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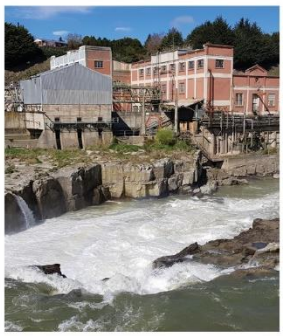


January 2024

Barrytown Mineral Sand Mine
Avian Management Plan

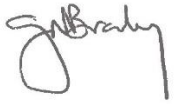
Submitted to:
TiGa Minerals and Metals Limited

water fauna flora land

Quality Assurance

This report has been prepared and reviewed by the following:

Prepared by: Dr Gary Bramley
Senior Terrestrial Ecologist



Reviewed by: Rebecca Bodley
Ecologist

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ecoLogical solutions

tauranga office
115 the strand, tauranga 3141.
po box 13507
p: 07 5771700

auckland office
building 2/195 main highway, ellerslie, auckland
p: 021 578726

northland office
30 leigh street, kāeo
po box 180, kāeo 0448
p: 021 403386

hawkes bay office
p: 027 336 0966
www.ecoLogicalsolutions.co.nz

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1.0 Introduction

1.1 Overview

TiGa Minerals and Metals Limited ('TiGa') proposes a mineral sand mine located on farmland near Barrytown, approximately 36km north of Greymouth. The mining area is proximate to wetland areas, including natural coastal lagoons which provide habitat for a range of indigenous bird species, some of which are considered to be threatened or at risk. The proposed mine is located outside PUN-W034, which is mapped as a Significant Natural Area (SNA) in the draft proposed Te Tai o Poutini District Plan. The proposed mine is also located near the only known breeding colony of tāiko (Westland petrel, *Procellaria westlandica*).

This management plan has been prepared to address potential effects on 'threatened' and 'at risk' birds using the area to be mined and immediate surrounds. This plan provides for detection and monitoring of breeding birds within the mining area, protection of any nests from human disturbance and introduced predators, restrictions on lighting and traffic movements during darkness to avoid effects on tāiko and other birds, management of any grounded tāiko and monitoring of birds using the site and the adjoining lagoon area to inform operational decisions and species management.

The data collected will be compiled and presented in an annual bird management plan to be used in adaptively managing the operations to protect the birds at the site and provided to Greymouth District Council, Te Runanga o Ngāti Waewae, Paparoa Wildlife Trust, the Community Liaison Group for the project, West Coast Penguin Trust and the Buller/Kawatiri Department of Conservation office in Westport.

1.2 Background

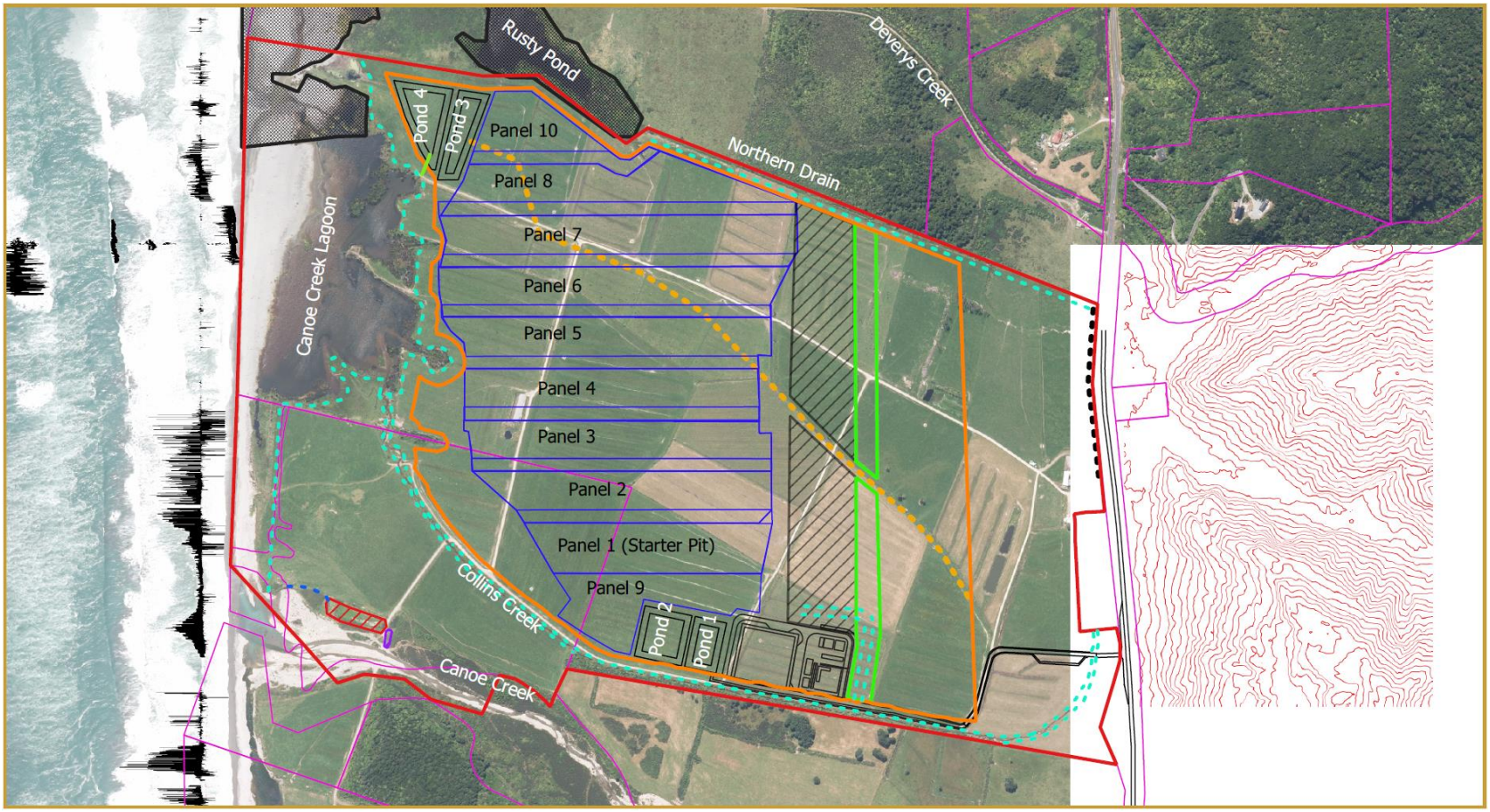
TiGa proposes to construct and operate a mineral sand mine located north of Canoe Creek and west of State Highway 6 on the Barrytown flats approximately 36 km north of Greymouth. The location of the proposed mine is shown in Figure 1.

The mine would be set back from State Highway 6 and the property at 3261 Coast Road. Barrytown JV Limited also proposes a setback of 20m from Collins Creek, the property boundaries and the coastal lagoon. Vegetation throughout the area to be mined comprises farm pasture growing on land which has previously been 'humped and hollowed' to improve drainage for farming.

