

Macraes Phase 4 Fast-track

Terrestrial and Wetland Ecology Summary

for: OceanaGold New Zealand Limited



Document Approval and Revision History

Document title	Macraes Phase 4 Fast-track
	Terrestrial and Wetland Ecology Summary
Prepared for	OceanaGold New Zealand Limited
Version	Rev B
Date	3 September 2026
Filename	E1_MP4Fast_Summarydocument

Author(s)	Chris Wedding, Ecology Manager	Dylan van Winkel, Technical Lead - Terrestrial Ecology
	Laura Dooley, Senior Ecologist – Freshwater	Michael Anderson, Senior Ecologist – Terrestrial Ecology

Rev. no.	Date	Author(s)
Final	3 September 2026	CW, DvW, LD, MA

Reference: Bioresearches (2026). Terrestrial and Wetland Ecology Summary. Report for OceanaGold New Zealand Limited. 82 p.

Cover Illustration: Tussock, Coronation North, Macraes, Otago.

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1 Executive summary

1.1 Purpose and overall approach

This document provides an integrated summary of the terrestrial and wetland ecological values, and the full suite of effects management measures for the Macraes Phase 4 Project (MP4). It is intended to guide decision-makers through the ecology reporting suite, while the supporting technical reports remain the primary source for detailed methods, data, spatial schedules and management requirements.

MP4 is a brownfields extension of the existing Macraes Operation. The mineral resource is fixed in location, and the safe and efficient recovery of that resource constrains the position, method and form of mining pits, waste rock stacks and associated infrastructure. OceanaGold has applied the effects management hierarchy by avoiding effects where practicable, minimising the extent and severity of unavoidable effects, remediating disturbed land and compensating for significant residual effects. The Back Road Waste Rock Stack has been removed from the Project, and the associated consents and development rights are proposed to be surrendered.

1.2 Ecological values

The assessment area is a modified mining and pastoral landscape that retains important indigenous biodiversity. The principal values are tall tussock grassland, dry shrubland, schist rock outcrops and tors, natural inland wetlands, Threatened and At-Risk flora, indigenous lizards, open-country birds and a diverse terrestrial invertebrate fauna (Table 1-1).

1.3 Ecological effects

The pre-mitigation and residual levels of effect on vegetation, flora, fauna and wetlands are summarised in Table 1-1, below, and described further here.

Table 1-1. Summary of the principal ecological values and effects before and after mitigation but prior to residual effects management within the MP4 project area.

Component*	Value	Area of Impact (ha)	Pre-mitigation level of effect
Tussock grassland	Very High	90	Very High
Dry shrubland	Moderate	3	Low
Rock habitat	Very High	0.26	Moderate
Ephemeral wetland	Moderate to Very High	1.14	Moderate to Very High
Sedgeland wetland	Moderate	1.74	Low to Moderate
Freshwater herbaceous wetland	Low to High	4.78	Low to High
Shrubland wetland	Moderate	0.03	Moderate
Seepage wetland	High	0.02	High
Copper tussock wetland	Moderate to High	0.21	Moderate
Induced wetland	Negligible to Low	3.58	Low
Threatened or At Risk (TAR) flora (27 spp.)	Moderate to Very High	Individual plants and populations	Species dependent: Very Low – Very High
Lizards (3 spp.)	Low to High	239	Moderate-Very High

Terrestrial invertebrates	High	325	Low- Very High
Avifauna (23 spp.)	Moderate overall	Species dependent: 0.35 - 235.5	Species dependent: Very Low to Moderate

*Wetland ecological values and levels of effect vary between locations. The values and effect levels shown represent the range across MP4, Camp Creek and Coal Creek. Camp Creek and Coal Creek wetland effects are assessed separately in the detailed EclA and Wetland Residual Effects Analysis but are combined here to show the full wetland loss associated with the Fast-track application.

1.3.1 Vegetation and flora

The MP4 Project will result in permanent and temporary effects on terrestrial ecological values through vegetation clearance, earthworks, pit and waste rock stack development, road construction and associated mining activities. Direct effects include habitat loss, modification and fragmentation. Indirect effects may extend into retained habitats through dust deposition, sedimentation, weed invasion, altered drainage and microclimate, noise, vibration, lighting and accidental encroachment.

The principal terrestrial vegetation effect is the loss or degradation of approximately 90.01 ha of narrow-leaved snow tussock grassland, comprising approximately 75.42 ha of direct loss and a further 14.59 ha included as a precautionary allowance for potential effects within 20 m of the direct works footprint. Snow tussock grassland is assessed as Very High ecological value at the Project-wide scale. The magnitude of effect is High, principally because of the absolute extent of habitat affected, resulting in a Very High pre-mitigation level of effect.

Approximately 3.06 ha of dry shrubland will also be lost or potentially degraded, including direct loss and the precautionary 20 m effects allowance. Dry shrubland is of Moderate ecological value and the affected extent represents a small proportion of that mapped within OGNZL landholdings. The magnitude and pre-mitigation level of effect are therefore assessed as Low.

Approximately 0.26 ha of Very High-value schist rock outcrop and tor habitat will be lost or potentially affected. Although the affected area is small, these features provide specialised habitat for indigenous flora and fauna. The magnitude of effect is assessed as Low, resulting in a Moderate pre-mitigation level of effect.

Vegetation clearance will also directly affect Threatened and At Risk flora. Twenty-seven species have confirmed records within the direct loss footprint, with ecological values ranging from Moderate to Very High. Species-specific pre-mitigation levels of effect range from Very Low to Very High, reflecting differences in ecological value, the number and proportion of known plants or populations affected, and the extent and importance of supporting habitat affected.

1.3.2 Wetlands

Natural inland wetlands will be impacted through direct reclamation, inundation, drainage, dewatering and changes to surface-water and groundwater processes. Additional indirect effects may occur through altered runoff and catchment contributions, sediment and dust deposition, reduced water quality, weed invasion, changes in adjoining vegetation, and accidental encroachment during construction and operation. The affected wetland types include ephemeral wetlands, sedgeland, freshwater herbaceous wetlands, seepage wetlands, shrubland wetlands and copper tussock wetlands. Although many occur within a modified pastoral and mining landscape and contain substantial exotic vegetation cover, they

retain hydrological and habitat functions, support indigenous vegetation and TAR flora, and contribute to wetland diversity within the Macraes Ecological District.

The cumulative predicted loss of wetland extent associated with MP4, seepage capture drains and the Camp Creek and Coal Creek reservoirs is approximately 11.50 ha, equivalent to about 20.77% of mapped wetland extent within OGNZL landholdings. The affected wetland types and their respective areas are summarised in Table 1-1 above.

The highest pre-mitigation effects are associated with ephemeral wetlands, reflecting their specialised character and status as a Naturally Uncommon and nationally Critically Endangered ecosystem type. Effects on other wetland types vary according to ecological value, condition and location, with freshwater herbaceous, seepage and copper tussock wetlands generally supporting the higher effect ratings, while effects on sedgeland and shrubland wetlands are generally lower. The range of wetland-specific effect ratings across MP4, Camp Creek and Coal Creek is summarised in Table 1-1.

1.3.3 Fauna

Effects on terrestrial invertebrates include mortality during vegetation and soil removal, loss of host plants and breeding habitat, fragmentation of populations, and degradation of habitat adjoining the works footprint. Approximately 325 ha of potentially suitable habitat occurs within the assessed impact area, including tussock grassland, shrubland, rock outcrops, wetlands and riparian margins. Species with restricted mobility or specialised host-plant relationships are most susceptible.

The Project will affect approximately 238 ha of suitable habitat for McCann's skink, southern grass skink and kōrero gecko through habitat removal, fragmentation, injury, mortality and displacement. At the Project-wide scale, the residual effect is assessed as Moderate for McCann's skink and Very High for southern grass skink and kōrero gecko. These ratings are precautionary and reflect the large aggregate area and number of individuals potentially affected, rather than an expected loss of species viability. All three species are expected to remain widespread within the surrounding landscape.

The Project area supports a Moderate-value avifauna assemblage characteristic of modified inland pastoral and mining landscapes but includes several indigenous species of elevated ecological value. The principal effects are permanent loss or modification of foraging and breeding habitat, together with potential injury or mortality of birds, eggs or chicks where works coincide with occupied breeding habitat. Approximately 236 ha of potential habitat is affected for kārearea and approximately 130 ha each for banded dotterel and South Island pied oystercatcher. Pre-mitigation levels of effect are Moderate for these three species, Low for black shag and New Zealand pipit, and Very Low for most other indigenous bird species. These effect levels reflect the ecological value of the species, the extent and function of habitat affected, and, for most species, the availability of similar habitat within the surrounding landscape.

