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Macraes Phase 4 Fast-track

Bat Values Assessment

for: OceanaGold New Zealand Limited

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Cover Illustration: Long-tailed bat *(Chalinolobus tuberculatus)*. Photo by Alisha Hart.

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Executive summary

This Bat Values Assessment has been prepared to inform the proposed Macraes Phase Four (MP4) Project.

Native bat species (pekapeka) comprise two extant species: the long-tailed bat (*Chalinolobus tuberculatus*) and the lesser short-tailed bat (*Mystacina tuberculata;* southern subspecies *M. t. tuberculata* of relevance). Both are Threatened species and are subsequently of Very High ecological value where they occur.

This report finds that based on desktop review, habitat availability, and a lack of bat detections across a landscape-scale acoustic survey; it is very unlikely that bats are present in the area. Accordingly, neither an assignment of site ecological value for bats nor a subsequent impact assessment are considered relevant; the effects on pekapeka from the MP4 project are considered to be nil.

Survey methods

Pekapeka presence and values were determined using:

- Desktop review of the DOC bat database and other known surveys;
- Site visits by a bat ecologist accredited with DOC competency 3.3[1] to gain an overview of potential habitat;
- A three week acoustic survey of the Macraes operation and adjoining areas of quality habitat using Automatic Bat Monitors (ABMs) across 27 locations in March 2026.

Bat presence

In consideration of the desktop review, habitat available, and lack of bat detections during the landscape-scale acoustic survey, pekapeka are considered likely absent from the site and surrounds.

Lesser short-tailed bats rely on indigenous old-growth forest, which is not present in the landscape, and on the South Island mainland are only known to persist in the Fiordland area over 200 km away.

Long-tailed bats have proven to be adaptable to human-modified landscapes; however, the Macraes area presents an especially challenging landscape for them due to near-total deforestation and unfavourable climate conditions. The closest known populations of long-tailed bats are over 100 km from the site.

Ecological value and potential effects

Values assessment and discussion of potential effects have not been undertaken. The MP4 Project is considered to have no effect on pekapeka due to their absence.

[1]https://www.doc.govt.nz/globalassets/documents/conservation/native-animals/bats/bat-recovery/bat-handling-competencies.pdf

1 Introduction

OceanaGold (New Zealand) Limited ("OGNZL") currently undertakes open pit and underground gold mining operations at the Macraes Operation located at Golden Point Road, Macraes Flat, East Otago. As part of their ongoing operations, OGNZL continually review the remaining life of the Macraes Operation in light of updated knowledge of the gold resource and the economics of mining.

Reflecting recent exploration success and optimisation work, together with higher gold prices, the Macraes Phase Four Project ("MP4" or "the Project") seeks to extend the life of mining at the Macraes Operation until at least 2039. The Project, which will enable ongoing gold production at a rate of approximately 130,000 ounces per annum, is identified as a Listed Project in Schedule 2 of the Fast-track Approvals Act 2024 ("FTAA") as a project providing significant national or regional benefits.

To support the development of the substantive application for the Project, OGNZL has engaged Bioresearches to provide an assessment of the Project's effects on bat values and, to the extent required, identify any necessary management and operation measures to address any such effects.

Figure 2.1 shows the arrangement of the major mine features at the Macraes Operation. In summary, the current components of the Macraes Operation include:

- Numerous open pits (both operational and non-operational);
- Two underground mines (Frasers, now closed, and Golden Point, which is actively mined);
- Waste rock stacks at various stages of operation and rehabilitation;
- A network of haul roads and general mine service tracks;
- A Processing Plant;
- Five tailings storage facilities (three inactive, one active but nearing capacity, and one under construction and currently receiving tailings);
- An extensive network of water management infrastructure, including diversion drains, silt ponds, sumps, pit lakes, and freshwater storage reservoirs;
- Two consented but not yet constructed water storage reservoirs (Camp Creek Dam and Coal Creek Dam); and
- Associated infrastructure supporting ongoing operations, including district roads, powerlines, workshops, offices, and associated water and amenity facilities.

This document (E6) sits within a series of ecology-focused documents relating to the Project (Table 1.1). The scope of this report is limited to assessing bat values and does not include an assessment of the Project's effects on those values. The effects of the Project on bats are addressed separately in the EcIA prepared by Bioresearches (E7).

Table 1.1. Ecology Documents prepared for the proposed Macraes Phase 4 Project. Current document highlighted.

Document #	Document name	Aspects covered	Author
E1	Terrestrial and Wetland Ecology Summary		Bioresearches (2026a)
Ecological Assessments			
E2	Assessment of Vegetation and Wetland Values	Terrestrial vegetation and wetlands	Whirika (2026)
E3	Assessment of Invertebrate Values		Bioresearches (2026b)
E4	Assessment of Lizard Values		Bioresearches (2026c)
E5	Assessment of Avifauna Values		Bioresearches (2026d)
E6	Assessment of Bat Values		Bioresearches (2026e)
E7	Ecological Impact Assessment	Terrestrial and wetland ecosystems and fauna	Bioresearches (2026f)
Ecological Management			
E8	Vegetation and TAR Flora Management Plan	Indigenous vegetation and threatened plants (wetland and terrestrial)	Bioresearches (2026g)
E9	Wetland Management Plan	Wetlands and TAR wetland plants	Bioresearches (2026h)
E10	Invertebrate Management & Monitoring Plan		Bioresearches (2026i)
E11	Lizard Management & Monitoring Plan		Bioresearches (2026j)
E12	Avifauna Management & Monitoring Plan		Bioresearches (2026k)
Residual Effects Analysis and Management			
E13	Residual Effects Analysis: Terrestrial Ecology	Residual effects analyses for vegetation and fauna	Bioresearches (2026l)
E14	Residual Effects Analysis: Wetlands	Residual effects analyses for wetlands	Bioresearches (2026m)
E15	Residual Effects Terrestrial Restoration Plan	Compensation planting and vegetation restoration	Bioresearches (2026n)
E16	Residual Effects Wetland Management Plan	Planting and restoration for wetlands	Bioresearches (2026o)
E17	Ecological Impact Assessment: Pest-proof Fence Construction	Terrestrial and wetland ecosystems and fauna	Bioresearches (2026p)
E18	Pest Control and Elimination Plan	Animal pest management	Alliance Ecology (2026)

1.1 Purpose and scope

This Bat Values Assessment aims to detail the findings of desktop and site surveys in regard to the likelihood of bat presence, and subsequently identify and evaluate the relevant ecological values associated with bats

present within the Project area and its zone of influence. The assessment forms part of a broader ecological evaluation to inform resource management decision-making and is undertaken in accordance with the Ecological Impact Assessment Guidelines (EcIAG) for use in New Zealand as developed by the Environment Institute of Australia and New Zealand (EIANZ) (Roper-Lindsay *et al.* 2018).

Specifically, the purpose of this report is to:

- Describe the bats potentially present within the site, based on a combination of desktop review and acoustic survey.
- Where applicable, characterise the habitats present across the Project area and zone of influence, and assess their functional role for bats such as for roosting, foraging, or commuting corridors.
- Assign ecological values to present bat and associated habitats using the EIANZ framework for value assessment.

2 Macraes Phase Four Project

2.1 Site location and description

OGNZL owns and operates the Macraes Operation at Macraes, approximately 30 km northwest of Palmerston in the Otago Region. The Macraes Operation is the largest gold mine in New Zealand and, since commissioning in 1990, has produced more than 6 million ounces of gold.

Macraes Flat is located within the Macraes Ecological District (ED), part of the Lammerlaw Ecological Region in Otago. The district is characterised by distinctive topography associated with the northeast–southwest trending Taieri Ridge and a series of smaller faulted ridges to the southeast, along with dendritic drainage systems. Terrain is generally gentle below 600 m, with higher ridges exceeding 800 m. The geology is dominated by Paleozoic Haast Schist, with minor Miocene sediments and volcanic features. The climate is cool and dry montane, with moderate annual rainfall (600–800 mm), frequent north-westerly winds, and occasional winter snowfall (McEwen 1987).