The proposal is to undertake progressive strip mining across the site moving from west to east and south to north. Each open strip would be approximately 75m x 100m wide and no more than 8ha would be "open" at any one time[1]. The indicative mining approach is shown in Figure 2. No mining or trucking would occur outside daylight hours[2].

Seasonal bird surveys including five-minute counts and the use of acoustic recorders were undertaken at the site between April 2022 and January 2024 and this was combined with database records in eBird to identify the species likely to be present at the site. Seasonal bird surveys will continue until mining commences, throughout mine life and for at least one year following the conclusion of mining at the site.

[1] This includes rehabilitated areas and the Processing Plant area.
[2] The period outside daylight hours is defined as the period between 30 minutes after sunset and 30 minutes before sunrise. Sunrise and Sunset times will differ throughout the year, and are determined by sunrise and sunset times at Greymouth which can be found at the following website: https://www.timeanddate.com/sun/new-zealand/greymouth



Tai Poutini RESOURCES

TiGa
Consent Application

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Produced for: TiGa
by Luke McNeish on 18/01/2024

0 125 250 m
1:8,000 @ A3

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

Legend:

- Planting
- Stockpile Area
- Mining Disturbance Area
- TiGa Application Area
- Bund
- Gallery Water Take
- Premining ore stockpile
- Overflow Channel
- Canoe Creek Infiltration Basin
- Bund and Planting
- Central Drain
- SNA
- Property Boundaries
- Mine Infrastructure
- Overflow Path

Note: Refer to Landscape Mitigation Plan for detailed information on planting and bunds.

Figure 1: Location and features of the proposed mineral sand mine at Barrytown (from Tai Poutini Resources.

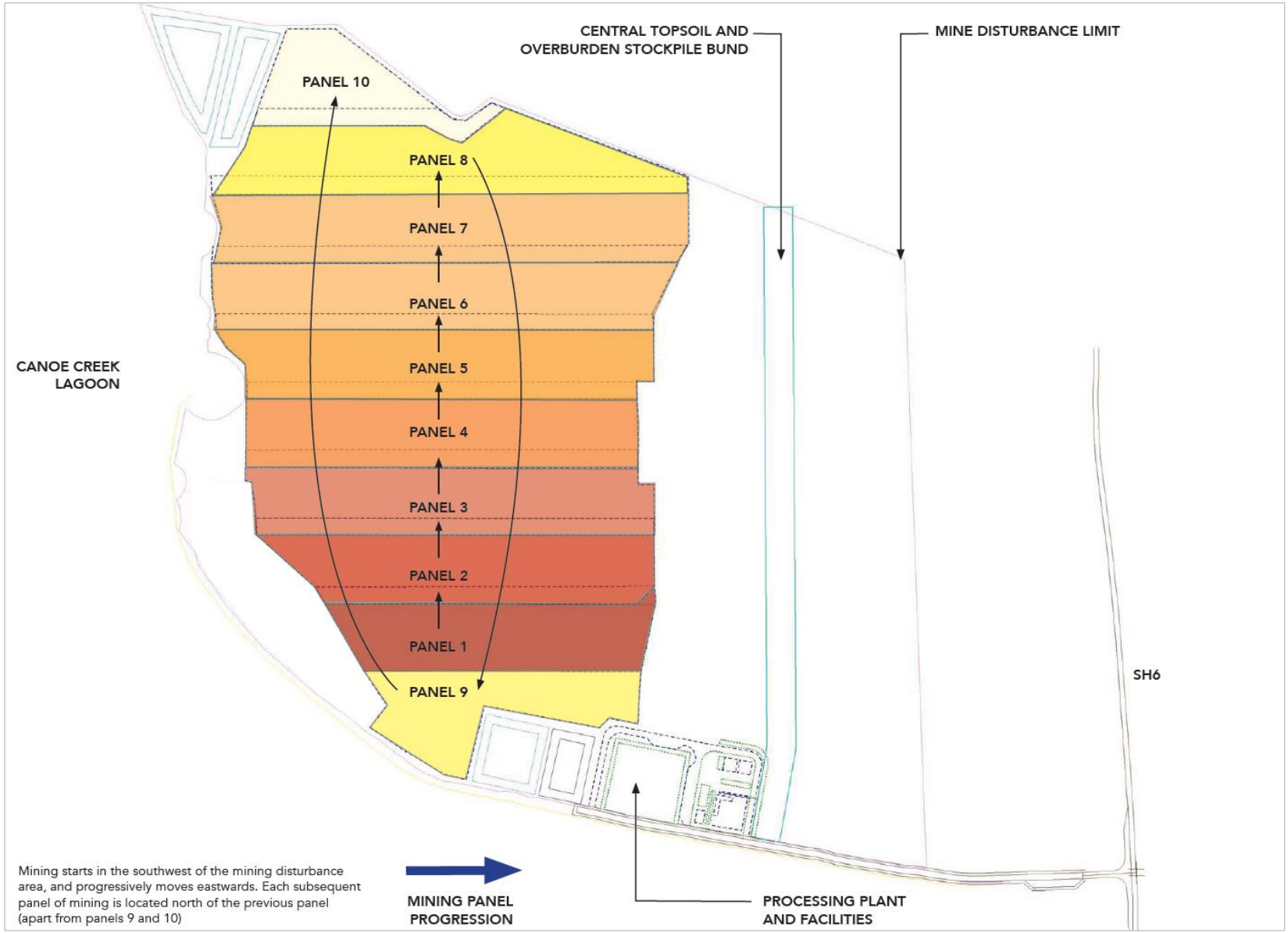

Figure 2: Indicative mining approach at TiGa mineral sand mine, Barrytown (From Glasson Huxtable Landscape Architects).

Species present were generally exotic or common native species. A total of 40 species were confirmed using the site surroundings including 14 species of conservation concern as shown in **Error! Not a valid bookmark self-reference.**.

Table 1: Birds of Conservation Interest confirmed within or near the proposed mining area.

Common name	Scientific name	Conservation status
Black Shag	*Phalacrocorax carbo*	At Risk (Relict)
Black-billed gull	*Chroicocephalus bulleri*	At Risk (Declining)
Caspian Tern	*Hydroprogne caspia*	Threatened (Nationally Vulnerable)
Grey duck	*Anas superciliosa*	Threatened (Nationally Vulnerable)
Kororā, little blue penguin	*Eudyptula minor*	At Risk (Declining)
Kotuku, white heron	*Ardea alba*	Threatened (Nationally critical)
Pacific Reef heron	*Egretta sancta*	Threatened (Nationally Endangered)
Red-billed Gull	*Chroicocephalus novaehollandiae*	At Risk (Declining)
Royal spoonbill	*Platalea regia*	At Risk (Naturally uncommon)
South Island fernbird	*Poodytes punctatus*	At Risk (Declining)
South Island Pied Oystercatcher	*Haematopus finschi*	At Risk (Declining)
Tāiko/Westland Petrel	Procellaria westlandica	At Risk (Naturally Uncommon)
Variable Oystercatcher	*Haematopus unicolor*	At Risk (Recovering)
White fronted tern	Sterna striata	At Risk (Declining)

In addition, a bird which may have been a marsh crake (*Zapornia pusilla*) was heard in September 2022 and October 2023. Assuming marsh crake are present, this brings the number of threatened or at risk bird species near the site to 15. The locations where these birds were detected during seasonal surveys is shown in Figure 3. In addition to the ten species shown in Figure 3, a pair of Pacific reef heron were observed using the coastal lagoon, a dead kororā was observed on the beach at the end of Burke Road and a single kōtuku was also observed at the site. Tāiko have not been observed within the Application site.