1.4 Effects Management

1.4.1 Effects Mitigation

A comprehensive suite of ecological management plans covering vegetation and flora, wetlands, invertebrates, lizards and avifauna. Measures addressed in the management plans include works

demarcation, no-go areas, pre-clearance surveys, staged clearance, ecological supervision, vegetation, flora and fauna salvage, erosion and sediment controls, dust suppression, weed control, wetland hydrology management and monitoring, and breeding bird controls. Monitoring of retained TAR flora and wetlands will be used to identify changes in wetland extent, vegetation condition, hydrology and dust deposition, with trigger levels and corrective actions applied where project-related changes are detected. These measures are expected to reduce effects but cannot avoid the permanent loss of habitat, flora, indigenous vegetation and wetland extent located within mine and reservoir footprints. Moderate to Very High residual effects therefore remain and require aquatic compensation through the restoration, enhancement and long-term protection of wetlands elsewhere within OceanaGold landholdings.

Table 1-2. Summary of the pre- and post-mitigation residual level of effects, but prior to residual effects management within the MP4 project area.

Ecological component	Pre-mitigation level of effect	Post-mitigation residual level of effect*
Snow tussock grassland	Very High	Very High
Dry shrubland	Low	Low
Rock outcrops and tors	Moderate	Moderate
Threatened and At Risk flora	Low – Very High (species dependent)	Net Positive – Very High (species dependent)
Terrestrial invertebrates	Moderate-Very High, Species dependent	Very Low - Very High
Indigenous lizards	Low- Very High, Species dependent	Moderate - Very High
Indigenous avifauna	Very Low – Moderate, Species dependent	Very Low - Moderate
Natural inland wetlands	Moderate-High	Moderate overall
Ephemeral wetland	High to Very High	Very High.
Freshwater herbaceous vegetation	High	Low to High.
Sedgeland	Moderate	Moderate.
Shrubland	Low to Moderate	Moderate.
Wetland seepage	High	High.
Copper tussock	Moderate	Moderate.
Induced wetland	Negligible to Low	Very Low to Low

1.4.2 Residual effects management

The terrestrial compensation package provides approximately 225 ha of indigenous revegetation, comprising 175 ha of tussock grassland at Mt. Highlay and 50 ha of dry shrubland and Cranky Jims Link (Table 1-3). Approximately 15 ha of the tussock restoration will include targeted planting around rock outcrops and tors using shallow-soil, rock-associated and TAR plant species, included within the 175 ha tussock total.

The package will also protect and enhance (via covenants, pest management and stock fencing) approximately 578 ha of existing or developing habitat, comprising approximately 354 ha of tussock, 48 ha of dry shrubland, 31.5 ha of rock outcrops and tors, and 143.6 ha of additional fauna habitat within non-indigenous vegetation as part of an averted habitat loss strategy. A 252 ha predator-exclusion fenced

area and associated landscape-scale pest management will provide significant gains for indigenous fauna and habitat condition at Murphys Ecological Enhancement Area (MEEA). Biodiversity accounting predicts net positive conservation outcomes for the proposed tussock and dry shrubland restoration, while the wider protection, connectivity and pest-management measures provide additional benefits for rock habitat, flora, invertebrates, lizards and indigenous birds.

The overarching objective of residual effects management is to provide additional, enduring and measurable ecological benefits that, supported by quantitative modelling and the scale of proposed protection and restoration, are predicted to outweigh the residual adverse effects of MP4 after practicable avoidance, minimisation and remediation measures have been applied.

The maintenance of the MEEA fence will be funded by OGL through to 2050. Post 2050, the MEEA, Cranky Jims link and Mt Highlay compensation locations will be transferred to a special purpose trust which will be funded by a closure capitalisation fund set up by OGNZL. At this stage the parties to the trust and its governance have not been confirmed.

The package is designed as biodiversity compensation rather than a formal offset because strict ecological equivalence and certainty of outcome cannot be demonstrated for every affected value. It combines restoration, habitat protection and enhancement, mammalian pest management, stock exclusion, weed control, improved connectivity and long-term legal protection. Its design also reflects consultation with Kā Rūnaka and the local community, including concerns about large areas of uniform tussock planting and the conversion of productive pasture where alternative restoration methods may provide better ecological outcomes. These considerations have informed a practical and enduring package without reducing its ecological objectives.

The surrounding OceanaGold landholdings provide substantial opportunities to implement these measures within the Macraes Ecological District and close to the affected ecological values. These opportunities include restoring indigenous vegetation on modified land, protecting extensive existing tussock, shrubland and schist rock habitats, reconnecting fragmented habitats and existing protected areas, and preventing the future deterioration of fauna habitat associated with plantation development. The scale and spatial arrangement of the available land also provide an opportunity to establish a large predator-excluded refuge and undertake wider landscape-scale mammalian pest control, benefiting indigenous lizards, birds, invertebrates and plant communities beyond the areas directly restored.

The proffered compensation package has been designed to make meaningful improvements to important ecological values in the Macraes Ecological District, including some values that are not adversely impacted by MP4, but are worthy of investment. It combines like-for-like measures with strategic conservation actions that improve habitat condition, connectivity and resilience across the surrounding landscape, within OGNZL landholdings, and within the Macraes Ecological District. These actions would not occur without the MP4 Project.

Table 1-3. Overview of total planting and legal protection (compensation) of existing terrestrial biodiversity values for MP4. All areas quantified below will be legally protected in perpetuity.

Terrestrial Habitat Type	Mt Highlay**	Cranky Jims Link	Murphys Pest-exclusion fence	Murphys Link	Total Compensation (ha)
Revegetation Actions					
Tussock grassland (modelled net positive)	175	0	0	0	175
Dry shrubland (modelled net positive)	0	50	0	0	50
Rock outcrop/tor (planting)	15**				15*
Total Revegetation					225
Protection and enhancement of existing values					
Tussock	18.66	0	134.87	201.35	354.88
Dry shrubland	0.74	6.58	7.37	33.51	48.2
Rock outcrop & tors	4.07	0.56	7.79	19.12	31.54
Non-indigenous fauna habitat	143.6				143.6
Total Terrestrial Habitat Protection					578.22

*Dedicated shallow soil species planting is part of 175 ha tussock community planting and does not count towards total revegetation

**Excludes 7.5 ha of VDT proposed to be relocated to Mt. Highlay protected area (c. 349.5 ha).

1.4.2.1 Additional conservation benefits

MP4 will enable the enhanced protection of the only known Otago skink population on OceanaGold landholdings. The population is not directly affected by the Project, and its protection is not included in the quantitative compensation accounting. Establishment of the MEEA predator-exclusion fence will protect this remnant population from introduced mammalian predators and provide opportunities for population recovery, monitoring and research. OGNZL will fund maintenance of the fence through to 2050, after which the MEEA will transfer to a special purpose trust funded through an OGNZL closure capitalisation fund. This represents a significant additional conservation outcome that would not otherwise be secured through the existing land management regime.

The Project will also initiate the long-term recovery of dryland podocarp-broadleaved forest through enrichment planting over approximately 21 ha at Cranky Jims Link. The planting will include taoka and culturally significant flora such as rimu, mataī, Hall's tōtara, mountain toatoa, kōhūhū, tī kōuka and kōwhai, while the developing shrubland and forest will provide additional habitat for taoka manu, including pīwakawaka, riroriro and kārearea. This action will establish a seed source and support succession towards a forest type that is considered functionally extinct within the Macraes Ecological District. Although development of a mature forest community will require a long timeframe and remains inherently uncertain, it provides additional ecological, cultural and landscape benefits that would not occur without MP4. These benefits are additional to, and are not relied upon as equivalent replacement for, the Project's quantified residual effects.