The Macraes Operation is situated on an elevated plateau at approximately 500 m above sea level. The plateau is flanked by the Taieri Ridge to the northwest, Shag Valley and Horse Range to the east, and the coastal hills and extinct volcanic cones of Palmerston and Waikouaiti to the southeast. Macraes Road provides access to Macraes Flat and the Macraes Operation, connecting to State Highway 85 to the east and State Highway 87 (SH87, the Middlemarch–Hyde Road) to the west.

Historically, the Macraes ED supported a mosaic of tussock grassland interspersed with mixed hardwood–podocarp forest, kānuka forest, and coprosma–flax shrubland (Bibby 1997). Since

European settlement, however, extensive burning and pastoral development have significantly modified this vegetation, resulting in widespread exotic grasslands and a highly altered landscape (Thompson 1949, McGlone *et al.* 1995, Whitaker 1996). The current ecosystems and vegetation types within the Project area are described in detail by Whirika (2026) (document E2) but are broadly characterised by narrow-leaved tussock and exotic grassland, interspersed with grey shrubland, schist outcrops, riparian vegetation along gullies, and both permanent and ephemeral wetlands. Native terrestrial invertebrates occur widely across the Project area.

The environment within and surrounding the Macraes Operation has been shaped by historic and current mining activities. Figure 2.1 shows the arrangement of the major mine features at the Macraes Operation. In summary, the current components of the Macraes Operation include:

- Numerous open pits (both operational and non-operational);
- Two underground mines (Frasers, now closed, and Golden Point, which is actively mined);
- Waste rock stacks at various stages of operation and rehabilitation;
- A network of haul roads and general mine service tracks;
- A Processing Plant;
- Five tailings storage facilities (three inactive, one active but nearing capacity, and one under construction and currently receiving tailings);
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- Associated infrastructure supporting ongoing operations, including district roads, powerlines, workshops, offices, and associated water and amenity facilities.

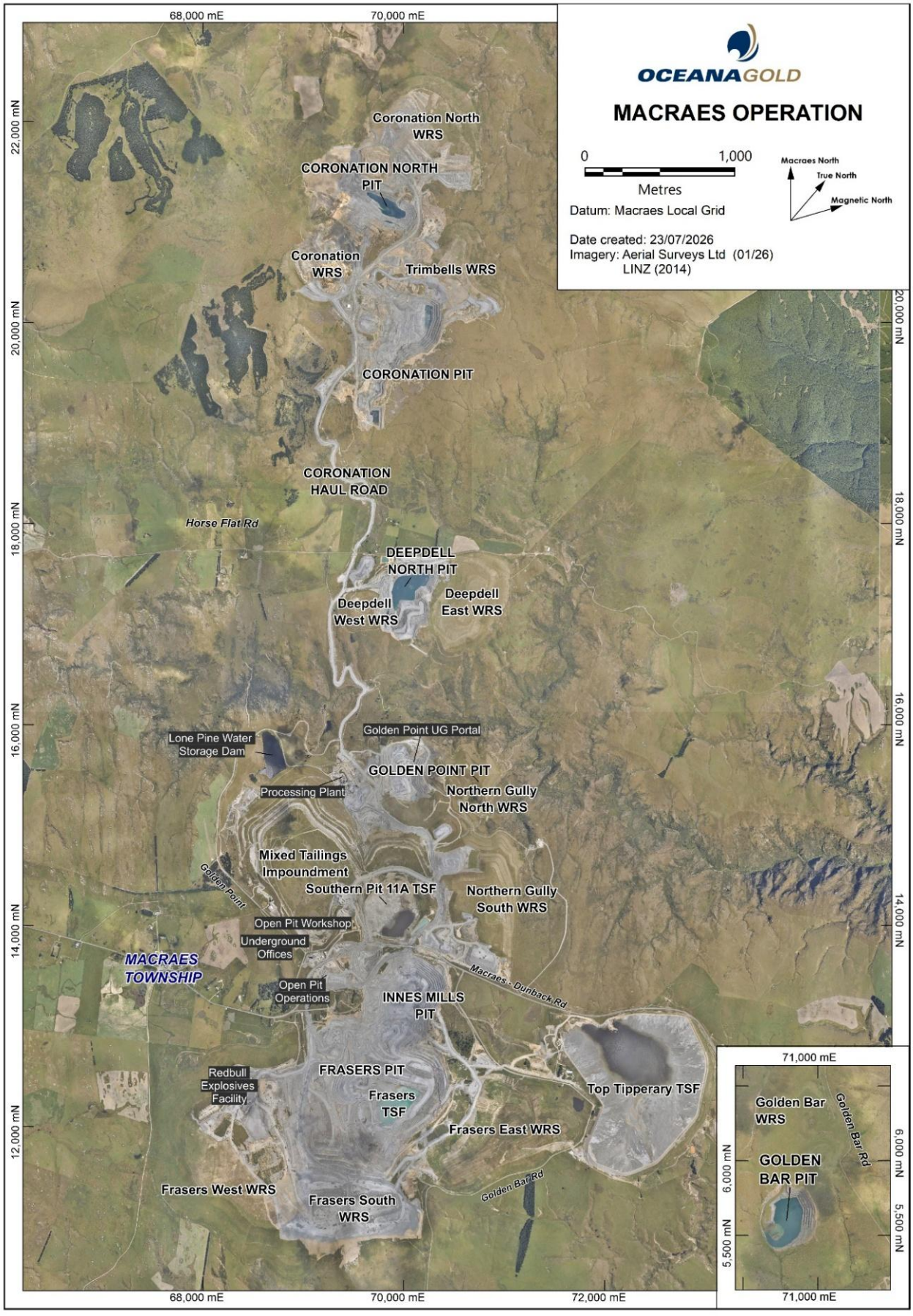

Figure 2.1. Existing site layout at the Macraes Operation (as of July 2026).

2.2 Project overview

The Project is made up of the following proposed key activities:

- **Open pit extensions** at Golden Bar, Coronation, Coronation North, and Innes Mills.
- **Underground mine expansion** through further development of the Golden Point Underground mine ("**GPUG**").
- Tailings management, including:
- Construction of the Frasers Tailings Storage Facility ("**FTSF**") Stage 3 to accommodate an additional 118 Mt of tailings; and
    - Hydraulic mining and relocation of tailings from the Mixed Tailings Impoundment ("**MTI**"), Southern Pit Option 10 TSF ("**SP10**"), and Southern Pit Option 11A TSF ("**SP11**") to FTSF.
- Waste rock disposal, including:
    - Increased storage capacity within open pits and at existing waste rock stacks at Coronation, Coronation North, Innes Mills, Golden Bar, Golden Point, and Frasers.
- Water management infrastructure and operations, including:
    - Construction of Camp Creek and Coal Creek water storage dams for flow and water quality management; and
    - Management of the Mine Water Management System ("**MWMS**").
- Infrastructure and roading works, including:
    - Realignment of Macraes Road in two stages; and
    - Relocation of the Open Pit Mining Workshop.
- Ecological enhancements, including:
    - Establishment of the Murphys Ecological Enhancement Area ("**MEEA**") near Murphys Creek, including predator-proof fencing, access tracks, and site facilities; and
    - Additional offset and compensation measures for residual ecological impacts.
- Mine closure and rehabilitation activities, including:
    - Rehabilitation of mining landforms, creation of pit lakes, dry capping of tailings storage facilities, and revegetation consistent with existing closure objectives.

An overview of the proposed activities which make up the Project is shown in Figure 2.2 below.