Figure 3: Location of threatened and at risk birds detected during seasonal surveys 2022 – 2023.

Birds of conservation concern identified as being present within 10km of the site from eBird records, but not confirmed as present during the surveys of the site include rōroa (*Apteryx haastii*), tūturiwhatu (banded dotterel, *Charadrius bicinctus*), New Zealand pipit (*Anthus novaeseelandiae*) and Australasian bittern (*Botaurus poiciloptilus*).

Of the species listed in Table 1, none are likely to rely on the pasture habitat within the site, but some species (such as gulls and oystercatchers) may visit pasture areas (particularly where soils have been turned over) for feeding or loafing. Tāiko will fly past the site and could be affected by lighting or other activities there. Pipit do use pasture as habitat, but prefer rough open habitats from the coastline to alpine shrublands at c.1900 m.

Grey District Council and West Coast Regional Council have granted TiGa resource consents (NUMBER) to construct and operate the mine subject to conditions, which includes the following conditions associated with the land use consents from the Grey District Council:

18.0 Avian Management	
18.1	The consent holder shall conduct activities on site in general accordance with an Avian Management Plan (AMP) prepared by a suitably qualified ecologist/ornothologist.The objectives of the AMP are: • 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. • To ensure adverse effects on the rushland, flaxland and other important bird habitats adjoining the mining site including Canoe Creek Lagoon, Rusty Pond and the coastal margin are avoided during the breeding season and minimised at other times of the year during mining. • To ensure 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.* *Advice Note: Threatened or at-risk bird species refers to the Conservation Status according to the Department of Conservation's Threatened Classification System*
18.2	The AMP shall detail: o A description of the site and surrounding avian habitats o A description of the threatened and at risk birds likely to be present in these habitats and which species require specific management within the AMP o A description of the management and mitigation measures that are required to be implemented to avoid effects on these species A description of the monitoring requirements to assess the effectiveness of the AMP
18.3	The AMP must be reviewed annually by the Consent Holder. Any amendments to the AMP must be submitted to Council and must: o achieve the AMP's purpose of avoiding effects on any threatened or at-risk indigenous bird species (including specifically the Tāiko); o comply with the conditions of this resource consent; and o have been reviewed by an appropriately qualified and experienced ecologist/ornithologist;

	○ have been provided in advance to Te Runanga o Ngāti Waewae and the Buller/Kawatiri office of the Department of Conservation for comment (and feedback received collated and submitted with the amendments to be provided to Council). ○ follow the certification process set out in Condition 6.0. *Advice note: any disturbance or relocation of avifauna may require a permit from the Department of Conservation under the Wildlife Act (1953).*
18.4	The Consent Holder must undertake continuous monitoring of avian species from the commencement of consent until at least one year following the cessation of mining activities on this site. The monitoring must be carried out in accordance with the monitoring requirements in the AMP.
18.5	Mining, topsoil and overburden stripping and rehabilitation activities shall not take place within 100m of the Canoe Creek Lagoon or Rusty Pond wetland between the months of September and December each year to maintain separation from the lagoon during the bird breeding season.
18.6	The Consent Holder shall engage a suitably qualified expert to carry out annual penguin surveys of Pakiroa beach within 500m of the mining area to detect the presence of Korora. If penguin are detected the location will be mapped and the following management actions are to apply: i) If penguins are detected using the mining area to access other habitats, any existing access ways are to be maintained and/or works affecting that accessway are to be completed in the period March – June (outside the breeding and moult period). ii) Where any penguin burrows are compromised by mining (i.e., direct effects), replacement artificial burrows/nest boxes are to be installed at a rate of 2:1. Any additional nest boxes provided are to be located within the vegetated coastal foreshore habitat associated with any identified accessways. Where coastal erosion occurs and compromises breeding penguins, a specific mitigation plan is to be developed by a suitably qualified and experienced ecologist on behalf of the applicant in conjunction with the West Coast Penguin Trust.
18.7	The Consent Holder must establish a ring of traps and/or bait stations targeting rats and mustelids placed around the perimeter of the property and the coastal lagoon in accordance with the AMP. The network of traps is to be installed prior to mining commencing and serviced as required.
18.8	An annual bird management report shall be provided to Environmental Planning Team Leader Grey District Council, Te Runanga o Ngāti Waewae, the Buller/Kawatiri office of the Department of Conservation in Westport, the West Coast Penguin Trust, Paparoa Wildlife Trust, the Community Liaison Group and Waka Kotahi NZ Transport Agency Environment and Sustainability Team (via:environment@nzta.govt.nz), no later than June each year. The report shall include the following matters: ○ The timing and duration of any mining within 100m of the coastal lagoon vegetation and the SNA; ○ Results of seasonal bird surveys at the site; ○ Timing of nest detection surveys and observations relating to nesting or other behaviours observed within the area to be mined;

	○ Efforts to deter any attempts at nesting within the area to be mined and the outcome of those efforts; ○ Species attempting to nest within the area to be mined (including threatened and at risk species); ○ Date of first nesting attempts (if any) for threatened and at risk species within the area to be mined; ○ Number and location of nesting attempts by threatened and at risk species within the area to be mined; ○ Species attempting to nest within the area to be mined (including threatened and at risk species); ○ Date any predator control commenced, the location of traps and bait stations, the number of captures, the amount of bait consumed and any relevant observations; ○ Outcome of individual nesting attempts by threatened and at risk species within the area to be mined; ○ Results of annual kororā surveys on Pakiroa Beach, the implications for mine operations and any management actions undertaken; ○ Number and location of any grounded tāiko and any birdstāiko found dead on site; ○ 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 with vehicles for any native species; ○ 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 results of the quarterly walk-through surveys of birds using the lagoon area.

1.3 Goals, Scope and Objectives

The goals of this Avian Management Plan ('**AMP**') are:

i) To ensure adverse effects on the threatened and at risk birds present in the vicinity of the site including those listed in Table 1 and any other threatened and at risk species detected by subsequent monitoring are avoided.

ii) To ensure adverse effects on the rushland, flaxland and other important bird habitats adjoining the mining site including Canoe Creek Lagoon, Rusty Pond and the coastal margin are avoided during the breeding season and minimised at other times of the year during mining.

iii) To ensure ongoing use of the site and its environs by the birds which currently occur in the area.