1.4.2.2 Overall Biodiversity Benefits of Compensation Package

The MP4 compensation package is designed to deliver broader and more enduring ecological benefits than would be achieved through strict hectare-for-hectare replacement of affected tussock grassland alone. It combines substantial indigenous revegetation with the protection of existing habitats, landscape-

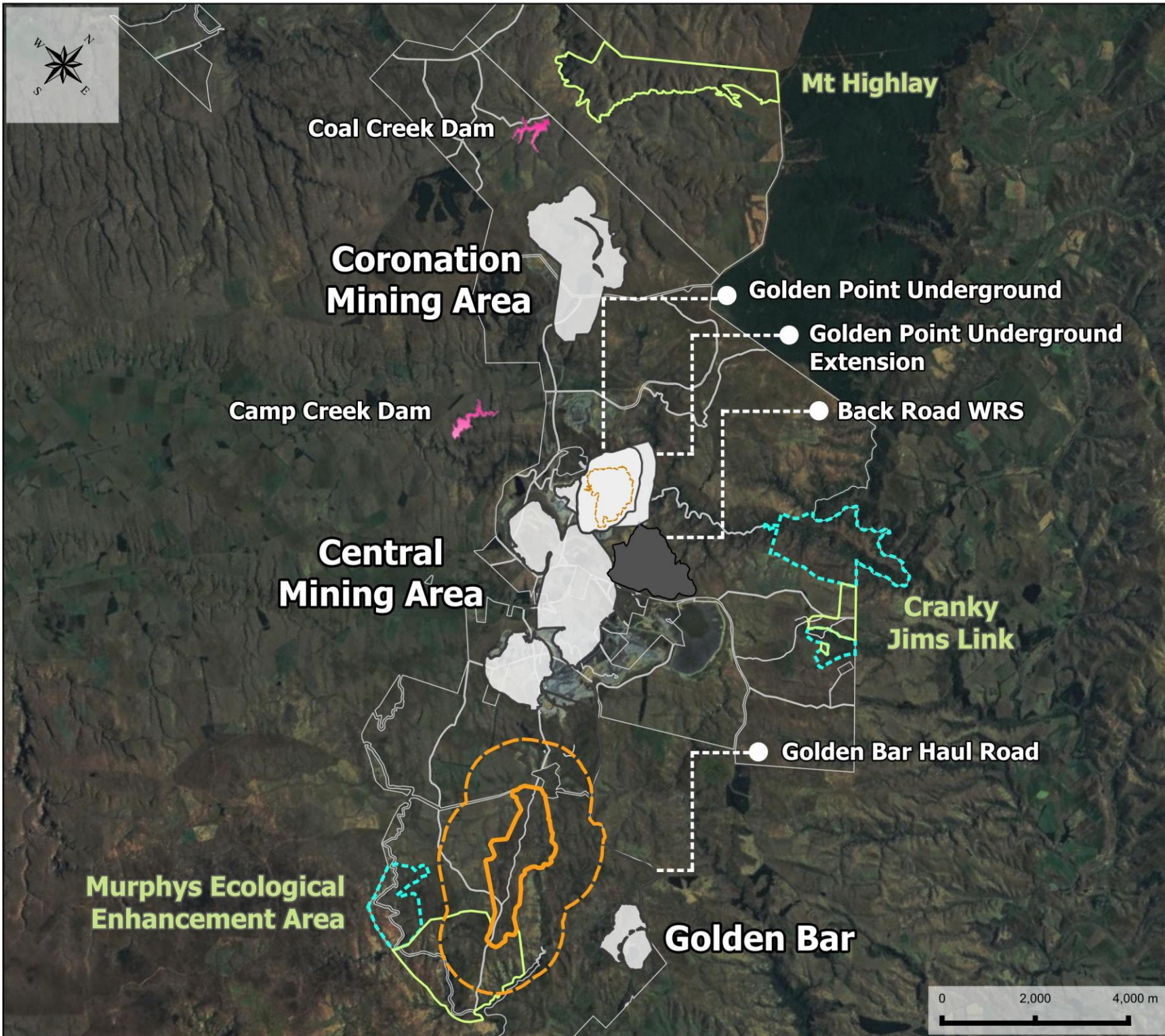
scale pest management, prevention of future habitat loss, wetland restoration, and improved ecological connectivity.

Key benefits include:

- approximately 225 ha of indigenous revegetation, comprising 175 ha of tussock grassland and 50 ha of dry shrubland;
- protection and enhancement of approximately 578.22 ha of existing and developing terrestrial habitat;
- predator exclusion across approximately 252 ha within the Murphys Ecological Enhancement Area, supported by pest management across approximately 1,170 ha of the surrounding landscape through to at least 2050;
- protection and management of the only known Otago skink population on OceanaGold landholdings, although that population is not directly affected by MP4 or credited in the biodiversity accounting;
- removal of approximately 265 ha of plantation saplings at Mount Highlay, preventing the future loss and fragmentation of open-country, tussock, rock and lizard habitat;
- initiation of dryland podocarp-broadleaved forest restoration across approximately 21 ha, contributing to the recovery of an ecosystem type considered functionally extinct within the Macraes Ecological District;
- targeted restoration and management of rock-associated vegetation, Threatened and At Risk flora, wetlands and riparian habitats; and
- creation of an integrated network of protected and actively managed habitats across the wider Macraes landscape.

Biodiversity accounting predicts Net Positive outcomes for the modelled tussock, dry shrubland, lizard and avifauna components. The package also provides additional benefits for ecological values that cannot be fully quantified, including rock-associated communities, indigenous invertebrates, Threatened and At Risk plants and species not directly affected by MP4. Although some permanent and uncertain losses will remain, the scale, diversity and enduring protection of the proposed actions are expected to outweigh the residual adverse effects at the package level and establish a substantial positive biodiversity legacy for the Macraes Ecological District.

Figure 1.1.(Over page). Proposed terrestrial restoration actions as part of the compensation package.



MP4 Project Areas

Date: 23/07/2026

Drawn By: MS

Client: OceanaGold New Zealand Ltd

Scale: 1:110,000

Legend

OGL Landholdings

Mining Areas

MP4 Project Components

Camp and Coal Creek Dams

GPUG Consented Boundary

Back Road Waste Rock Stack

Offset/Compensation Sites

Sites of Protection/Restoration for Compensation Package

Existing Ecology Covenants

Predator Exclusion Fence

Predator Exclusion Fence Buffer

SOURCES

LINZ Basemap aerial

MAP PROJECTION

NZGD2000 / New Zealand Transverse
Mercator 2000

1.5 Ecological outcomes

Overall, ecological benefits resulting from the compensation package are expected to outweigh impacts despite some Net Loss outcomes acknowledged for certain values, most notably some TAR plants. The package will deliver enduring landscape-scale benefits through habitat protection, restoration, ecological connectivity and long-term pest management. These outcomes depend on full implementation, enduring legal and physical protection, achievement of specified performance targets, and monitoring and adaptive management over the applicable 1 to 20-year assessment and monitoring periods.

While the programme cannot avoid all ecological loss, it provides a substantial and integrated local-landscape scale response to the residual adverse effects of MP4. Permanent losses of some wetlands and schist rock outcrops will remain, and outcomes for some TAR species are uncertain. Because these values cannot all be restored or replaced with strict ecological equivalence, the package does not claim no net loss for every ecological component. Instead, it delivers restoration, protection and enhancement at a scale expected to outweigh most localised losses, while clearly identifying the remaining shortfalls and uncertainties.

For example, while up to 0.26 ha of rock habitat (conservatively including that within a 20 m of the direct loss footprint) will be permanently lost, the package will deliver a much larger improvement in the condition, protection and ecological function of retained rock habitat. Targeted planting around approximately 15 ha of existing rock outcrops, about 58 times the area lost, will enhance associated indigenous vegetation and habitat for rock-associated flora and fauna. Pest management and long-term protection will also benefit approximately 31.5 ha of rock habitat, more than 121 times the affected extent. The outcome is therefore a small acknowledged loss of physical habitat extent, accompanied by a substantially greater improvement in the quality, security, connectivity and ecological function of rock habitat across the surrounding landscape.

Table 1-4. Overview of ecological values, residual effects, compensation actions and additional benefits for MP4.