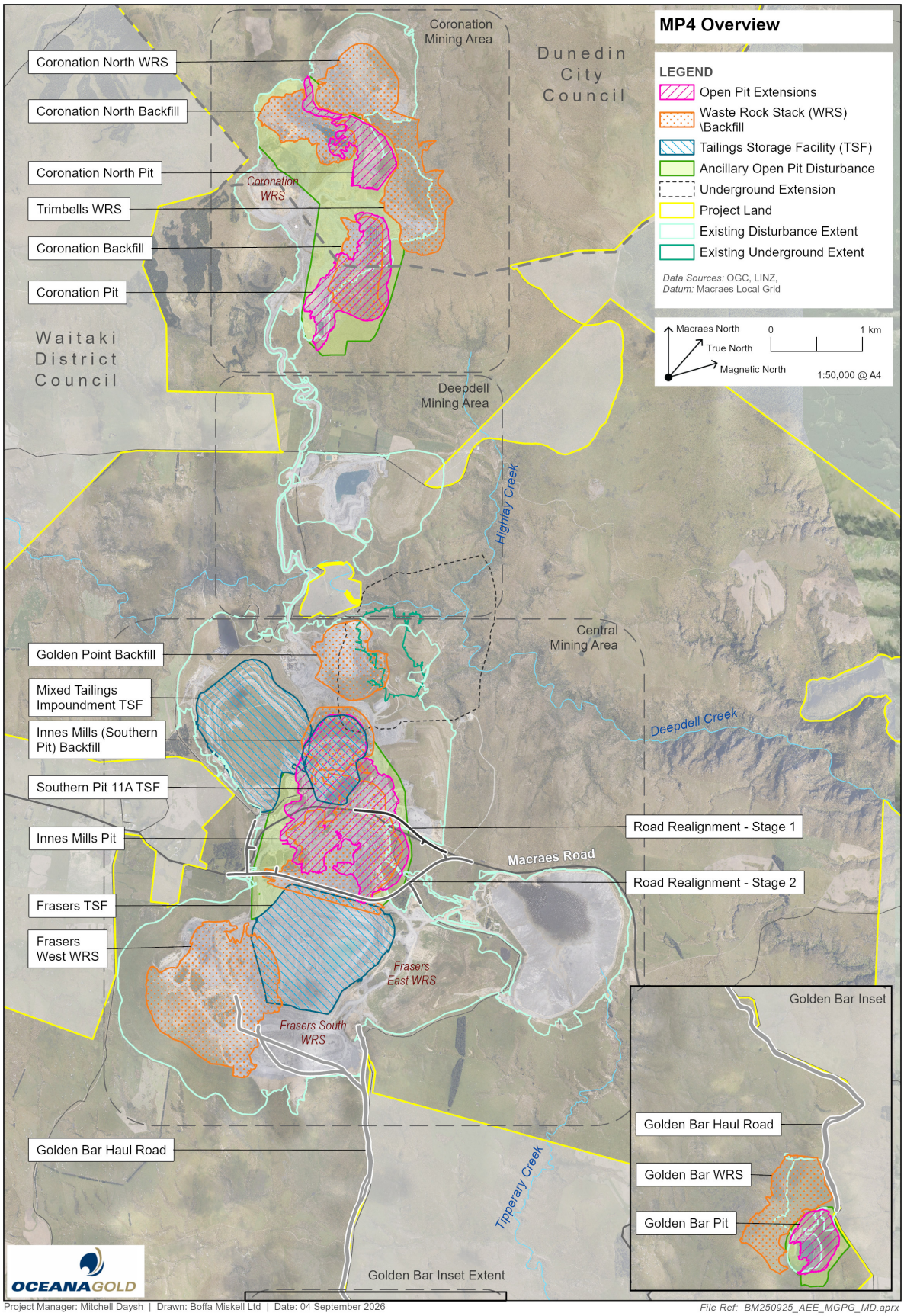

Figure 2.2. MP4 Overview Plan (as of July 2026). Figure supplied by OceanaGold.

The Project area extends over approximately 785 ha of land within the OGNZL landholdings. This comprises land for which resource consents are required under the FTAA for mining and associated activities (approximately 440 ha), and land that is already consented under existing resource consents, but where mine development has not yet been undertaken (approximately 345 ha).

The unconsented and consented footprints are further broken down as follows.

2.2.1 Unconsented areas

- An approximately 325 ha surface impact footprint where mining and ancillary mining activities are proposed.
- An approximately 58 ha precautionary buffer applied around parts of the direct impact footprint, where direct adverse ecological effects are not anticipated, but total loss of ecological values has been conservatively assumed for the purpose of the MP4 application.
- An approximately 63 ha area of proposed underground mine expansion, where ecological values have been assessed but underground activities are not considered to have measurable adverse ecological effects on the surface.
- An additional approximately 200 ha buffer surrounding the impact area, combined with a 20 m precautionary buffer, providing for potential indirect effects on ecological features up to 80 m away.

2.2.2 Consented areas

- An approximately 172 ha Back Road Waste Rock Stack (BRWRS) area, for which the resource consents providing for construction of the BRWRS will be surrendered as part of the MP4 Project.
- Approximately 14.4 ha for construction of the Camp Creek dam and reservoir, and approximately 14.9 ha for construction of the Coal Creek dam and reservoir.
- Approximately 144 ha of previously disturbed and rehabilitated land within several MP4 Project areas (e.g., parts of Coronation, Golden Bar WRS, Golden Bar Pit, and the Innes Mills Pit disturbance area), which will be re-worked as part of the Project.

In addition, resource consents will be required for land management activities associated with mitigation and compensation sites as part of the Project. These areas include:

- Approximately 1,500 ha of the wider Murphys Creek catchment, where Project mitigation and compensation measures are proposed, including but not limited to construction of a 252 ha predator-exclusion fence, implementation of surrounding landscape predator management, and restoration planting.
- An approximately 300 ha area of the recently acquired Mt Highlay Station, where fencing and habitat enhancement activities will take place.

In summary, the MP4 Project will involve additional vegetation clearance, earthworks, habitat modification and infrastructure development within and adjacent to existing disturbed mining areas.

Certain components, including waste rock stack extensions and ecological enhancement areas, extend beyond previously disturbed footprints. These activities have the potential to affect bats, if present, through direct habitat loss, disturbance, changes to hydrology, modification of landforms, increased traffic movements, lighting, noise and vibration, and long-term changes in post-mining land use.

As the MP4 Project includes multiple components, including pit expansions, waste rock stacks and new haul roads, the approach used here is to divide assessments into smaller components, listed in sections 2.2.3 to 2.2.8. Further description of the existing ecosystems and fauna habitats are described within these sections.

2.2.3 Coronation Mining Area

The Coronation Mining Area of MP4 involves the continuation and extension of open-pit mining (Stage 6), together with associated backfilling and waste rock management. Mining will recover additional ore from deeper and laterally extended portions of the existing pit footprint; with waste rock placed within approved backfill areas and raised waste rock stacks where required. Activities will utilise existing mining infrastructure and haul road networks and will occur in a sequenced manner consistent with the broader MP4 mining schedule (approximately 2033–2035 for this area). No substantial new standalone infrastructure is proposed, as Coronation operates within an established mining envelope.

Habitat types present include extensive tussock grassland, scattered rock tors, ephemeral wetland, pasture, and felled pine forest (Figure 2.3).

Figure 2.3. Examples of habitat present within the Coronation Mining Area.

2.2.4 Central Mining Area

The Central Mining Area component comprises extensions to the Innes Mills open pit (Stages 11–13) and the development of Frasers Tailings Storage Facility (FTSF) Stage 3 within the mined-out Frasers Pit. The Innes Mills pit will be expanded primarily to the east and northwest, largely over previously disturbed haul roads and pasture, with mining undertaken sequentially to enable efficient cut-and-fill

balancing across adjacent pits. FTSF Stage 3 will provide substantial additional tailings storage capacity within the Frasers Pit void, including relocated tailings from other facilities. Waste rock will be disposed of in existing and expanded backfill areas and waste rock stacks. Mining will utilise established haul routes and processing infrastructure and will continue through approximately 2035 under the indicative schedule.

