAL ASSOCIATION INCORPORATED

Summary Site Record

ARCHSITE archaeological site recording scheme

NZAA Site Number:	K31/11	**Site Coordinates (NZTM)**	
Imperial Site Number:	S37/27	**Easting:**	1461246
Site Type:	Artefact find	**Northing:**	5324958
Site Name(s):		**Source:**	CINZAS

Finding Aids to the Location of the Site:

Brief Description:
FINDSPOT

Condition of Site when last visited:
No Recent Info

This report contains a summary of the information about this site held in ArchSite.

For a complete Site Record Form containing all the recorded information, please contact the ArchSite Coordinator.

For further information please contact:

ArchSite Coordinator, PO Box 6337, DUNEDIN

admin@archsite.org.nz

NEW ZEALAND ARCHEOLOGICAL ASSOCIATION INCORPORATED

Summary Site Record

ARCHSITE archaeological site recording scheme

NZAA Site Number:	K31/12	**Site Coordinates (NZTM)**	
Imperial Site Number:	S37/28	**Easting:**	1460545
Site Type:	Artefact find	**Northing:**	5322359
Site Name(s):		**Source:**	CINZAS

Finding Aids to the Location of the Site:

Barrytown, along the sea beach about 0.8 km above the entrance road to the beach.

Brief Description:

Findspot for a shaped greenstone (brown trout) pendant (?), reported in 1980. Finder possesses some 30 pieces of greenstone pebbles found along the beach, among the greenstone is the patu piece and two greenstone chisels.

Condition of Site when last visited:

No Recent Info

This report contains a summary of the information about this site held in ArchSite.

For a complete Site Record Form containing all the recorded information, please contact the ArchSite Coordinator.

For further information please contact:

ArchSite Coordinator, PO Box 6337, DUNEDIN

admin@archsite.org.nz

Appendix C
Proposed conditions – archaeological authority

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Barrytown Critical Minerals Project
Southern Block
Proposed Conditions of Archaeological Authority

1.	The authority holder must ensure that all contractors working on the project are briefed by the s45 approved person , who may appoint a person to carry out the briefing on their behalf, prior to any works commencing on: a. The possibility of encountering archaeological evidence; b. How to identify possible archaeological sites during works; c. The archaeological work required by the conditions of this authority; and d. Contractors' responsibilities with regard to notification of the discovery of archaeological evidence to ensure that the authority conditions are complied with.
2.	Prior to the start of any on-site archaeological work, the authority holder must ensure that Heritage New Zealand Pouhere Taonga is advised of the date when work will begin. This advice must be provided at least 2 working days before work starts. The authority holder must also ensure that Heritage New Zealand Pouhere Taonga is advised of the completion of the on-site archaeological work, within 5 working days of completion.
3.	Any earthworks that may affect any High Archaeological Potential sites (attached as Figure 8-1) must be monitored by the s45-approved person who may appoint a person to carry out the monitoring on their behalf. Topsoil stripping of these sites must be undertaken by a hydraulic excavator and occur over consecutive days at the beginning of each stage of works and prior to any other earthworks in this stage.Any archaeological evidence encountered during the exercise of this authority must be investigated, recorded and analysed in accordance with current archaeological practice.
4.	Immediately following the discovery of material suspected to be a taonga, kōiwi or archaeological site the following steps shall be taken: a. All works on the site will cease immediately at that place and within 20m around the site; b. Immediate steps will be taken to secure the site to ensure the archaeological material is not further disturbed; c. The contractor/works supervisor/owner will notify the Rūnanga, Council and the Area Archaeologist of Heritage New Zealand. In the case of kōiwi (human remains), the New Zealand Police must be notified;

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	d. The Rūnanga and Heritage New Zealand will jointly appoint/advise a qualified archaeologist who will confirm the nature of the accidentally discovered material; e. The contractor/works supervisor/owner will also consult the Rūnanga on any matters of tikanga (protocol) that are required in relation to the discovery and prior to the commencement of any investigation and enable access to Rūnanga in accordance with any site safety requirements; f. If kōiwi (human remains) are uncovered, in addition to the steps above, the area must be treated with utmost discretion and respect, and the kōiwi dealt with according to both law and tikanga, as guided by the Rūnanga. Remains are not to be moved until such time as Rūnanga, NZ Police and Heritage New Zealand have responded; g. Works in the site shall not recommence until authorised by the Rūnanga, Heritage New Zealand (and the NZ Police in the case of kōiwi) and any other authority with statutory responsibility, to ensure that all statutory and cultural requirements have been met; h. All parties will work towards recommencing activities in the shortest possible timeframe while ensuring that any archaeological sites discovered are protected until a decision is made on whether the archaeological material is to be recorded and/or removed.
5.	Any taonga tūturu are prima facie the property of the Crown who will be notified of the find. Taonga tūturu will be registered with the Ministry for Culture and Heritage. Heritage New Zealand, in collaboration with manawhenua, shall notify the Ministry of Culture and Heritage and establish the most appropriate temporary storage, management and care for taonga tūturu, until such time as traditional or actual ownership is determined, with an appropriate institution or kaitiaki.
6.	Although bound to uphold the requirements of the Protected Objects Act 1975, the contractor/works supervisor/owner recognises the relationship between Ngāi Tahu whānui, including its Rūnanga, and any taonga (Māori artefacts) that may be discovered. Where Rūnanga so request, any information recorded as a result of the find such as a description of location and content, is to be provided for their records.
7.	That within 20 working days of the completion of the on-site archaeological work associated with this authority, the authority holder shall ensure that site record forms are updated or submitted to the NZAA Site Recording Scheme.

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8.	That within 12 months of the completion of the on-site archaeological work, the authority holder shall ensure that a final report, completed following the Archaeological Report Guideline (AGS12 2023), is submitted to the Heritage New Zealand Pouhere Taonga Senior Archaeologist for inclusion in the Heritage New Zealand Pouhere Taonga Archaeological Reports Digital Library, to tangata whenua via Ngāti Waewae, the Grey District Museum, and the NZAA Central Filekeeper. a. One hard copy and one digital copy of the final report are to be sent to the Heritage New Zealand Pouhere Taonga Senior Archaeologist. b. Digital copies of the final report must also be sent to to tangata whenua via Ngāti Waewae, the Grey District Museum, and the NZAA Central Filekeeper.
9.	Protection of sites / features: As a first principle, every practical effort must be made to avoid damage to any heritage site, whether known, or discovered during any redevelopment of the site, including: a. Drystone structure under Cargills Road - To avoid damaging the structure the Cargill Road bund should not be built up against this structure. The use of heavy machinery should by limited or monitored in proximity to the structure, to limit the potential damage from vibrations.

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