Biodiversity value	Impact quantum and residual effect	Compensation Actions	Predicted Residual Outcome (after Compensation)
Narrow-leaved snow tussock	Up to 90.01 ha loss or degraded. Residual effect: Very High .	175 ha of tussock planting at Mt Highlay; 336.2 ha tussock at MEEA fenced, pest-controlled and 18.66 ha tussock at Mt Highlay; fenced, pest-controlled	Net Positive (modelled) for restoration planting only. Additional stock fencing, protection and predator control is approximately 4 times the extent lost.
Dry shrubland	Up to 3.06 ha loss or degraded. Residual effect: Low .	50 ha of dry shrubland planting at Cranky Jims Link; Fence, protect and pest control: 40.88 ha shrubland at MEEA 6.58 ha at Cranky Jims Link; 0.74 ha at Mt Highlay;	Net Positive (modelled) for restoration planting only. Additional stock fencing, protection and predator control is nearly 16 times the extent lost.
Rock outcrops and tors	Up to 0.26 ha loss or degraded. Residual effect: Moderate .	15 ha rock edge planting at Mt. Highlay; Fence, protect and pest control: 31.54 ha rock and tor habitat at MEEA, Cranky Jims & Mt Highlay combined	Net Loss (extent) Net Positive value (unmodelled) Targeted planting around approximately 15 ha of existing rock outcrops, about 58 times the area lost Pest management and long-term protection of existing rock habitat is approximately 121 times the affected extent.
27 TAR Plant species	Species-specific: 20 species assessed as likely to experience moderate or higher residual effects: 7 spp. – Very High 5 spp. – High 8 spp. – Moderate 4 spp. – Low 5 spp. – Very Low	Propagation and restoration for some species in compensation planting schedules for tussock, rock edge, dry shrubland and wetlands	Species-specific: 16 species assessed as likely to experience moderate or higher residual magnitude of net loss: 5 – Very High 4 – High 7 – Moderate 4 – Low 5 – Very Low 1 – Uncertain 3 spp. – Net positive (unmodelled)
Ephemeral wetland	Up to 1.14 ha loss. Residual effect: Very High	1.8 ha restoration planting, fencing and protection at Cranky Jims Link. 0.98 ha restoration planting, fencing and protection at Macraes Central/Golden Bar Haul Road. 0.17 ha at Murphys Link.	Uncertain due to known difficulties in ephemeral wetland restoration. Restoration efforts include planting, fencing, weed control and managed grazing regime implemented. two times greater than wetland extent to be lost.

Biodiversity value	Impact quantum and residual effect	Compensation Actions	Predicted Residual Outcome (after Compensation)
			Additional research opportunity for the creation of 1.14 ha of ephemeral wetland not included in compensat
Sedgeland	1.74 ha Residual effect: Moderate	1.93 ha restoration planting, fencing and protection Cranky Jims Link, 1.62 ha restoration planting, fencing and protection Murphys Link, 1.68 ha restoration planting, fencing and protection at Macraes Central, and 3.6 ha wetland protection in perpetuity at Coal Creek	Net Positive (modelled and unmodelled) Restoration and enhancement planting, stock exclusion, buffer planting and weed control three time greater than area lost.
Freshwater herbaceous	4.78 ha Residual effect: Low to High	2.08 ha restoration planting, fencing and protection at Cranky Jims Link, 3.32 ha restoration planting, fencing and protection at Macraes Central, and 4.5 ha wetland protection in perpetuity at Coal Creek, 0.96 ha wetland and riparian protection in perpetuity and Murphys Link	Net Positive (modelled and unmodelled) Restoration and enhancement planting, stock exclusion, buffer planting and weed control equivalent to greater than area lost. Protection and stock exclusion of wetland extent of equivalent amount, with total wetland compensation two times greater than wetland extent lost.
Shrubland	0.03 ha Residual effect: Moderate	0.14 ha restoration planting, fencing and protection at Murphys Link	Net Positive (modelled) Restoration and enhancement planting, stock exclusion, buffer planting and weed control five time greater than area lost.
Seepage	0.02 ha Residual effect: Very High	0.22 ha wetland protection in perpetuity at Murphys Link	Net Positive (unmodelled) Protection and stock exclusion of wetland extent eleven times greater than amount lost
Copper tussock	0.21 ha Residual effect: Moderate	0.92 ha wetland protection in perpetuity at Coal Creek	Net Positive (unmodelled) Protection and stock exclusion of wetland extent four times greater than amount lost
Induced wetland	3.58 ha Residual effect: Low	4.14 ha wetland protection in perpetuity at Mt Highlay	Net Positive (unmodelled)

Biodiversity value	Impact quantum and residual effect	Compensation Actions	Predicted Residual Outcome (after Compensation)
			Protection and stock exclusion of wetland extent equivalent to amount lost, however wetland extent lost of much lower value than the extent to be protected.
Terrestrial invertebrates	Approximately 325 ha of potentially suitable habitat is lost or degraded. Residual effect: High for the project-wide assemblage and several notable taxa, with Moderate or lower effects for other taxa.	Snow tussock and dry shrubland planting; protection of existing vegetation and rock habitat; establishment of identified host plants; pest plant management, stock exclusion and improved habitat continuity.	Net Positive (unmodelled) for several notable taxa and Uncertain for the remainder. The package is expected to increase host-plant availability, indigenous vegetation cover, litter and structural complexity. No quantitative invertebrate BOAM conducted.
Indigenous lizards	Approximately 238.7 ha of suitable habitat is affected, with an estimated 155,564 lizards potentially present. Residual effect: Moderate for McCann's skink and Very High for southern grass skink and kōrero gecko.	A 252 ha predator-exclusion fence; approximately 1,170 ha additional predator-control buffer; the 395.54 ha Murphys Link and lizard release area; protection of existing tussock, dry shrubland and rock habitat; removal of approximately 265 ha of plantation forestry at Mt Highlay; and habitat restoration.	Net Positive (modelled & unmodelled) The BOAM predicts positive outcomes for the two modelled skinks over the short to medium term. However, southern grass skink retains a modelled deficit in snow tussock habitat, with the proposed fence estimated to address approximately 20% of that component. Kōrero gecko has not been quantitatively modelled but for both kōrero gecko and the southern grass skink deficit, unmodelled positive outcomes are predicted.
Kārearea / eastern falcon	Approximately 235.99 ha of suitable habitat affected. Residual effect: Moderate.	Predator exclusion and landscape-scale predator control across MEEA and its buffer; protection and restoration of open-country, tussock, dry shrubland and rock-associated habitat.	Net Positive (modelled) The BOAM predicts a positive outcome for kārearea.
Banded dotterel / pohowera	Approximately 130.38 ha of suitable habitat affected. Residual effect: Moderate.	Landscape-scale predator control over open and lightly vegetated habitat within the MEEA package.	Net Positive (modelled) The BOAM predicts a positive outcome for banded dotterel.
South Island pied oystercatcher / tōrea	Approximately 130.38 ha of suitable habitat affected. Residual effect: Moderate.	Landscape-scale predator control over open-country habitat within the MEEA package.	Net Positive (modelled) The BOAM predicts a positive outcome for SIPO.
Shrubland birds	Up to 3.06 ha habitat loss or degradation. Residual effect: Low .	50 ha of dry shrubland planting at Cranky Jims Link; Fence, protect and pest control: 80.52 ha shrubland at MEEA 6.58 ha at Cranky Jims Link; 0.74 ha at Mt Highlay;	Net Positive (modelled) for shrubland habitat planting. Net Positive (modelled) for shrubland bird diversity at Cranky Jims Link. Additional stock fencing, protection and predator control is approximately 13 times the extent lost.

Biodiversity value	Impact quantum and residual effect	Compensation Actions	Predicted Residual Outcome (after Compensation)
Otago skink, grand skink and podocarp-broadleaved forest values	These values are not identified as directly affected residual-effect components of MP4.	Predator exclusion at MEEA, Murphys Link, habitat protection and podocarp-broadleaved enrichment at Cranky Jims Link.	Net Positive (unmodelled) Potentially important additional conservation benefits at the species, ecosystem and landscape scales.

1.6 Monitoring and adaptive management

Monitoring and adaptive management are integral to the management and compensation packages. Performance targets, reporting requirements and corrective actions are intended to verify that restoration, pest management, habitat protection and species responses remain on an acceptable trajectory. OGNZL will fund implementation of the relevant pest-management measures, including maintenance of the MEEA predator-exclusion fence, through to 2050. After 2050, the MEEA, Cranky Jims Link and Mt Highlay compensation areas will be transferred to a special purpose trust funded through an OGNZL closure capitalisation fund. The parties to the Trust and its governance arrangements have not yet been confirmed.

1.7 Conclusion

The ecological assessment identifies unavoidable adverse effects on indigenous vegetation, natural inland wetlands, Threatened and At Risk flora, terrestrial invertebrates, indigenous lizards and avifauna. Before mitigation, levels of effect range from Very Low to Very High depending on the ecological value affected, the extent and magnitude of loss, and the species or habitat concerned. Avoidance, minimisation and remediation measures reduce some of these effects, although Moderate to Very High residual effects remain for several ecological components and require residual effects management.

The proposed residual effects management package responds to these remaining effects through indigenous revegetation, wetland restoration, habitat protection, predator exclusion and control, plantation removal, improved ecological connectivity and species-focused management. Quantitative biodiversity accounting has been used where suitable data are available, supported by professional ecological judgement for values that cannot be reliably modelled. The package is predicted to provide substantial biodiversity gains across the wider Macraes landscape, although net losses or uncertain outcomes remain for some values, particularly irreplaceable rock habitat and some Threatened and At Risk species.