Vegetation remaining in the Frasers/Innes Mills area is almost exclusively pasture and gorse (Figure 2.4), with scattered exotic trees through one area around a derelict building. The trees are largely young pines but include a large macrocarpa and a tī kōuka with cavities/ hollows (Figure 2.5).

Figure 2.4. Example of typical habitat in Frasers/Innes Mills area

Figure 2.5. Trees supporting cavities/ hollows in the Frasers/Innes Mills area

2.2.5 Golden Bar Haul Road

The Golden Bar component includes realignment of sections of Golden Bar Road (and associated connections to Macraes Road) to accommodate pit expansion and ongoing mining activities. The realignment will involve construction of a new road corridor across previously disturbed and rehabilitated mining landforms, with earthworks including cuts and fills, installation of culverts for stormwater management, and formation of a new road platform. The works are designed to maintain safe public access while enabling continued mining at Golden Bar and Innes Mills. Vegetation clearance and earthworks will be required within the designated corridor.

The habitat along the Golden Bar Haul Road is exclusively pasture with scattered tussock (Figure 2.6). A few tors are close to the road alignment but outside of the footprint. No mature trees are within the footprint.

Figure 2.6. Grazed pasture/ scattered tussock landscape typical of Golden Bar Haul Road impact area

2.2.6 Golden Bar

The Golden Bar component comprises Stage 2–3 extensions to the existing open pit, involving an approximate lateral expansion (primarily to the east and northeast) to access additional ore. Much of the expansion footprint occurs over rehabilitated land from earlier mining phases, although some new disturbance will occur over tussock grassland. The pit extension necessitates expansion of the existing Golden Bar Waste Rock Stack (WRS), including placement of additional material over the current stack and extension of its footprint to increase storage capacity. Ore will be stockpiled adjacent to the WRS and transported to the Processing Plant via established private haul roads. Temporary ancillary infrastructure (e.g., fuel storage, ablutions, operator facilities) will be established as required. Progressive rehabilitation, contouring, and revegetation will occur during and following operations.

Habitat in the impact area is dominated by exotic pasture with patches of tussock grassland. While tors are scarce and trees are absent from the footprint, hydrological features including ponds and wetlands are present, albeit degraded by stock access (Figure 2.7).

Figure 2.7. Habitat in the Golden Bar impact area surrounding existing pit including exotic grassland, tussock, tor, ponds, and wetland.

2.2.7 Back Road Waste Rock Stack (BRWRS)

The Back Road Waste Rock Stack (BRWRS) was previously consented under the Macraes Phase III Project (MP3) for expansion east of the Round Hill/ Southern Pit area. Under MP4, OceanaGold proposes to surrender the existing consents relating to further BRWRS construction, meaning the expanded BRWRS will not form part of the MP4 development footprint.

2.2.8 Compensation sites

There are three proposed ecological compensation areas within MP4 (Figure 2.9):

- Mt. Highlay: an area north of the Coronation Mining Area where young pine plantation is to be disestablished and replaced with tussock planting and tor buffer planting.
- Cranky Jim's Link: revegetation and enhancement to link existing covenants at Cranky Jim's Creek and Island Block.
- Murphys Ecological Enhancement Area: intensive pest exclusion and enhancement (detailed below).

2.2.8.1 Murphys Ecological Enhancement Area

The Murphys Ecological Enhancement Area (MEEA) is a key ecological compensation area within MP4, established to address residual terrestrial and aquatic ecological effects after avoidance, remediation, and mitigation measures have been applied. Located within the Murphys Creek catchment in proximity to the Golden Bar and Central mining areas, the MEEA has been selected for its ecological enhancement potential and habitat similarity to affected areas. Proposed works include the establishment of all-weather access, installation of predator-proof and stock exclusion fencing, predator control measures, habitat restoration and revegetation, and potential lizard salvage or translocation activities. The MEEA will be subject to covenanting and long-term management to secure enduring biodiversity outcomes consistent with MP4's ecological management strategy.

Murphys Creek is one of the larger waterways in the area, with a gulley system characterised by extensive areas of exposed schist and tors (Figure 2.8). Vegetation is largely exotic pasture and tussock, with gorse dominating the gulley floor. Scattered patches of scrubby indigenous vegetation are present which include matagouri *(Discaria toumatou)* and golden speargrass *(Aciphylla aurea)*.

Figure 2.8. Habitat of Murphys Creek catchment: gulley system with mixed exotic-tussock grassland, areas of open water, and extensive tor/ schist structures

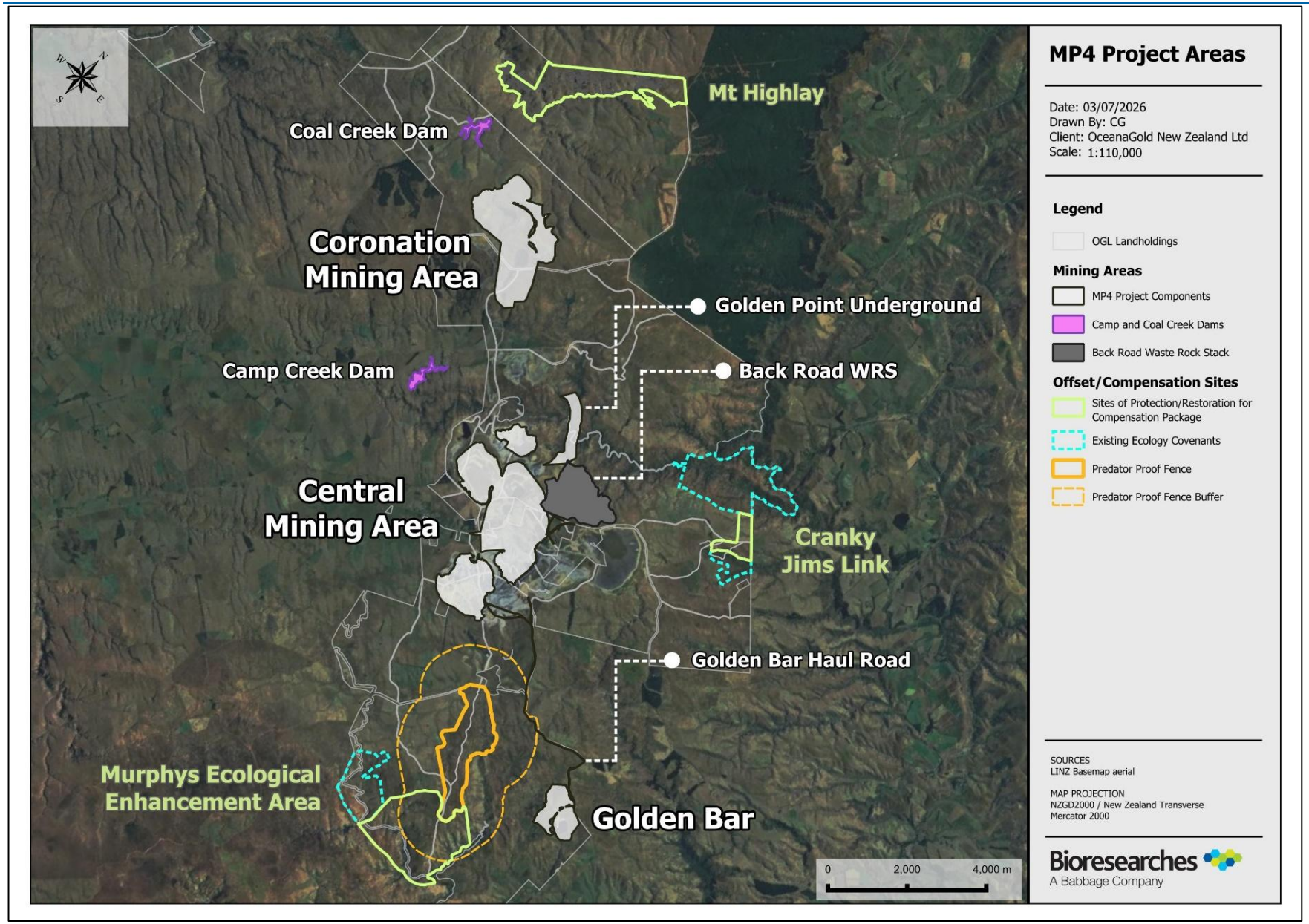

Figure 2.9. Locations of the sites used for this assessment.