This will be achieved by operating so as to avoid effects on birds and important habitats identified, monitoring of birds to confirm occupancy and inform operational decisions and species management and regular review of monitoring data to inform any operational changes required to address any unanticipated effects.

This AMP also sets out the monitoring that will be undertaken to detect threatened and at-risk species at the site, actions to be taken to protect those birds as well as record keeping and reporting.

1.4 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. If a new record of a threatened or at risk species is made during monitoring, then this plan will also be updated as required.

2.0 Background

2.1 Important Habitats

The site adjoins an area identified by Boffa Miskell (2006) on behalf of the Grey District Council as a potential Significant Natural Area ('**SNA**', Site PUN-W034) as shown in Figure 4. This SNA has been amended and included in the Te Tai o Poutini Proposed District Plan ('the TTPP'). This SNA, along with the part of the coastal lagoon to the south which is outside the SNA, but adjoins the mining area, is the location of the most important bird habitats in the immediate vicinity of the site as shown in Figure 3.

Figure 4: Location of SNA PUN-W034 at Barrytown.

2.2 Threatened and At Risk Birds Likely to be Present

The species of birds which are considered to be “threatened” or “at risk” and have been confirmed using the site and the adjoining SNA during the ecological assessments for the resource consent application are shown in Species present were generally exotic or common native species. A total of 40 species were confirmed using the site surroundings including 14 species of conservation concern as shown in **Error! Not a valid bookmark self-reference.**.

Table 1. Of the birds listed in Species present were generally exotic or common native species. A total of 40 species were confirmed using the site surroundings including 14 species of conservation concern as shown in **Error! Not a valid bookmark self-reference.**.

Table 1, different species are expected to be affected by different activities. The majority of them would not use habitats within the site, rather using the adjoining beach, lagoon or wetland habitats and would therefore be affected by noise, human activities and vehicle movements near their habitats, particularly during the breeding season. For these species the following management actions are proposed:

- Commencement of mining during the first year at least 100m from the edge of the mining area. Monitoring of birds prior to the commencement of mining and throughout mining so as to inform later management. Post-mining monitoring is also proposed for at least one year to confirm species are still present in the adjoining habitats.
- Maintenance of a 20m buffer from the edge of mining to the existing lagoon vegetation. This boundary is to be permanently marked so as to avoid crossing it inadvertently.
- Planting of parts of that buffer with flax and other native species set out in the planting plan for the site (required by Condition 19.1 of the relevant resource consents) so as to visually screen the mining activities from the lagoon.
- Avoidance of mining the parts of the strips closest to the highest quality habitats (the lagoon and provisional SNA area, Panels 4-8 and 10) between the months of August and December (inclusive) in order to provide separation from activities. The purpose of this avoidance is to provide spatial separation of at least 100m for breeding birds from the mining activities.

Monitoring for these birds is described in Section 3.0.

2.3 Bird Species to be Managed

2.3.1 Introduction

For a small subset of the birds known to occur in the area, i.e., those which are known to occur there, or are likely to visit the mining area and may attempt to nest there in future, specific management activities are proposed. The three species for which specific management actions will be provided are shown in Table 2. Specific management actions are set out in Section 3.0 (for tūturiwhatu, kororā, and tōrea if they are detected at the site during ongoing monitoring) and Section 4.0 for tāiko.

Table 2: Threatened and at-risk birds to be managed at the Barrytown Site.

Common name	Scientific name	Threat classification
tūturiwhatu, banded dotterel	*Charadrius bicinctus bicinctus*	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	*Haemotopus bicolor*	At Risk - Recovering

2.3.2 Tūturiwhatu/New Zealand Banded Dotterel

Tūturiwhatu (banded dotterel) are the most common small plover of New Zealand seashores, estuaries and riverbeds. Their plumage varies seasonally, but they are readily identified by their brown upperparts and complete or partial chestnut breast band, which is quite obvious in breeding plumage. Like other plovers, the body is held erect and they have a characteristic run-stop-peck-run foraging behaviour in their pursuit of small invertebrates.

Typical breeding habitat for banded dotterels comprises lightly vegetated riverbeds, outwash fans, herb fields, beaches and farmland. The composition of vegetation varies regionally and particularly with altitude. Banded dotterels are often attracted to earth worked areas for breeding.

Banded dotterel pairs are solitary and territorial, but there can be high concentrations of birds in good habitat. Birds begin to arrive on the breeding grounds and set up territories in July. First eggs are laid in August to early November, in shallow scrapes in gravel, sand or soil, usually lined with tiny stones, occasionally shell. The clutch-size is nearly always three eggs, which are coloured 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.

During the West Coast Penguin Trust survey of Pakiroa/Barrytown Beach in 2014, 33 banded dotterels were recorded (I. Perkins, West Coast Penguin Trust, pers. comm.).

Management of tūturiwhatu is discussed in more detail in Section 3.0 below.

2.3.3 Kororā/Little Blue Penguin

Kororā occur throughout New Zealand and are thought to have a large, but declining population. One dead kororā has been detected at Barrytown near the end of Burke Road. West Coast Penguin Trust records confirm that kororā are resident in the Barrytown flats area with both breeding and mortality records (I. Perkins, West Coast Penguin Trust, pers. comm.). The population is thought to be a small number of birds (I. Perkins , West Coast Penguin Trust, pers. comm.).

West Coast Penguin Trust kororā survey data include 14 kororā tracks crossing Pakiroa/Barrytown Beach in 2013, 16 tracks recorded in 2014 and 17 tracks recorded in 2015. This survey has not been repeated since. The approximate location of the known penguin deaths near the site between 2007 and 2020 is shown in Figure 5.

Suitable nesting habitat for kororā is present between the coast and the mining area, although no burrows have been confirmed there during field surveys. It is possible kororā visit or use the coastal lagoon area or may come to use it in future, or that they may cross the farm to habitats further inland, although this is considered unlikely.

Figure 5: Location of little blue penguin records near Barrytown between 2007 and 2020 (Image and data from West Coast Penguin Trust).

Kororā are nocturnal on land and typically breed in small colonies numbering from a few up to 20-30 pairs, sometimes semi-colonially, or sometimes as isolated pairs. Penguins commonly nest in dunes, coastal forest, farmland and rocky areas up to 200m inland or up to 500m upstream from river mouths. (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 and dense vegetation and 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. Chicks often return to their natal area to breed themselves.

During moulting, 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.

The main threats to penguins while on land are predators (including dogs, stoats, cats and rats), road mortality and habitat loss and/or disturbance either due to humans or natural causes. Kororā are active ashore at all times of the year, with the breeding season being the most active period. They can be found walking across the beach, returning to their nest from the sea any time after dusk and generally leaving for the sea some time before dawn.

For the Hokitika area the breeding season through to moulting is approximately June – February (I Perkins, West Coast Penguin Trust, pers. comm.). This is likely to be similar at Barrytown. Management of kororā is discussed in more detail in Section 3.0 below.