Overall, the assessment concludes that MP4 will result in significant residual ecological effects for some values, but that the scale and diversity of the proposed compensation measures provide a substantial and proportionate response to those effects and are expected to deliver broader ecological benefits across the Macraes Ecological District. These conclusions remain dependent on effective implementation of the mitigation and residual effects management measures, achievement of the specified ecological performance targets, and continuation of the management required to maintain those gains over the relevant assessment periods.

2 Introduction

2.1 Purpose and Scope

This Terrestrial and Wetland Ecology Summary Report has been prepared to support the Macraes Phase Four Project (MP4 or the Project) fast-track application. The purpose of this report is to provide an integrated summary of the terrestrial and wetland ecological reporting prepared for MP4, with particular focus on the values, effects assessments, and the full suite of effects management measures .

This report is intended to assist readers by explaining how the ecological reporting suite fits together and by summarising the key findings relevant to ecological values, ecological effects, residual adverse effects, proposed compensation actions, management plans, and monitoring. It is a summary document and does not replace the supporting technical reports (see Table 2-1. below for full list of ecology documents). Where detailed survey methods, species records, vegetation or habitat mapping, wetland delineation, effects calculations, biodiversity accounting, management procedures or monitoring methods are required, the relevant supporting technical report should be relied on.

Table 2-1.: 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	Summary of documents E2 – E16	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	Management and monitoring of Wetlands and TAR wetland plants	Bioresearches (2026h)
E10	Invertebrate Management & Monitoring Plan	Effects management and monitoring for invertebrates	Bioresearches (2026i)
E11	Lizard Management & Monitoring Plan	Effects management and monitoring for lizards	Bioresearches (2026j)
E12	Avifauna Management & Monitoring Plan	Effects management and monitoring for birds	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)

2.2 Macraes Project

2.2.1 Existing Macraes Operation

The Macraes Operation is an established large-scale mining operation in Otago. Existing mining activities include open pits, underground mining, waste rock stacks, tailings storage facilities, haul roads, water management infrastructure and associated support facilities. The operation occurs within a landscape that has been modified by historic and ongoing mining, pastoral land use, roading and associated infrastructure.

Despite this modified setting, the Macraes landscape supports a range of terrestrial and wetland ecological values. These include indigenous vegetation communities, natural inland wetlands, riparian habitats, terrestrial invertebrate, lizard, and avifauna habitat, and includes species with national, regional or cultural conservation significance.

2.2.2 Macraes Phase Four Project

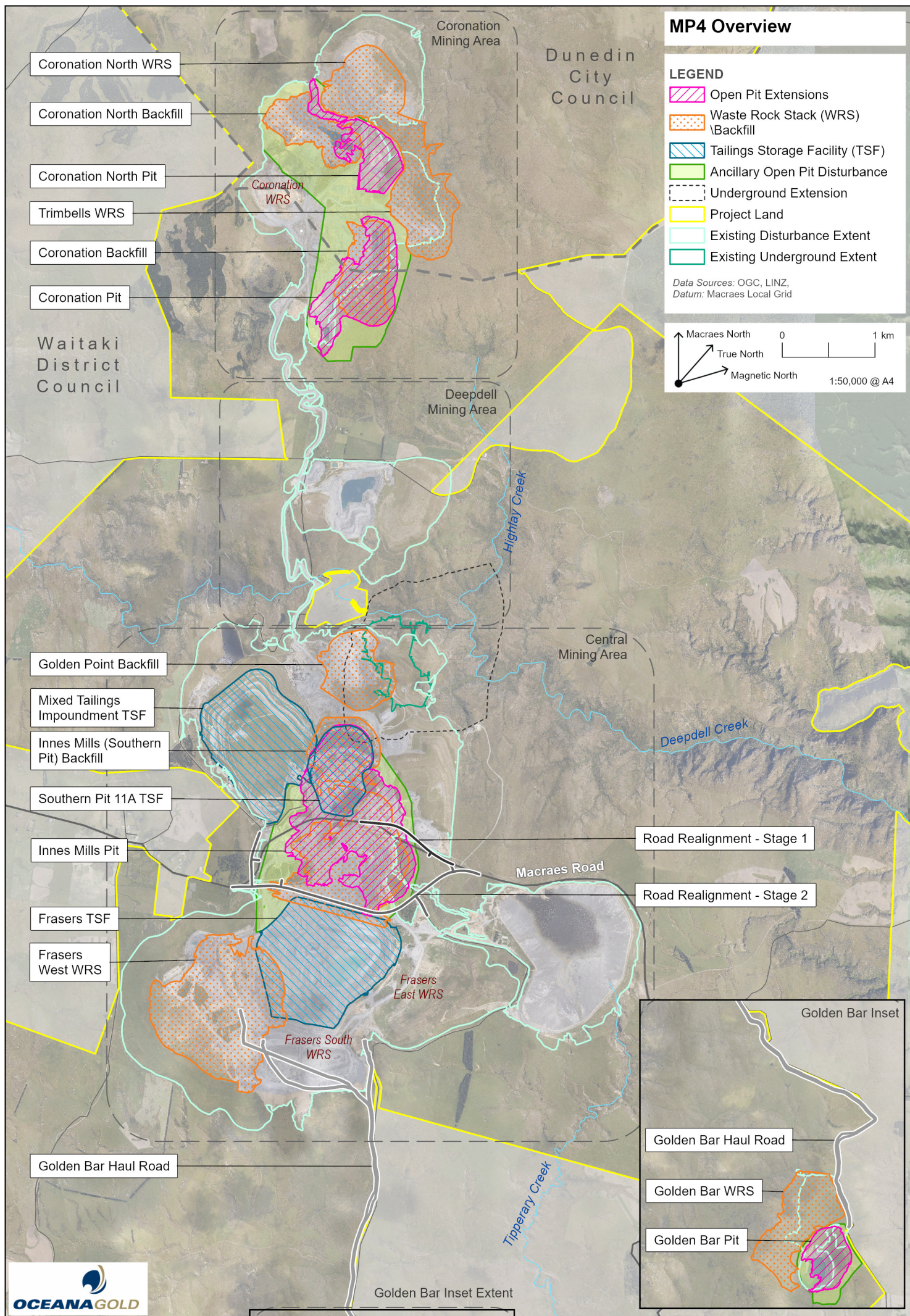
MP4 extends existing gold mining operations at Macraes through to approximately 2039. It includes open-pit extensions at Coronation North, the Central Mining Area and Golden Bar; the Golden Point Underground Extension; Frasers Tailings Storage Facility Stage 3; waste rock disposal and backfilling; road and infrastructure realignments; water management works; and progressive rehabilitation and closure.

2.2.3 Camp Creek and Coal Creek

In addition to MP4 mine expansion areas, OGNZL intends to undertake the construction, operation, and maintenance of water storage dams located in Camp Creek and Coal Creek (the Reservoirs). These dams were consented as a contingency water quality management method as part of the MP3 and Coronation North consenting projects, respectively. The purpose of the dams is to discharge clean dilution water into Deepdell Creek (from Camp Creek Dam) and Coal Creek and Mare Burn (from Coal Creek Dam) during dry periods so that acceptable water quality standards are maintained.

The consents that authorise the construction, operation and maintenance of Camp Creek and Coal Creek Dams do not lapse and may be implemented at any time prior to their expiry on 1 October 2046 and 24 April 2052, respectively. Camp Creek and Coal Creek, as it pertains to terrestrial vegetation, fauna and waterways have been assessed under the previous consents. However, OGNZL does not hold consent under the National Environmental Standards for Freshwater (2020) for activities on natural inland wetlands disturbance associated with the construction of the dam embankments or where the water reservoir will flood existing natural inland wetlands, reducing their extents and values. Analysis of residual adverse effects to wetlands within Camp Creek and Coal Creek are presented within this plan as a separate effects package.

Figure 2.1.(Over page) MP4 overview plan. Source: OceanaGold spatial schedule



3 Ecological values

3.1 Landscape context

The Macraes Ecological District has been modified by pastoral land use, historic and ongoing mining, plantation forestry, roads and water management infrastructure. Indigenous biodiversity persists as a mosaic of narrow-leaved snow tussock grassland, dry shrubland, rock outcrops and tors, wetlands, riparian gullies and mine-modified habitats (Figure 3.6 to Figure 3.13). The ecological importance of individual areas reflects both their intrinsic values and their role within this wider, fragmented landscape, within which many of these features, including tussock grassland and dry shrubland are widespread (including within OGNZL landholdings).