3 Pekapeka survey

3.1 Pekapeka background

Two extant species of native bat (pekapeka) are found in New Zealand, comprising the long-tailed bat (*Chalinolobus tuberculatus*) and lesser short-tailed bat (*Mystacina tuberculata*); the latter is represented by three subspecies (O'Donnell et al., 2023). Both species are listed as 'Threatened' or 'At Risk' under the New Zealand threat classification system (long-tailed bat: 'Threatened – Nationally Critical' and Southern lesser short-tailed: 'Threatened – Nationally Increasing') (Townsend et al., 2008; O'Donnell et al., 2023). Their threat statuses reflect the chronic decline in populations across much of New Zealand, due to the loss and fragmentation of habitats and adverse impacts of pest mammals.

Both species are highly mobile and can have extensive home ranges, with individuals capable of moving tens of kilometres in one night (O'Donnell, 2001). Short-tailed bats are associated with old-growth native forest that provides suitable foraging and roosting habitat, while long-tailed bats have demonstrated greater adaptability to modified landscapes and are recorded in many rural areas commuting/foraging along linear features such as forest edges and streams. Roosts are often in tree cavities, epiphytes, or under loose bark (Borkin & Parsons, 2009; R. Griffiths, 1996) and change frequently, often on a nightly basis in the case of long-tailed bats (Sedgeley, 2001). However, roost fidelity can be high on a year-to-year basis (Sedgeley & O'Donnell, 1999) or where quality roost options are limited.

3.2 Desktop assessment

A desktop review was undertaken to determine pekapeka distribution and survey effort in the surrounding landscape, including review of the DOC National Bat Database and relevant ORC shapefiles.

While bats were historically commonly sighted around cities on the eastern coast of the South Island, including Dunedin, they have been lost through much of their range through pressures such as extensive habitat loss and introduced predators. The closest known current long-tailed bat populations to the Macraes area are in Geraldine (~120 km away), the Catlins (~128 km away), and Waikaia (~105 km away). On the South Island mainland, lesser short-tailed bats are only known to persist in Fiordland areas over 200 km from the site.

Prior survey effort has been low with only two locations within 25 km of the site having received survey attention as per the DOC bat database (Figure 3.1). Otago Regional Council has identified several forested areas in the region as 'Bat Priority Areas', i.e. as priority for future survey. This includes Waianakarua Scenic Reserve approximately 20 km east of the site, and Silverpeaks Scenic Reserve near Dunedin. Waianakarua Scenic Reserve was subject to a recent opportunistic survey with five ABMs (model Song Meter Mini Bat 2) set for 14 nights over February to March 2026, including two set by Waianakarua River (middle branch) within the reserve. No bats were detected during this survey (M. Jones, Tou-Roa Ecology, pers. comm. 31st March 2026).

There is additionally some 'Significant Bat Habitat' as mapped by Otago Regional Council within 25 km of the site, at Orokonui. The information provided for this overlay is that it is based on buffers applied to DOC bat database records; however, there are no associated records in the current version of the database or recognised extant bat population at Orokonui.

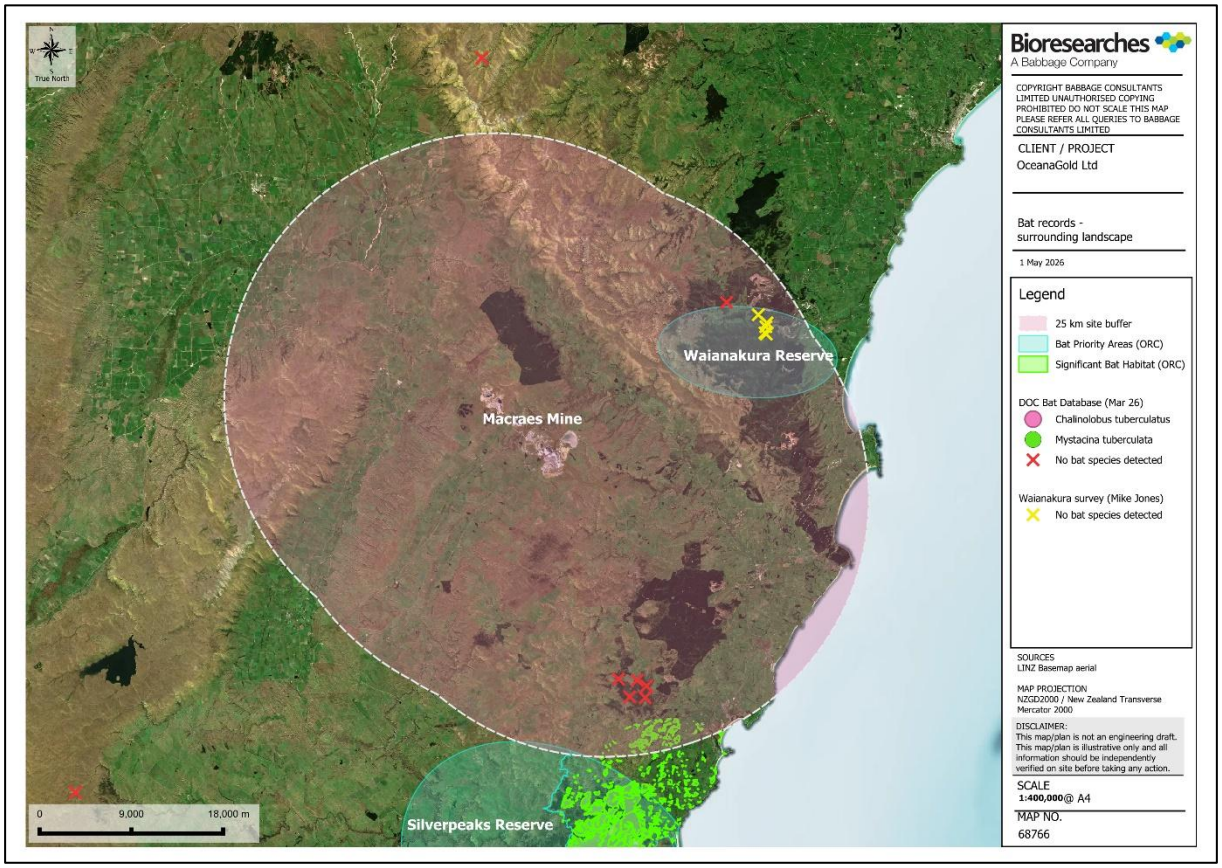

Figure 3.1. Satellite imagery of Macraes Mine (centre) with 25 km buffer shown (pink). Otago Regional Council Bat Priority Areas and DOC database records (March 2026 version) shown for context.

3.3 Landscape overview

The Macraes Ecological District is a landscape of high plateau scattered with gulleys and schist rock tors. Historically the area held a mosaic of tussock, scrub, and hardwood-podocarp forests. The forest extent is believed to have shrunk beginning from approximately 2,500 years ago due to increasing natural fires in a warming, drier climate, with further forest lost through burning and agricultural practices by human settlers (McGlone 1989). The existing mine area spans altitudes of approximately 500-700 metres and is generally a dry, cold environment.