2.3.4 Oystercatchers

Tōrea (South Island pied oystercatchers) and tōrea tai (variable oystercatchers) have both been recorded using the coastal area adjoining the site and the pasture within the farm as shown in Figure 3. 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. Tōrea have a conservation status of At Risk (Declining), whilst tōrea tai have a status of At Risk (Recovering).

During the West Coast Penguin Trust survey of Pakiroa/Barrytown Beach in 2014, five variable oystercatchers were recorded (I. Perkins, West Coast Penguin Trust, pers. comm.). Both tōrea and tōrea tai have been recorded during seasonal surveys at the site.

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, tōrea tai and other threatened or at risk species that may (though not expected to) be found breeding on site is discussed in more detail in Section 3.0 below.

2.3.5 Fernbird

South Island fernbird (*Poodytes punctatus punctatus*) have been detected near the coastal lagoon as shown in Figure 3. In the first instance, protection of fernbird will rely on maintaining 100m separation from mining activities during the breeding season.

In order to inform the location and number of fernbirds present and confirm they continue to persist in similar numbers throughout the project and beyond, territory mapping of South Island fernbird will take place in advance of mining commencing in Panel 4

3.0 Species Management

3.1 Detecting Breeding

Birds which might breed in the areas of pasture or areas of bare soil created by mining include tūturiwhatu and oystercatchers. New Zealand pipit may also nest in undisturbed pasture areas. The breeding season for most seasonally breeding birds in New Zealand starts between June and September with most breeding being undertaken between September and December. Some birds will attempt second clutches and breeding can extend through until February or March. Site works and other activity is likely to deter birds (except dotterel) from establishing nests near that activity, forcing them to nest elsewhere.

In advance of each breeding season, a general detection route will be devised across the area to be mined within the coming breeding season and adjoining areas (within 50m) which will be used to detect birds using the site to be mined during the upcoming season. The route will be identified by a suitably qualified and experienced ecologist experienced in the detection of breeding birds.

Fortnightly detection surveys will take place between 1 August and the onset of breeding (or the 14th September, whichever is the earlier) and weekly detection surveys between the commencement of breeding and 25 December.

During these detection surveys, suitably qualified and experienced observers will walk over the predetermined route which will cover areas intended to be mined within the forthcoming breeding season and adjoining areas in order to detect breeding behaviour or nesting that indicates species management should begin. Species management comprises discouraging nesting before it occurs and managing any established nests once they are discovered. Each of these actions is discussed further below.

This frequency of detection survey was chosen so that:

(i) There is a high probability that birds will be detected soon after their arrival at the site.

(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 (at least those that persist two weeks or more) 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 (including non-target species) seen or heard will be recorded, and their approximate 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., calling, displaying, defending areas or other behaviour), 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 and the outcome (where known) will be recorded. Non-target species will be recorded so that a record of all species using the site can be compiled and any threatened or at risk species not identified in this plan can be identified and a management strategy developed to protect them from mining.

3.2 Discouraging Nesting

To reduce the need to disrupt mining activities by having to place a 50m buffer around any nests identified during monitoring, nesting birds will be discouraged from settling each prospecting season. This method is only to be used prior to the establishment of any nesting activity, and will involve the use of one or more of the following methods:

(i) Completing disruptive site walkovers regularly between the 1st August and the onset of breeding. A disruptive site walkover would involve one or more people walking through the area with a dog on a lead.

(ii) Installing streamers/tapes that flutter in breeding habitats (farmland, herb fields, gravel, burrows, earthworked areas) 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.

(iii) Parking earthworks machinery in future stage locations, starting the engine from time to time, but not moving equipment.

3.3 Management of Nest Sites

Any nests of threatened or at-risk species located will be subject to protection and management until such time as the chicks have successfully fledged.

A minimum separation distance of 50m will be maintained between any works and existing nest sites so as to minimise the risk of nest abandonment. All vehicles, machinery and people will be excluded from the area until either the nest is abandoned or any chicks fledge.

If a nest of any threatened or at-risk species (including those listed in Table 1) is discovered within the area to be mined, the following plan would be implemented:

(i) Minimise time spent near the nest to avoid attracting ground predators such as rats and stoats and aerial predators such as gulls.

(ii) Establish a “no go” zone approximately 50m radius around the nest using tape and markers.

(iii) If it is the first nest of the season, alert the appropriate supervisor to initiate a predator control plan immediately.

(iv) If a predator control plan is in place, adapt it as required to ensure bait stations or baited traps are located just outside the “no go” zone.

(v) 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 after the chicks have fledged. This monitoring is described in more detail in Section 5.0 below.

3.4 Kororā

Given that they are nocturnal on land, only undertaking mining and trucking during daylight hours will avoid the potential for mortality and reduce the potential for disturbance of kororā due to mining at the site. Although kororā are known to burrow/nest under buildings, the processing plant would be constructed on a concrete slab and would not allow for penguin access. This reduces the potential for birds coming in contact with humans and vehicles at the processing plant.

No active kororā burrows (as indicated by guano, smell, tracks or the presence of cavities) have been detected either within the farmland or in adjoining habitats, and no kororā have been detected by the acoustic recorder monitoring at the site. We note that the habitats

adjoining the mining area have not been comprehensively searched, but do appear suitable for kororā. We have assumed the adjoining habitats are where any penguin using the area currently reside.

Kororā are expected to be present at relatively low densities at Barrytown and are also considered unlikely to cross the open farmland for significant distances, instead preferring to use denser vegetation and waterways (such as Canoe Creek) to access inland habitats. Thus, it is considered unlikely that penguin access ways to areas inland occur across the farmland to be mined. Annual monitoring of Pakiroa Beach within 500m of the mining area is proposed to detect penguin tracks crossing the beach.

Monitoring will take place during November and commence prior to the start of mining. This is an appropriate time to detect the presence of penguin activity, and in particular identify any active burrows or nests since signs such as guano and footprints are often present.

Surveys will be timed for when a low tide occurs in the morning and involve a suitably qualified and experienced person slowly walking a planned survey route in the late afternoon. Early the following morning, during low tide, the same route will be walked looking for faeces, feathers, new tracks or other penguin sign and investigating any cavities.

If penguins are detected, the location would be mapped and the following management actions are to apply:

iii) If penguins are detected using the mining area to access other habitats, any existing access ways are to be maintained and/or works affecting that accessway are to be completed in the period March – June (outside the breeding and moult period).

iv) Where any penguin burrows are compromised by mining (i.e., direct effects), replacement artificial burrows/nest boxes are to be installed at a rate of 2:1. Any additional nest boxes provided are to be located within the vegetated coastal foreshore habitat associated with any identified accessways.

v) Where coastal erosion occurs and compromises breeding penguins, a specific mitigation plan is to be developed by a suitably qualified and experienced ecologist on behalf of the applicant in conjunction with the West Coast Penguin Trust.

3.5 Pest Control

Predator control will consist of a ring of traps and/or bait stations targeting rats and mustelids placed around the perimeter of the property and the lagoon. This network of traps will be installed prior to mining commencing and serviced at least 12 times per year.