3.2 Field survey and data collection

3.2.1 Vegetation & Flora

Vegetation surveys combined desktop review with repeated botanical investigations across the Project area and surrounding landscape between 2022 and 2026, supplemented by substantial historical survey information. Field methods included expert walk-through surveys, vegetation and habitat mapping, targeted searches for Threatened, At Risk and uncommon plants, wetland delineation, GPS recording of notable features, aerial and drone imagery, and quantitative vegetation plots. The quantitative dataset included 32 snow tussock plots and 20 dry shrubland plots, together with additional wetland and riparian vegetation plots.

3.2.2 Invertebrates

Terrestrial invertebrate surveys were undertaken over several seasonal periods between April 2022 and April 2026. Methods included sweep netting, hand searching, visual observations, manual and automated moth light trapping, opportunistic collection during lizard salvage, targeted surveys for notable Lepidoptera, and environmental DNA sampling. Survey coverage included the principal Project areas, ecological covenants and proposed compensation areas, with specialist lepidopterist input to targeted moth surveys. The most intensive moth sampling occurred between February and April 2026 and recorded 720 individuals representing 24 families and 209 distinguishable taxa.

3.2.3 Lizards

Lizard surveys were undertaken between April 2022 and March 2026 using systematic visual encounter searches, rock and crevice searches, aerial drone surveys, tracking tunnels, artificial cover objects, CritterPic® cameras and baseline pitfall trapping. Total effort comprised 515.2 person-hours of systematic searching, 14 hours of aerial drone searching, 2,016 pitfall-trap days, 187 tracking-tunnel days, 204 artificial cover object inspections, 65 CritterPic® survey days and six Gee's minnow-trap days. Surveys covered the Project impact areas, consented development areas and potential ecological enhancement sites.

3.2.4 Birds

Avifauna surveys used complementary observer-based and acoustic methods across two seasonal periods, comprising spring and early summer 2025 and autumn 2026. Five-minute bird counts were undertaken through a network of 66 survey stations across representative habitats. Passive acoustic

monitoring used Department of Conservation AR4 recorders, with 49 units contributing to the breeding-season survey and 48 units to the autumn survey; units generally recorded continuously for five to six days. This effort was supplemented by 30 waterfowl counts at 22 locations, 17 targeted fernbird playback surveys, and incidental observations recorded during other ecological fieldwork.

3.2.5 Bats

Bat surveys comprised a desktop review of the Department of Conservation National Bat Database and relevant Otago Regional Council spatial datasets, followed by a landscape-scale habitat inspection and acoustic presence or absence survey. Twenty-eight automatic bat monitors were deployed from 9–10 March to 27–28 March 2026 across Project areas, proposed enhancement areas and higher-quality habitats in the surrounding landscape. Survey locations targeted streams and gullies, ponds, wetlands, forest edges, trees with potential roost features and schist tors. Units operated for up to 20 nights, generally providing 15–16 valid survey nights after weather screening.

3.3 Terrestrial vegetation and flora

The principal indigenous terrestrial communities within the MP4 impact area are tussock grassland, dry shrubland and rock habitat (Figure 3.1; Figure 3.2). Data were collected over 4-5 years, including vegetation plots, rare plant surveys and drone mapping. Tussock grassland is High value because of its indigenous composition, extent and role as habitat for flora, lizards, birds and invertebrates. Dry shrubland is generally of Low to Moderate ecological value because it is relatively widespread within the surrounding landscape and OGNZL landholdings, is often modified by grazing and exotic species, but retains indigenous shrub cover and provides habitat and ecological connectivity for indigenous flora and fauna. Rock outcrops and tors are Very High value because they support specialised plants and fauna. Non-indigenous ecosystems, including exotic pasture and mine-worked areas are quantified and assessed where they support high-value fauna (e.g. lizards, birds).

Twenty-five Threatened and At Risk (TAR) plant species are recorded within the MP4 works extent, excluding records within the wider disturbance buffers. The greatest concentrations occur at Coronation North and Golden Bar, including on or in rock outcrops, clay banks, damp gullies, wetland margins and ephemeral wetlands. Some plants can be avoided or salvaged; for others, successful ex-situ management is uncertain.

3.4 Wetlands and riparian habitats

As with terrestrial vegetation, data were collected over 4-5 years, including vegetation plots, rare plant surveys and drone mapping. Natural inland wetlands include ephemeral wetlands, freshwater herbaceous wetlands, sedgelands, seepages, shrubland wetlands and copper tussock wetlands (Figure 3.2). This also includes induced wetlands which have been created from seepage emerging from WRS's. This includes areas of riparian habitat which support the equivalent wetland habitats. Many are small and scattered but are important because naturally uncommon wetland types and specialist hydric flora occur within the landscape. Ephemeral wetlands are particularly significant because of their rarity, seasonal hydrology and distinctive plant communities. Wetlands, including riparian habitats, have been assessed as ranging between Low to Very High ecological value when considering their conservation status, presence of TAR flora species and ecological services, however these wetlands, including those with an elevated ecological

value, demonstrate pressures and reduced ecological services due to exotic plant invasion, dryland plant presence, and stock grazing and pugging.

3.5 Terrestrial invertebrates

Snow tussock, dry shrubland, rock, riparian and wetland-margin habitats support a diverse invertebrate assemblage, including moths, beetles, spiders, true bugs, caddisflies, stoneflies and orthopterans (Figure 3.3). Seventeen conservation-interest or notable species are identified within the impact area. Habitat complexity, indigenous host plants, and continuity between habitat patches are important to their persistence.

Terrestrial invertebrate communities within the MP4 works footprint are assessed as having High overall ecological value, with the highest values associated with schist rock outcrop habitats and tall tussock grassland supporting specialist assemblages. The invertebrate values assessment records 17 conservation-interest species within the assessment area, including one Threatened – Nationally Vulnerable moth species, *Orocrambus sophistes*, with a Very High ecological value.

3.6 Lizards

Three indigenous lizards (McCann's skink, southern grass skink and kōrero gecko) are confirmed to be present within the Project footprint (Figure 3.4). These lizards are common and abundant on OGNZL landholdings and the wider surrounding landscape but two (southern grass skink and kōrero gecko) are categorised as 'At Risk – Declining.' McCann's skink has Low ecological value; southern grass skink and kōrero gecko have High ecological value.

Lizard habitat is widespread in indigenous vegetation (tussock, shrubland, rock, dense herbaceous vegetation, riparian gullies and wetland margins) and exotic land cover such as pasture grasses. The impact areas are estimated to support approximately 155,500 lizards. This excludes areas already consented for disturbance—supporting approximately 123,270 additional lizards—and are subject to Wildlife Act Authority considerations.

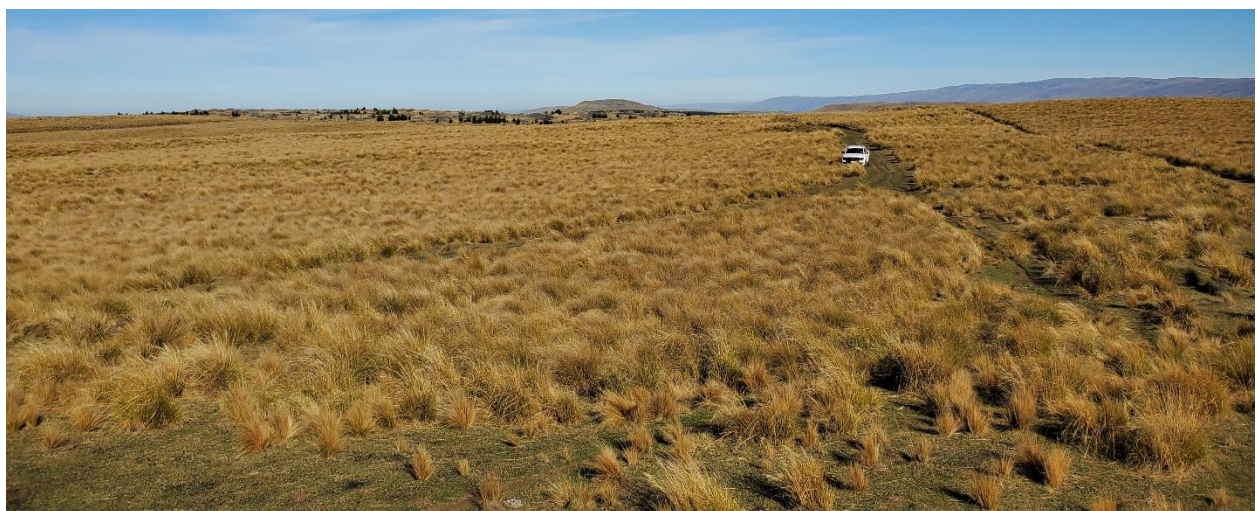




Figure 3.1. Tussock grassland at Coronation (upper) and dry shrubland at Golden Bar (lower).