The 'potential ecosystem extent' – i.e. the expected native ecosystem cover in the current climate without human interference – would be expected to be dominated by podocarp-hardwood cool forest in the vicinity of the site (Otago Ecosystems and Habitat Mapping, ORC, 2026). The potential ecosystems mapped within a 10 km radius of the site include:

CLF4.2 - Kahikatea, tōtara, matai forest: dominant around current mine area

- CLF1 - Hall's tōtara, mountain celery pine, broadleaf forest: southwest of existing mine area

- AL1 - Narrow-leaved and slim snow tussock tussockland/ shrubland: south of existing mine area

The current ecosystem extent is dominated by exotic pasture, with areas of tall tussock persisting in gulleys and unfarmed land. Indigenous treeland is extremely scarce – grey scrub (VS6: Matagouri, *Coprosma propinqua*, kōwai scrub) exists in small patches associated with rock tors and is otherwise relegated to steeper gulleys where it is frequently in competition with environmental weeds such as gorse *(Ulex europaeus)* and Scotch broom *(Cytisus scoparius)*. McCormick's Creek has an extent of kānuka scrub/ forest mapped by ORC, but the sole area of indigenous forest near the site is Cranky Jims Creek. Cranky Jims is a covenanted area with established forest including kāpuka *(Griselinia littoralis)*, black matipo *(Pittosporum tenuifolium)*, karo *(Pittosporum crassifolium)*, mingimingi *(Coprosma propinqua)*, tree fuchsia *(Fuchsia excorticata)*, lancewood *(Pseudopanax crassifolius)*, tī kōuka *(Cordyline australis)*, and kōwhai *(Sophora microphylla)*. Tī kōuka and kōwhai (pers. obs.) have been known to be used by long-tailed bats for roosting, and while roost options observed at Cranky Jims are limited, there are tī kōuka specimens present with cavities.

Larger exotic trees are present in the wider surrounding landscape, sporadically planted for the purposes of amenity or windbreaks. However, there is also a large commercial pine plantation on private land to the east of the Highlay Hill Covenant. The larger exotic trees include species such as willow (*Salix* spp.), macrocarpa (*Cupressus macrocarpa*), and eucalyptus (*Eucalyptus* spp.), which long-tailed bats are known to use for roosting.

While tree roost options are very limited, pekapeka populations in several areas around the country have been reported utilising rock structures for roosting, including:

- Grand Canyon Cave: well-known limestone cave roost which is occupied year-round by long-tailed bats (Daniel & Williams, 1983)
- Geraldine: long-tailed bats roost in limestone outcrop crevices outside of the breeding season (Sedgeley & O'Donnell, 2004)
- Rakiura offshore islands: historic reports of both greater and lesser short-tailed bats utilising granite sea caves prior to rat introduction (Daniel & Williams, 1984)
- Central North Island: Pumice caves/ tomos used by long-tailed (unconfirmed, one report) and short-tailed bats across the volcanic plateau (Daniel & Williams, 1984)
- Orakei-Korako, Taupō: long-tailed bats recorded roosting in Ruatapu Cave, in a crevice above a geothermal pool (Daniel & Williams, 1983)
- Lake Taupō: a long-tailed bat observed solo-roosting in a crevice in an ignimbrite cliff (anecdotal/ photograph from rock climber)

The landscape across Macraes Flat has a high abundance of schist tors with many crevices and cracks which could offer potential roosting habitat for pekapeka. Research into thermal properties of rock structures and pekapeka roost requirements is very limited in New Zealand. Study of the Gerladine population at Hanging Rock found that long-tailed bats were not utilising rock crevices for maternity roosts, although it is worth noting that different rock types are likely to offer different rates/ sizes of crevices and vary in their thermal suitability.

Short-tailed bats rely on old-growth indigenous forest. As no such habitat is present in proximity to the site, they are considered absent from the area.

Long-tailed bats have shown remarkable adaptability to modified landscapes and while a combination of local climate, land use change history, limited roosting habitat, and known current distribution make it highly unlikely that they are present in the Macraes area, the potential impacts of the proposal could be very high for long-tailed bats if an incorrect assumption was made regarding absence. Therefore, further investigation was undertaken through acoustic survey.

3.4 Acoustic survey

A landscape-scale acoustic survey was conducted within and around the site to investigate whether pekapeka were present in the Macraes area.

As the purpose of the survey was to determine presence or absence, a range of sites were selected with the aim of maximising the chances of detecting long-tailed bats if they were present (Figure 3.2, Figure 3.3). These included:

- Streams/ gulleys
- Ponds and wetlands
- Rock tors that might support roosting habitat
- Trees with roost features
- Forest edges

Figure 3.2. Examples of habitat targeted by bat survey: wetland gully with pine forestry edge (left, location 3), indigenous forest at Cranky Jims Creek (right, location 18)

Figure 3.3. Examples of potential roosting habitat targeted by bat survey: willow with cracked trunk by wetland (left, location 17), large schist tor structure with crevices at Coal Creek (right, location 1)

Twenty-eight ABMs (model AR4, Department of Conservation electronics team, Wellington; and model AR5, Alato) were deployed for up to 20 nights (Figure 3.4; Table 3.1). ABMs were set on the 9-10th of March and collected 27-28th of March, with one check during the survey to replace batteries. These units have a detection range of approximately 30–60 m for long-tailed bats (S. Cockburn as cited in Smith *et al.,* 2020) and were set to record from at least one hour prior to sunset to at least one hour past sunrise.

Spectrograms were pre-processed using AviaNZ software (avianz.net, Wellington, New Zealand), and then each manually assessed using BatSearch 3.23 (Department of Conservation, Wellington, New Zealand) to validate and classify bat vocalisations.

Weather data for air temperature, wind speed, and rainfall were obtained from the on-site weather station at the central Macraes Mine 'Top Office', which logs weather data at 10-minute intervals. Data were checked against DOC guidelines and best practice thresholds to determine the number of valid survey nights (Department of Conservation, 2024). Nights were excluded when the air temperature dropped below 7°C within the first four hours after official sunset. While DOC guidance is subjective for rainfall and wind speed thresholds, nights were excluded where rainfall within the first four hours after official sunset exceeded 5 mm, or where average wind speed exceeded 20 km/ hr. However, these environmental thresholds are conservative and therefore spectrogram data from invalid survey nights were still analysed.

Four nights were deemed invalid due to weather, leaving ABMs with 15–16 valid nights of data each (excepting recording failures). One unit failed to record during the survey, and a further two units had notable failures for half of the survey span. Full weather details and breakdown of recording span by location are provided in Appendix C.

No bats were detected during the survey.