In addition, if nest attempts are recorded, a second ring of traps and/or bait stations will be installed around the 50m “no go” zone associated with a particular nest. The exact layout of traps and/or bait stations will be determined by the project ecologist at the time the predator control is initiated and will be in accordance with recognised best practice, including with respect to design and construction. In addition, traps and bait stations must be designed and deployed so as to exclude weka.

4.0 Tāiko, Westland Petrel

4.1 Potential Effects on Tāiko

4.1.1 Background

The area to be mined is located approximately 3.6km south of the only known colony of tāiko/Westland petrel. Tāiko breeding occurs between March and November. Adult birds

entering and departing the colony, and at sea close to shore, are known to be disoriented and attracted by artificial lighting and can be grounded. Young tāiko are known to be disoriented by lights when leaving the breeding colony and this can also result in birds being grounded. Groundings are most likely to occur between November and January, with a peak in early December as shown in Figure 6.

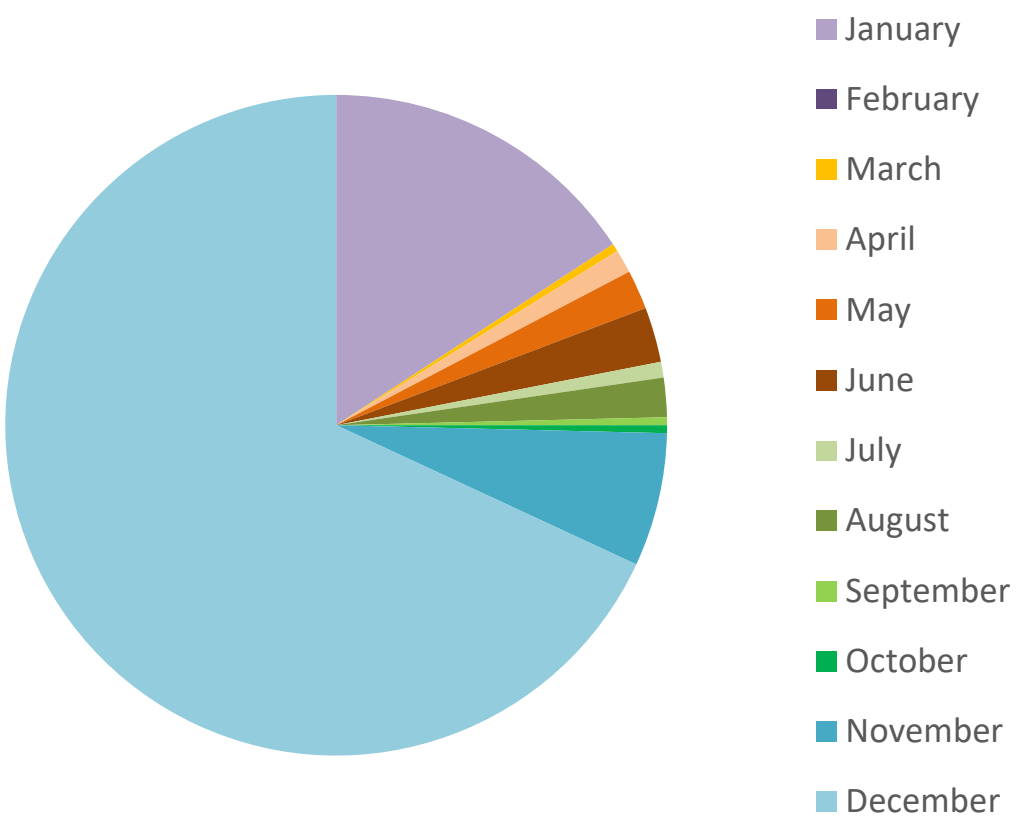

Figure 6: Records of grounded tāiko recorded between 2007 and 2022 categorised by month of occurrence (Data from Department of Conservation).

4.1.2 Fixed Lighting

In order to reduce the effects of lighting at the mine during night time operations, no mining and no trucking will occur outside daylight hours[3].

Processing will occur at night inside the processing plant. This building has been designed with exterior fixed lighting and no windows or other openings on the western (coastal) side to avoid light spill towards the coast. In addition, there are no windows on the eastern and southern sides and all doors can be closed to avoid light spill when not needed for entry or exit. Furthermore, the processing plant site will be bunded on the eastern and part of the northern sides with a 4.5m bund, the top of which will be planted with trees.

Some lighting will be at the processing plant to allow safe work conditions. Condition 16 (particularly 16.2) of the Greymouth District Council land use consents require minimisation of the amount of light at the site. This is to be achieved at the processing plant and loadout

[3] Night is defined as the period between 30 minutes after sunset and 30 minutes before sunrise. Sunrise and Sunset times will differ throughout the year, and are determined by sunrise and sunset times at Greymouth which can be found at the following website: https://www.timeanddate.com/sun/new-zealand/greymouth

area via adherence to the Australian Government's National Light Pollution Guidelines for Wildlife January 2020 (or subsequent revision), including but not limited to pointing all fixed lighting downward, shielding to avoid light spill 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.

In addition, the following actions will be deployed as appropriate at the site[4]:

- The use of 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 to avoid light spill as required;
- 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.

Random lighting audits will be undertaken at least annually making reference to the Australian Government Lighting Guidelines for Wildlife.

4.1.3 Pit Lighting

Mining will take not take place at night as set out above. Removal of topsoil and overburden is restricted to daylight hours by Condition 12.1. It is possible that minor, temporary lighting (such as a headlamp or similar) may be required to be used in the pit at night to maintain equipment such as pumps. If so, the following actions will be deployed as required by Condition 16.2:

- Lighting to 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.

4.1.4 Vehicle Headlights

No trucking movements are proposed outside daylight hours. Shift changes will occur at night and TiGa proposes to provide a minivan(s) to transport staff and reduce the number of light vehicle movements associated with these shift changes from around 20 to a much lower number depending on how many people use the transport provided. These light vehicle and other movements relating to shift changeovers or infrequent maintenance requirements on the site would be subject to the management requirements set out in this AMP and the Traffic Management Plan for the site including speed limits, a requirement to dip headlights and a requirement to report all near misses with wildlife.

In addition to avoiding night time mining at the site, other actions intended to protect tāiko,

[4] 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

kororā and other species from accidental death due to collision with vehicles on the State Highway include:

- Monitoring and reporting of all encounters with tāiko and other wildlife by all mine related vehicles throughout the year. In the event that any native wildlife collides with a mine related vehicle this management plan will be reviewed with a view to avoiding any further mortality.