Figure 3.2. Rock outcrop/ tor at Coronation (upper); wetland, tussock, and exotic grass on WRS at Golden Bar (centre); ephemeral wetland at Coronation (lower).



Figure 3.3. Invertebrates: *Hemiandrus maia* (upper); lower left to right: *Orocrampus sophistes* (male) (©Landcare Research); *Samana acutata* (©Landcare Research); *Megadromus bullatus*.



Figure 3.4. Lizards: southern grass skink (upper left); kōreo gecko (lower left); McCann's skink (right).

3.6.1 Birds

The MP4 assessment area supports an avifauna assemblage of which seven species carry an elevated conservation status. New Zealand falcon/kārearea (*Falco novaeseelandiae*; Threatened – Nationally Vulnerable, Figure 3.5), banded dotterel/tūturiwhatu (*Charadrius bicinctus*; At Risk – Declining) and South Island pied oystercatcher/tōrea pango (*Haematopus finschi*; At Risk – Declining) are confirmed as breeding within or immediately adjacent to the project footprint and are assessed as having Very High ecological value. The remaining four species of elevated status (New Zealand fernbird/mātātā, New Zealand pipit/pīhoihoi, black shag/kōau and silvereye/tauhou (*Zosterops lateralis*; Regionally Declining)) are present in the assessment area with generally Lower ecological value relative to the three primary species (Bioresearches 2026d; E5).



Figure 3.5. New Zealand falcon/ kārearea.

3.6.2 Bats

Both species of New Zealand bat (pekapeka), lesser short-tailed bat/pekapeka-tou-poto (*Mystacina tuberculata*) and long-tailed bat/pekapeka-tou-roa (*Chalinolobus tuberculatus*), were considered in the bat values assessment. A landscape-scale acoustic survey using 27 automatic recording units (ARUs) deployed across the MP4 assessment area and surrounding landscape in March 2026 detected no bat activity at any monitoring station. Desktop assessment, habitat evaluation and consideration of existing regional bat records confirm that the Macraes landscape provides limited roosting and foraging resources for either bat species, or that bat presence within the assessment area is considered unlikely (Bioresearches 2026e; E6).

3.7 Summary ecological values

Overall ecological Values are generally assigned Moderate to Very high. Where confidence in certain assessments was low, values were generally assessed conservatively.

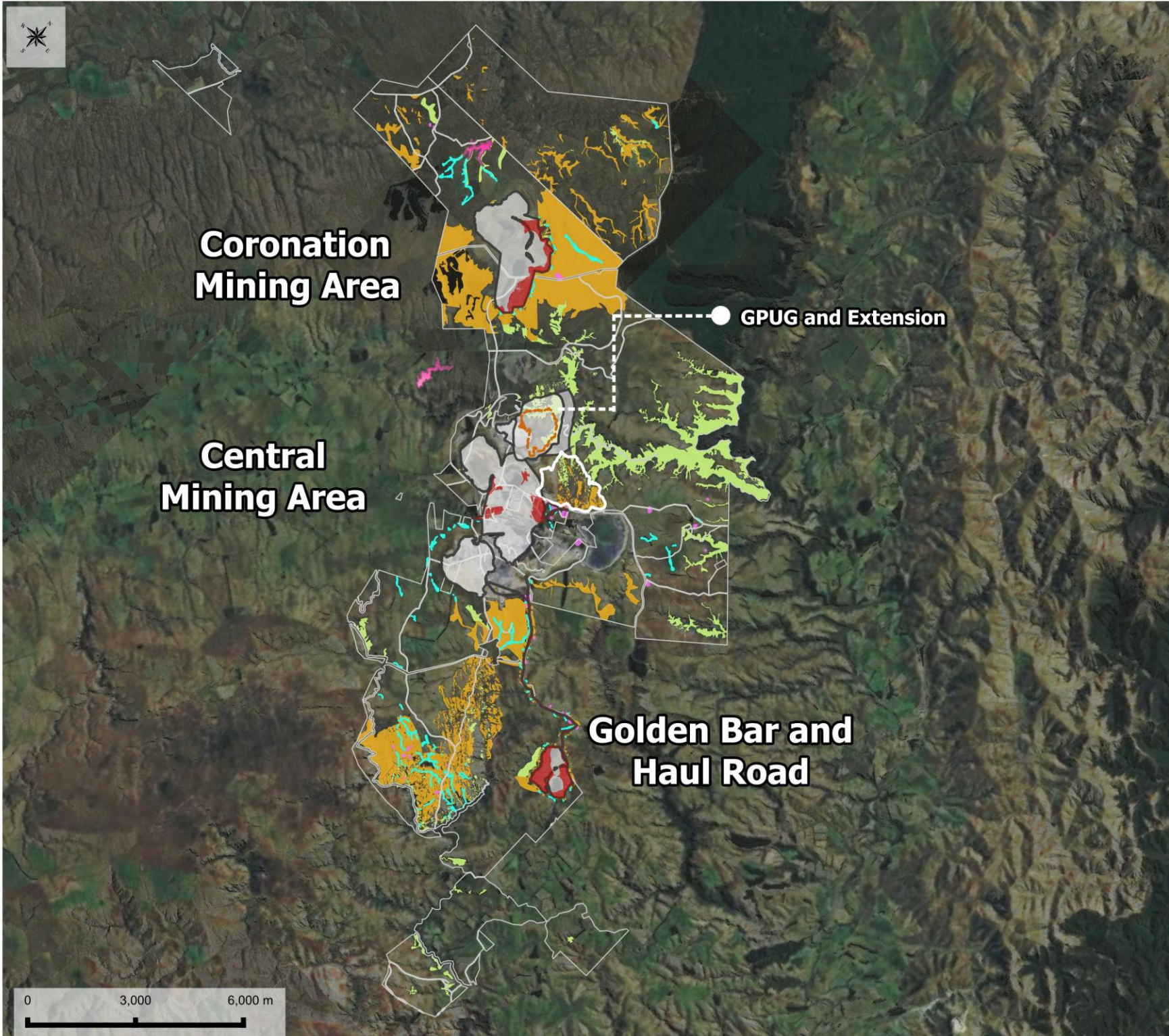
Table 3-1. Summary of ecological values per Project component.

Ecological component	Coronation	Central	Golden Bar	Golden Bar Haul Road	Camp Creek	Coal Creek	Waste Rock Stacks	Overall Value
Narrow-leaved tussock grassland	High	Low	Moderate	Moderate	-	-	-	High
Shrubland*	Moderate	Low	Moderate	Moderate	-	-	-	Moderate
Rock habitat	Very High	N/A	Low	Low	-	-	-	Very High
TAR plants	Moderate-Very High	Moderate-Very High	Moderate-Very High	Moderate-Very High	-	-	-	High-Very High
Invertebrates**	Moderate	Moderate	High	Low	-	-	-	High
Lizards**	Moderate	Moderate	High	Low	-	-	-	High
Avifauna**	Moderate	High	Moderate	Low	-	-	-	Moderate
Ephemeral wetland	Very High	-	High	High	-	-	-	Very High
Riparian freshwater herbaceous vegetation	High	-	-	-	-	-	-	High
Riparian sedgeland	Moderate	-	-	-	-	-	-	Moderate
Wetland freshwater herbaceous vegetation	High	Low	Low	Low	Moderate	High	-	High
Wetland sedgeland	Moderate	Low	Moderate	Moderate	Moderate	Moderate	-	Moderate
Wetland seepage	High	-	-	-	-	-	-	High
Wetland shrubland	Moderate	-	-	-	-	-	-	Moderate
Wetland copper tussock	Moderate	-	-	-	-	Moderate	-	Moderate
Induced wetland	-	-	-	-	-	-	Negligible - Low	Negligible - Low

*The Project-wide Moderate value reflects the collective ecological function and context of dry shrubland across MP4 and is not an average of the Low site-specific ratings

**For avifauna, lizards and terrestrial invertebrates, the values shown represent the overall ecological value assigned to the relevant taxonomic group at each Project location, taking account of the species assemblage, habitat and ecological context. These are distinct from the ecological values assigned to individual species, which are presented separately in the EclA.