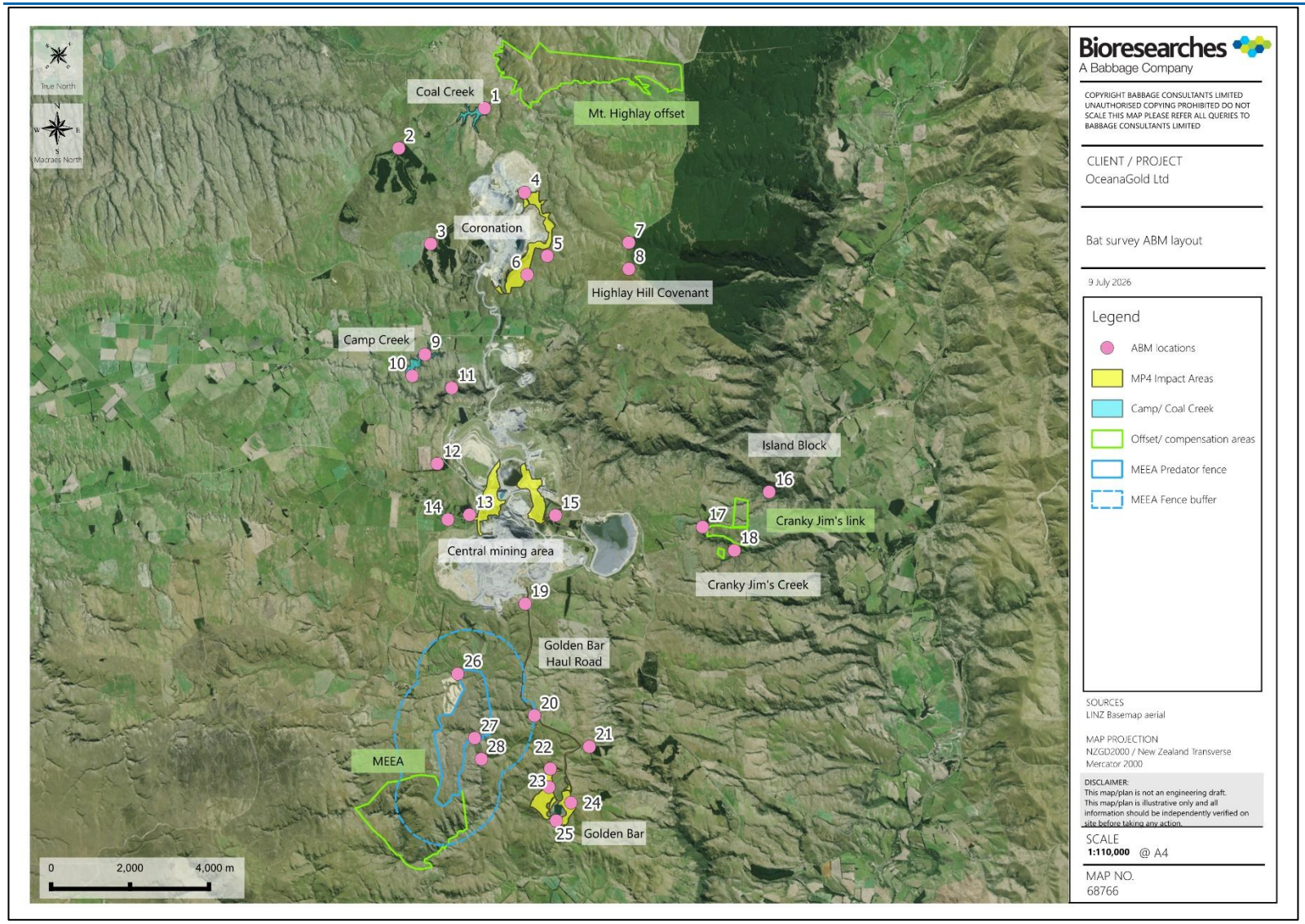

Figure 3.4. ABM survey locations for Macraes Mine pekapeka presence/absence survey

Table 3.1. Summary of ABM deployment

ABM number	ABM model	Number of recording nights	Valid recording nights	Location	Targeted habitat
1	AR4	18	15	Coronation surrounds (Coal Creek)	Stream gulley/ tor
2	AR4	18	15	Coronation surrounds	Forest edge/ creek
3	AR4	18	15	Coronation surrounds	Forest edge/ stream/ wetland/ tor
4	AR5	13	11	Coronation	Tor
5	AR4	19	16	Coronation	Tor
6	AR4	13	11	Coronation	Waterway/ tor
7	AR4	20	16	Coronation surrounds (Highlay Hill)	Forest edge/ minor gulley
8	AR4	19	16	Coronation surrounds (Highlay Hill)	Forest edge/ minor gulley
9	AR5	20	16	Central surrounds (Camp Creek)	Waterway/ gulley
10	AR4	0.5	0	Central surrounds (Camp Creek)	Waterway/ gulley/ tor
11	AR4	18	15	Central surrounds	Waterway/ gulley
12	AR4	19	15	Central	Forest edge
13	AR4	19	15	Central	Forest edge, tree roost options
14	AR4	9	8	Central	Pond
15	AR4	20	16	Central	Pond
16	AR4	16	14	Island Block Covenant	Major stream gulley
17	AR4	19	16	Cranky Jims Creek Covenant	Willows with roost features, wetland
18	AR4	19	16	Cranky Jims Creek Covenant	Indigenous forest with roost options/ stream gulley
19	AR4	19	15	Golden Bar haul road	Wetland
20	AR4	18	15	Golden Bar haul road	Minor gulley
21	AR4	17	14	Golden Bar haul road	Forest edge
22	AR5	18	15	Golden Bar	Pond/ tor
23	AR5	18	15	Golden Bar	Minor gulley/ tor
24	AR5	18	15	Golden Bar	Pond
25	AR5	18	15	Golden Bar	Wetland
26	AR4	9	8	MEEA	Minor stream gulley
27	AR4	19	15	MEEA	Pond/ stream gulley
28	AR4	19	15	MEEA	Stream gulley/ tor

3.4.1 Survey limitations

When conducting acoustic presence-absence surveys for pekapeka, best practice is to conduct multiple two-week surveys that target different sections of the warmer summer months. This allows higher confidence in null results, as bats may alter use of their home range seasonally based on weather conditions and species needs around the breeding season.

While only one acoustic survey has been conducted at Macraes, to maximise chances of detection the survey was undertaken at a landscape scale and included many locations outside of impact areas that were considered to hold higher quality potential habitat. This survey also targeted the late breeding season, when breeding females have finished lactating, are mating again, and young are volant and active in the landscape (Dekrout, 2009; Sedgeley et al., 2012). Home ranges and activity for these groups tend to be higher compared to earlier in the breeding season when females are pregnant or lactating, and young are non-volant or freshly volant (O'Donnell, 2001). This means that late-season surveys, such as the one undertaken at Macraes, may have higher detection rates than early-season.

4 Ecological values assessment

This assessment generally follows the Ecological Impact Assessment Guidelines for use in New Zealand (EcIAG) published by EIANZ[2] (Roper-Lindsay *et al.* 2018).

Only bats are considered in this report. Other fauna, including lizards, birds, and invertebrates, are addressed in separate values assessment reports.

4.1.1 Methods

Ecological values for bats have been assigned using a structured approach consistent with the EcIAG (Roper-Lindsay *et al*. 2018). Two complementary but distinct components are considered when assigning value:

1. The intrinsic value of the species, primarily determined by conservation status and ecological importance; and
2. The value of the site or habitat to that species, determined by habitat suitability, likelihood of use, and ecological function.

These components are related but not interchangeable. A species may be of very high conservation value nationally, but if the subject site provides negligible or unsuitable habitat, the ecological value of that species in the context of the site may be low.

4.1.1.1 Species value

Species value is assigned in accordance with Table 5 of the EcIAG (Appendix A), which considers factors such as:

- National conservation status under the New Zealand Threat Classification System;

[2] Environmental Institute of Australia and New Zealand

- Regional conservation status where relevant;
- Endemism;
- Ecological role or keystone function; and
- Population size and distribution.

Threatened species (e.g., Nationally Critical, Nationally Endangered, Nationally Vulnerable) are typically assigned Very High species value. At Risk species are generally assigned High species value, depending on their rarity and ecological significance. Not Threatened indigenous species are typically assigned Moderate or Low species value, depending on context.

4.1.1.2 Habitat Suitability and Site-Specific Value

The second component assesses the ecological value of the habitat within the subject site for each species. This assessment draws on the criteria outlined in the EcIAG and incorporates habitat suitability considerations as described by Baber *et al.* (2021) (Appendix B). Factors considered include:

- Availability of key habitat features (e.g., nesting substrates, prey resources, shelter, roosting sites);
- Habitat extent, quality, and condition;
- Connectivity to larger habitat networks;
- Presence of breeding evidence or regular use;
- Seasonal or transient use; and
- Likelihood of occurrence based on ecological district context.

Habitat suitability is typically categorised as High, Moderate, Low, or Negligible. This assessment determines how relevant a species' conservation value is in the specific site context.

4.1.1.3 Integrating Species Value and Habitat Suitability

The ecological value considered in this assessment reflects a combination of species value and habitat suitability within the site. Where a high-value species has a high likelihood of regular use (e.g., roosting or critical foraging habitat), the overall ecological value attributed to that species within the site will also be high or very high. Conversely, where a high-value species has only a low likelihood of occasional or incidental use, the site-specific ecological value may be moderate or low.

This dual assessment ensures that ecological value is not assigned solely based on species conservation status but instead reflects the functional importance of the site to the species. It also ensures transparency in distinguishing between nationally significant species and the actual ecological role of the subject site in supporting those species.