Moving vehicles within the site

In addition, the lights of vehicles travelling around the site at night, such as from the highway to the loadout, might also affect wildlife. Given that mining and trucking will not occur at night, the number of movements between the processing plant and pit would be very small and limited to those required to maintain equipment. The risk posed by these movements is very low. Actions intended to protect tāiko from accidental death due to collision with vehicles within the site include:

- Limiting the speed of vehicles to 15km per hour while on site as required by Condition 27.2 of the West Coast Regional Council consents.
- Requiring headlights to be dipped at all times within the site. The effectiveness of this action in avoiding birds 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 wildlife at the site) this practice will be discontinued.
- Monitoring and reporting of all encounters with wildlife by all site vehicles throughout the year. In the event that a bird collides with a vehicle within the site this management plan will be reviewed (including consideration of banning night time vehicle movements) with a view to avoiding any further mortality.

4.2 Detecting Grounded Tāiko

Mining will take place during daylight hours throughout the year, but there may be occasional vehicle movements across the site at night if required as described above. The most likely location for tāiko to be grounded is near any area where lights are being used (the processing plant and load out area and the internal road within the site).

It is the responsibility of TiGa 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. In addition, 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.

[NOTE an authority under the Wildlife Act 1953 will be required to handle absolutely protected wildlife (tāiko) if any are recovered and to implement other aspects of this Management Plan. This is a separate process administered by the Department of Conservation and can take some months to work through. A copy of the permit should be attached to this plan as [Appendix A.]

All trucking and other contractors and staff leaving the site (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.

4.3 Accidental Discovery

4.3.1 Equipment required to be kept on site

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.

4.3.2 Discovery of a Tāiko

In the event that a live grounded tāiko is discovered within the site, the bird will be caught with the minimum of disturbance and placed in the suitable enclosure in a cool place. The person undertaking capture of any wildlife will be suitably trained to undertake that task humanely and will call on a suitably qualified and experienced ecologist or the Department of Conservation as required. If the bird is heavily waterlogged then it should be dried using towels/paper towels and left in a warm, dark ventilated place. In such situations birds should be monitored regularly as once dry they can overheat. Birds should be transferred as quickly as practicable to the local Department of Conservation, who will determine if it is fit for release, 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 tāiko (either alive or dead) is recovered from within 50m of the pit, internal roads 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 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 as soon as possible (within 24hrs) from a suitably qualified and experienced ecologist and the Buller/Kawatiri office of the Department of Conservation in Westport.
- 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 Buller/Kawatiri office of 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 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.

4.3.3 Discovery of dead birds

In the event of any dead birds (including tāiko) being located within the mining area, the Buller/Kawatiri Department of Conservation office in Westport and Te Rūnanga o Ngāti Waewae will be informed and collection by or delivery to the Department of Conservation will be arranged.

5.0 Monitoring

5.1 Monitoring Proposed

Seasonal bird surveys at the site commenced in April 2022 and will continue until 12 months after completion of mining at the site. Seasonal bird surveys will be undertaken four times each year, once each in spring, summer, autumn and winter using five-minute bird counts and acoustic recorders at the locations shown in **Error! Reference source not found.**. These surveys are intended to detect species using the parts of the lagoons and Rusty Pond closest to the mining area and other adjoining habitats where effects beyond the site are most likely, and may need to be avoided or managed.

In addition to the seasonal surveys, as set out above, detection of “threatened” and “at risk” species using the mining area, will rely on fortnightly and/or weekly detection surveys and close (twice weekly) monitoring of any nesting attempts. The number, location and outcome of all nesting attempts will be recorded, along with the number, dates and times of monitoring visits.

For kororā an annual survey of Pakiroa Beach undertaken in November as described in Section 3.4 is proposed.

For tāiko, the location, date and time of any groundings will be recorded, along with any vehicle strikes and near misses. This information will be included in the annual bird monitoring report.

In order to have the best chance of detecting Australasian bittern, acoustic surveys must be undertaken at least once annually between September and November

For South Island fernbird, territory mapping using playback of fernbird calls will be undertaken in advance of mining commencing in Panel 4 so that the number and location of fernbirds can be confirmed.

Monitoring to quantify noise levels at the site boundary adjoining the SNA and coastal lagoon habitats will be undertaken to inform management decisions with respect to noise levels in natural habitats adjoining the site.

All bird monitoring should be undertaken by suitably qualified and experienced ecologists/ornithologists to ensure all species observations are accurately captured.

This information will be compiled into an annual bird monitoring report at the conclusion of the breeding season (March) and provided to the consent authorities and others no later than 30 June each year as discussed in Section 5.2.