Only Step 1 of the EcIA framework, being the assessment and assignment of ecological value, is undertaken in this report. The assessment of the magnitude of effects and overall level of effect is addressed separately in the Ecological Impact Assessment (Bioresearches 2026a).

4.1.2 Ecological value assignment

New Zealand's bats are listed as 'Threatened' (long-tailed bat – 'Nationally Critical' and Southern short-tailed bat – 'Nationally Increasing') under the New Zealand Threat Classification System (Townsend *et al*. 2007; Rolfe *et al.* 2022; O'Donnell *et al.* 2023). Accordingly, if confirmed to be present at a site the ecological value assignment would be 'Very High' in accordance with the EIANZ EcIAGs.

However, given the negative survey result across the MP4 Project Area during suitable survey conditions, and in combination with the absence of contemporary pekapeka records within > 100 km of the site, scarcity of preferred roosting habitat, and unfavourable local climate, we consider it very unlikely that pekapeka are present within the proposed impact areas or surrounding landscape.

For this reason, an assignment of ecological value for bats is not required.

5 Conclusion

Based on the available evidence, we consider there to be a high level of confidence that pekapeka are absent from the MP4 Project Area and surrounding landscape. The combination of negative survey results, the absence of contemporary local records, limited suitable roost habitat, prevalence of mammalian predators, and unfavourable climatic conditions provides the basis for this conclusion.

Accordingly, the MP4 Project is not expected to affect bats or bat habitat, and an ecological value assignment and subsequent assessment of ecological effects are not required; ecological effects on bats from the MP4 Project are considered to be nil.

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Applicability and Limitations

Restrictions of intended purpose

This report has been prepared solely for the benefit of OceanaGold New Zealand Limited as our client with respect to the brief.

Babbage/ Bioresearches acknowledges that this report will be relied on by a Panel appointed under the Fast Track Approvals Act 2024 and these disclaimers do not prevent that reliance.

Legal interpretation

Opinions and judgements expressed herein are based on our understanding and interpretation of current regulatory standards and should not be construed as legal opinions. Where opinions or judgements are to be relied on, they should be independently verified with appropriate legal advice.

Maps and images

All maps, plans, and figures included in this report are indicative only and are not to be used or interpreted as engineering drafts. Do not scale any of the maps, plans or figures in this report. Any information shown here on maps, plans and figures should be independently verified on site before taking any action. Sources for map and plan compositions include LINZ Data and Map Services and local council GIS services. For further details regarding any maps, plans or figures in this report, please contact Babbage Consultants Limited.

Reliability of investigation

Babbage/ Bioresearches has performed the services for this project in accordance with the standard agreement for consulting services and current professional standards for environmental site assessment.

APPENDIX A
EIANZ KEY TABLES FOR ASSESSING LEVEL OF EFFECT

Table 5 Factors to consider in assigning value to terrestrial species for EcIA

Determining factors	
Nationally Threatened species, found in the ZOI either permanently or seasonally	Very High
Species listed as At Risk – Declining, found in the ZOI, either permanently or seasonally	High
Species listed as any other category of At Risk, found in the ZOI either permanently or seasonally	Moderate
Locally (ED) uncommon or distinctive species	Moderate
Nationally and locally common indigenous species	Low
Exotic species, including pests, species having recreational value	Negligible

Table 6. Scoring for sites or areas combining values for four matters in Table 4.

Value	Description
Very High	Area rates High for 3 or all of the four assessment matters listed in **Table 4**. Likely to be nationally important and recognised as such.
High	Area rates High for 2 of the assessment matters, Moderate and Low for the remainder, or Area rates High for 1 of the assessment maters, Moderate for the remainder. Likely to be regionally important and recognised as such.
Moderate	Area rates High for one matter, Moderate and Low for the remainder, or Area rates Moderate for 2 or more assessment matters Low or Very Low for the remainder Likely to be important at the level of the Ecological District.
Low	Area rates Low or Very Low for majority of assessment matters and Moderate for one. Limited ecological value other than as local habitat for tolerant native species.
Negligible	Area rates Very Low for 3 matters and Moderate, Low or Very Low for remainder.

Table 8. Criteria for describing magnitude of effect (Adapted from Regini (2000) and Boffa Miskell (2011))

Magnitude	Description
Very high	Total loss of, or very major alteration to, key elements/features/ of the existing baseline conditions, such that the post-development character, composition and/or 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 existing baseline conditions such that the post-development character, composition and/or 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 existing baseline conditions, such that the post-development character, composition and/or attributes 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 existing baseline conditions. Change arising from the loss/alteration will be discernible, but underlying character, composition and/or attributes of the existing baseline condition will be similar to pre-development circumstances or patterns; AND/OR Having a minor effect on the known population or range of the element/feature
Negligible	Very slight change from the existing 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 10. Criteria for describing level of effects (Adapted from Regini (2000) and Boffa Miskell (2011))

Ecological Value ▸ Magnitude ▾	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

APPENDIX B

PROPOSED SET OF CRITERIA FOR ASSESSING HABITAT SUITABILITY OF A SPECIES (BABER *ET AL.* 2021).

Habitat suitability value score	Description
Negligible	Habitat not suitable.
Very low	Marginal habitat that may be used but is not important for any part of the species or species assemblage life cycle(s).
Low	Habitat that provides some, but not all, of a species or species assemblages life-history requirements and/or the habitat is of low quality and the relative abundance within the habitat is low compared to other habitat types.
Moderate	Habitat that provides for most, if not all, of a species or species assemblage's life-history requirements and/or the habitat quality is of moderate quality and the relative abundance within the habitat is moderate compared to other habitat types.
High	Habitat that would typically provide for all species or species assemblage life-history requirements and/or provides a critical resource or resource(s) for life-history requirements. The habitat quality is high and the relative abundance within the habitat is, or is likely to be, high compared to other habitat types.
Very high	Habitat that provides for all species or species assemblage life-history requirements and/or provides a critical resource or resource(s) needed for life-history requirements. The habitat quality is very high and the relative abundance within the habitat is or is likely to be very high compared to other habitat types. Likely to be a local or regional hotspot for that species assemblage or benchmark with the species or species assemblage at carrying capacity.

APPENDIX C

PEKAPEKA ACOUSTIC SURVEY WEATHER DATA AND RECORDING SPAN BREAKDOWN BY LOCATION

Date (night beginning)	Official sunset	Min temp within 4 hrs after sunset (°C)	Max wind speed within 4hrs after sunset (km/hr)	Rainfall within 4 hrs after dusk (mm)	Valid night	ABM location and recording status (green = recorded, pale orange = recording failed, grey = not deployed) 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
9 March	19:25	3.5	11.4	0	No	
10 March	19:26	4.9	12.8	0	No	
11 March	19:27	8.9	10.6	0	Yes	
12 March	19:29	12.6	21.9	0	No	
13 March	19:30	7.7	16.6	0	Yes	
14 March	19:31	7.4	14.5	0	Yes	
15 March	19:33	7.1	10.7	0	Yes	
16 March	19:34	9.6	11.8	0	Yes	
17 March	19:35	10.9	14.6	0	Yes	
18 March	19:37	8.0	13.6	0	Yes	
19 March	19:38	8.6	11.2	0	Yes	
20 March	19:39	7.3	11.5	0	Yes	
21 March	19:41	9.2	9.3	0	Yes	
22 March	19:42	8.9	16.1	0	Yes	
23 March	19:43	10.3	4.2	0	Yes	
24 March	19:45	9.6	10.4	0	Yes	
25 March	19:46	10.2	13.6	0	Yes	
26 March	19:47	12.2	35.6	20.2	No	
27 March	19:49	15.3	14.5	0.2	Yes	
28 March	19:50	10.2	15.1	0	Yes	

N **Note:** All weather data sourced from Macraes Mine Top Office weather station (4972660 N, 1398947 E). Continuous weather monitor with 10-minute means recorded. 4-hour windows calculated from official sunset and are rounded up either side to align with weather station data, e.g. window from 19:25 uses data from 19:20 – 23:30.

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