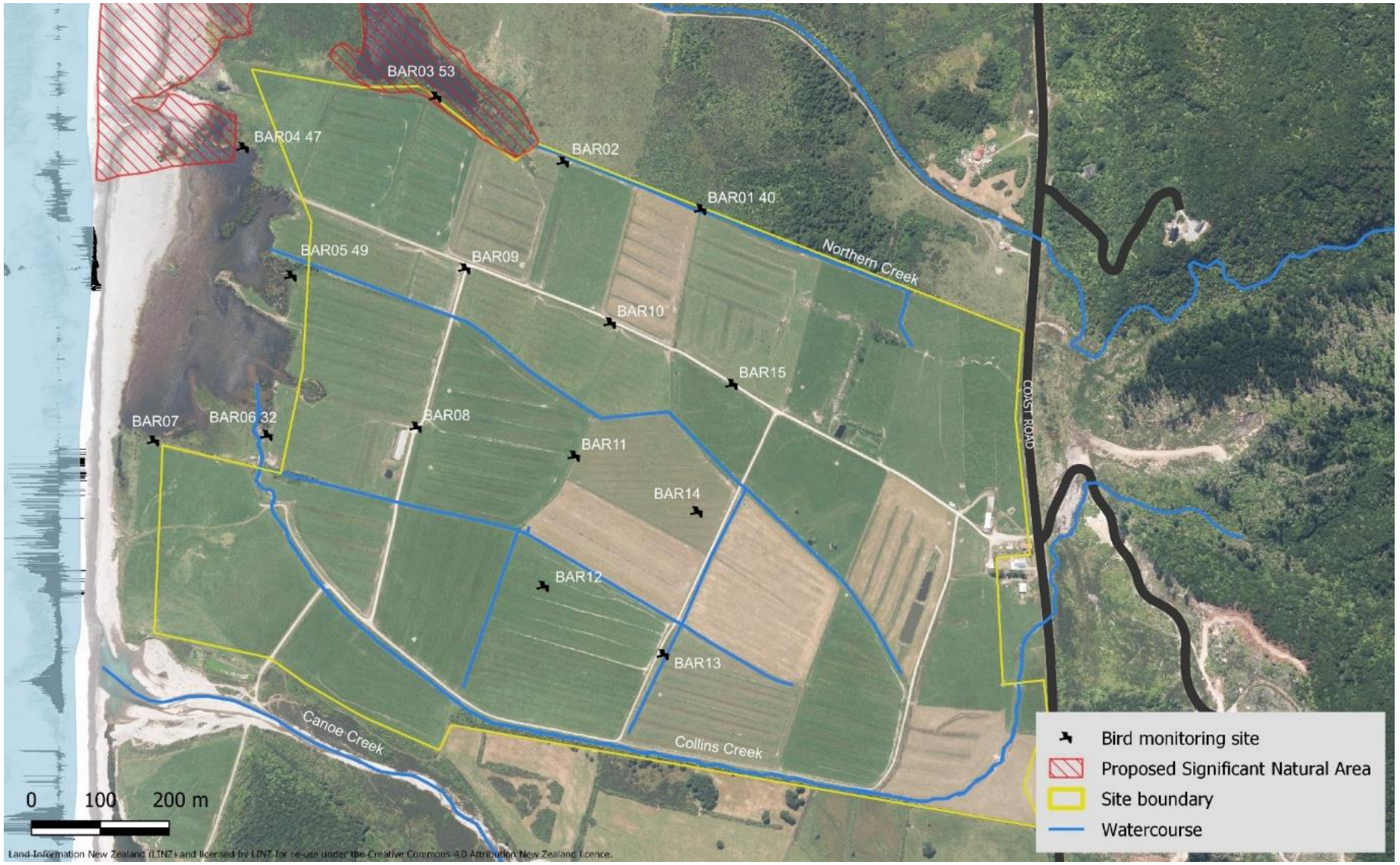

Figure 7: Location of bird monitoring sites at Barrytown.

5.2 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 100m of the coastal lagoon vegetation and the SNA;
- Results of seasonal bird surveys at the site;
- Timing of nest detection surveys and observations relating to nesting or other behaviours observed within the area to be mined;
- Efforts to deter any attempts at nesting within the area to be mined and the outcome of those efforts;
- Species attempting to nest within the area to be mined (including threatened and at risk species);
- Date of first nesting attempts (if any) for threatened and at risk species within the area to be mined;
- Number and location of nesting attempts by threatened and at risk species within the area to be mined;
- Date any predator control commenced, the location of traps and bait stations, the number of captures, the amount of bait consumed and any relevant observations;
- Outcome of individual nesting attempts by threatened and at risk species within the area to be mined;
- Results of annual kororā surveys on Pakiroa Beach, the implications for mine operations and any management actions undertaken;
- Number and location of any grounded tāiko and any birds found dead at the site;
- 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 with vehicles for any native species;
- 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 results of the quarterly walk-through surveys of birds using the lagoon area.

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 Grey District Council, Te Runanga o Ngāti Waewae, Paparoa Wildlife Trust, the Community Liaison Group for the project, West Coast Penguin Trust and the Buller/Kawatiri office of the Department of Conservation in Westport no later than 30 June each year.

6.0 Summary

TiGa proposes a mineral sand mine located on farmland near Barrytown, approximately 36km north of Greymouth. The mining area adjoins wetland areas which provide important 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 near the only known breeding colony of tāiko (Westland petrel, *Procellaria westlandica*).

Fourteen threatened and at-risk bird species have been identified using the habitats adjoining the site. The majority of these species would not use the pastoral habitats within the site, but would be affected by noise, human activities and vehicle movements near their habitats, particularly during the breeding season. A number of management activities (e.g., maintaining buffers from key areas of habitat, planting, avoidance of mining strips adjacent to high quality habitat during breeding season) will be undertaken to minimise impacts on these species.

Specific management actions for threatened and at risk species if they are detected at the site during ongoing monitoring include: detection surveys to identify birds prospecting for nest sites, discouraging birds from establishing nests in the work site, managing established nest sites (including establishing no-go zones within 50m and initiating predator control) and monitoring identified nests twice weekly.

Annual surveys will be undertaken to locate kororā using Pakiroa Beach within 500m of the mining area and this information will be used to plan kororā management.

The area to be mined is located approximately 3.6km south of the only known colony of tāiko/Westland petrel. Both adult and young birds are known to be disoriented and attracted by artificial lighting and can be grounded. In order to avoid the effects of lighting at the mine during night time operations no mining or trucking movements outside daylight hours are proposed. Processing would occur at night within the processing plant, which will require some lighting to maintain a safe workplace. The building has been designed to avoid light spill where possible and adherence to the Australian Government's National Light Pollution Guidelines or Wildlife, January 2020 (or subsequent revision) is proposed in relation to that lighting. Minimisation techniques will include (but not be limited to) pointing all fixed lighting downward, shielding to avoid light spill 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. Night time traffic movements to and from the site relating to shift changes will be minimised.

TiGa will also provide training so as to ensure staff are appropriately informed and able to implement an 'accidental discovery protocol' in the event a grounded tāiko is identified.

In the event any dead bird is identified within the site, the Department of Conservation office in Westport and Te Rūnanga o Ngāti Waewae will be informed, and collection or delivery of the bird arranged. In the event the dead bird is a tāiko and it is discovered within 50m of the pit or processing plant, a detailed information gathering and logging process will be followed.

Bird monitoring will include detection of "threatened" and "at risk" species using the site and adjoining areas. Given the small size of the mining area in relation to the wider site, birds using the area to be mined during any upcoming breeding season would be detected via fortnightly and/or weekly detection surveys and close (twice weekly) monitoring of any nesting attempts. Monitoring of birds using the parts of the lagoons, Rusty Pond and other adjoining habitats will be undertaken during seasonal bird surveys (four times each year in spring, summer, autumn and winter) using five-minute bird counts and acoustic recorders at 15 locations. At least one of those surveys each year will be undertaken at the appropriate time to detect Australasian bittern. Territory mapping of South Island fernbird will also take

place in advance of mining commencing in Panel 4 in order to inform fernbird management.

The data collected will be compiled and presented in an annual bird management plan to be used in adaptively managing the operations to protect the birds at the site and provided to Greymouth District Council, Te Runanga o Ngāti Waewae, Paparoa Wildlife Trust, the Community Liaison Group for the Project, West Coast Penguin Trust and the Buller/Kawatiri Department of Conservation office in Westport.

7.0 References

Boffa Miskell. 2006. Grey District Significant Natural Area Assessment. *Significant Natural Areas Programme.* Prepared for Grey District Council.

Holzapfel, S., Robertson, H. A., McLennan, J. A., Sporle, W., Hackwell, K., & Impey, M. (2008). Kiwi (Apteryx spp.) recovery plan. Threatened species recovery plan, 60.

Marchant S. and Higgins P.J. 1990: Handbook of Australian, New Zealand & Antarctic birds. Vol. 1, Ratites to ducks, P. AB. Oxford University Press.

National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds, Commonwealth of Australia. 2020.

O'Donnell, C.F.J., Williams, E.M. 2015. Protocols for the inventory and monitoring of populations of the endangered Australasian bittern in New Zealand. Department of Conservation Technical Series No 38. Department of Conservation, Wellington.

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.

Stark, J. D., Boothroyd, I. K. G., Harding, J. S., Maxted, J. R., Scarsbrook, M. R. 2001. Protocols for sampling macroinvertebrates in wadeable streams. Prepared for the Ministry for the Environment. November 2001.

APPENDIX A

Wildlife Act (1953) Authority to Handle Absolutely Protected Wildlife