Figure 3.6 (following page) Ecosystem types identified within OGNZL landholdings



Ecosystem Extents OGL Landholdings

Date: 07/08/2026
Drawn By: MS
Client: OceanaGold New Zealand Ltd
Scale: 1:142,857

Legend

- OGL Landholdings: 15,018.44 ha
- Camp and Coal Creek
- Back Road Waste Rock Stack
- MP4 Impact Areas
- GPUG Consented Boundary
- Areas of habitat/vegetation loss within the MP4 Project

Indicative Ecosystem Types within OGL Landholdings

- Tussock Grassland: 1,913.46 ha
- Dry Shrubland: 1,294.38 ha

Wetlands

- Gully: 45.66 ha
- Ephemeral: 9.70 ha

Vegetation boundaries and classifications were interpreted from LINZ aerial imagery and validated where possible through selected ground-truthing and desktop aerial analysis. Vegetation types and boundaries should be regarded as indicative.

SOURCES
LINZ Basemap aerial

MAP PROJECTION
NZGD2000 / New Zealand Transverse
Mercator 2000

Bioresearches
A Babbage Company

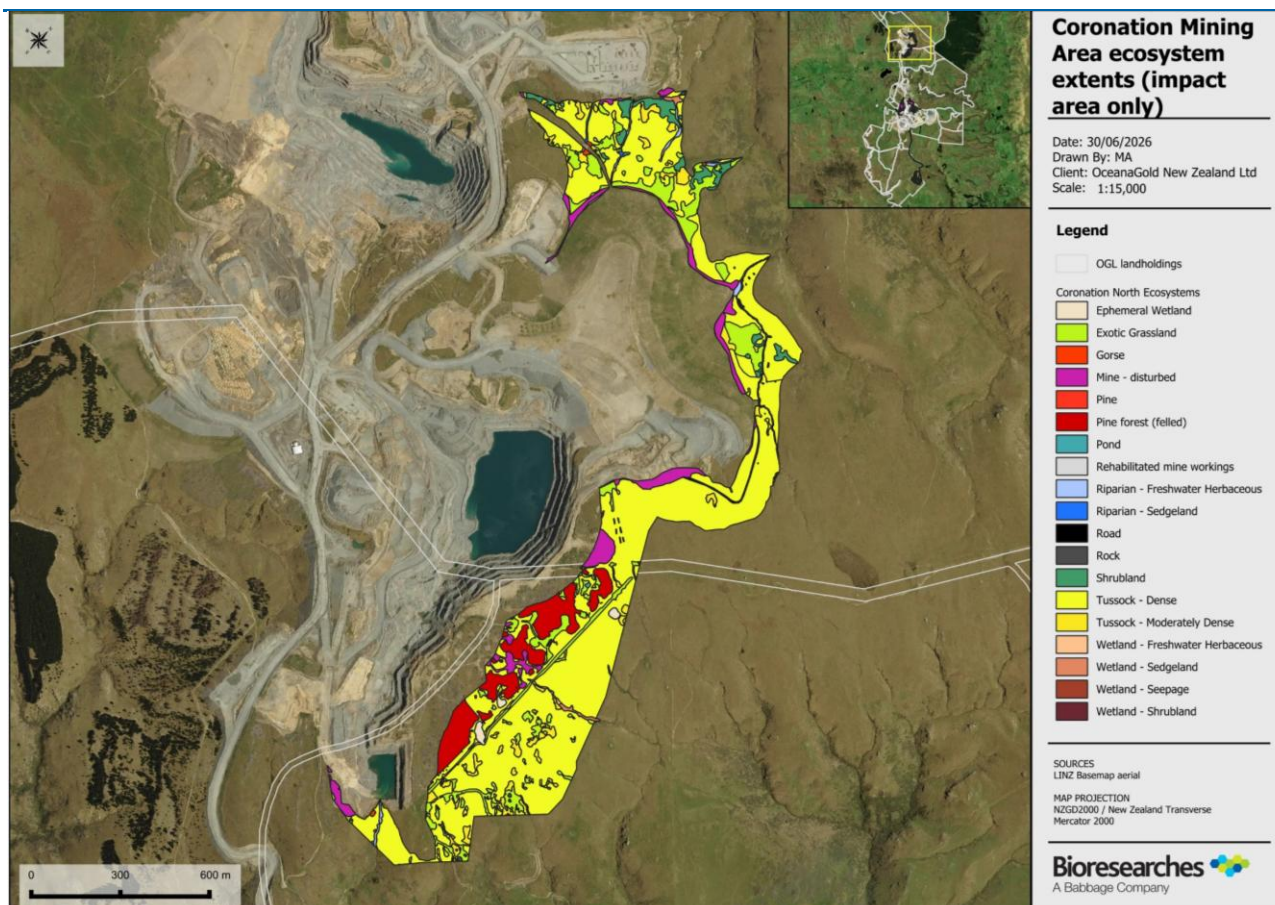


Figure 3.7. Coronation North. Ecosystem types identified within the assessed Project area.

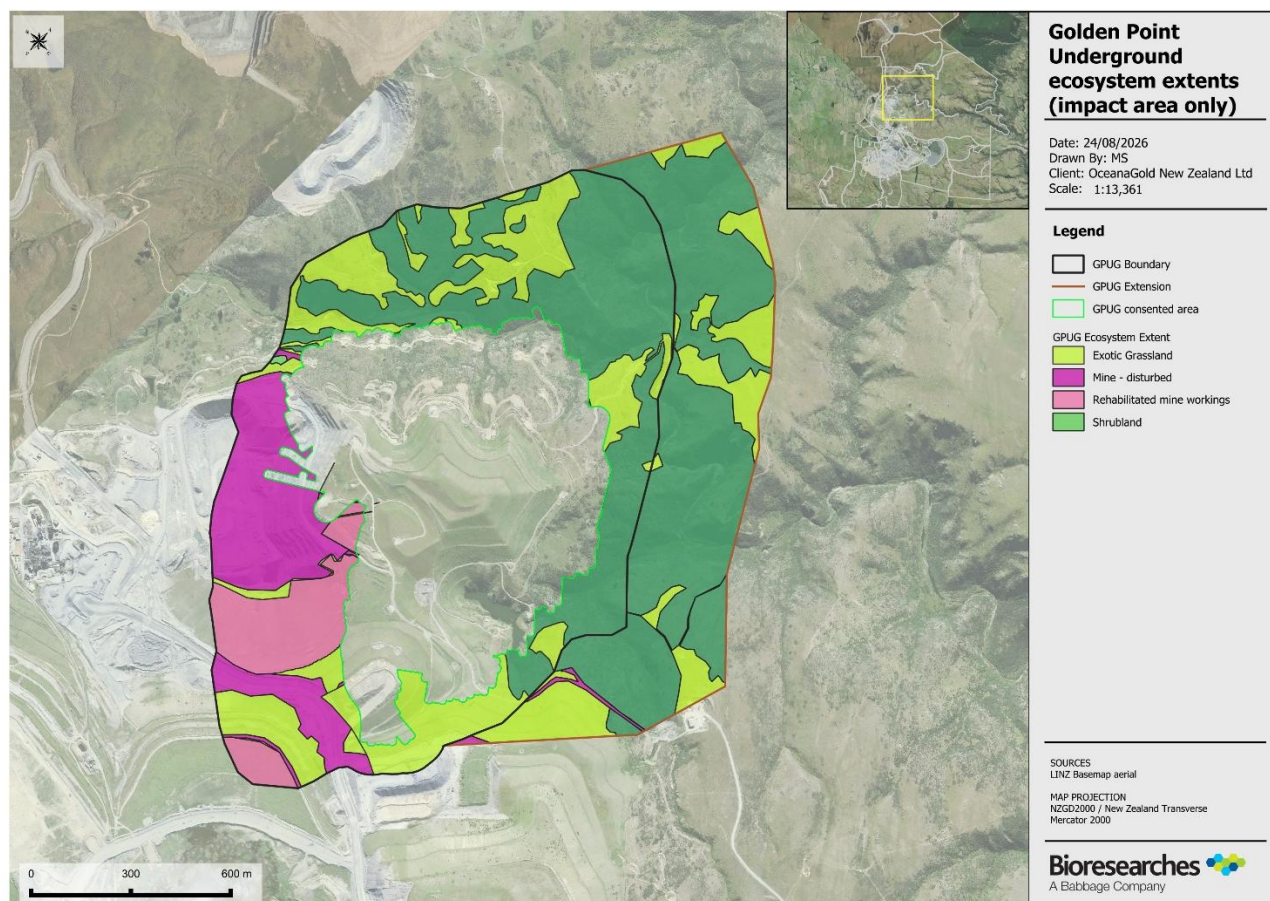


Figure 3.8. Golden Point Underground. Ecosystem types identified within the assessed extension Project area (note no surface areas within the GPU boundary are directly impacted due to underground activities).

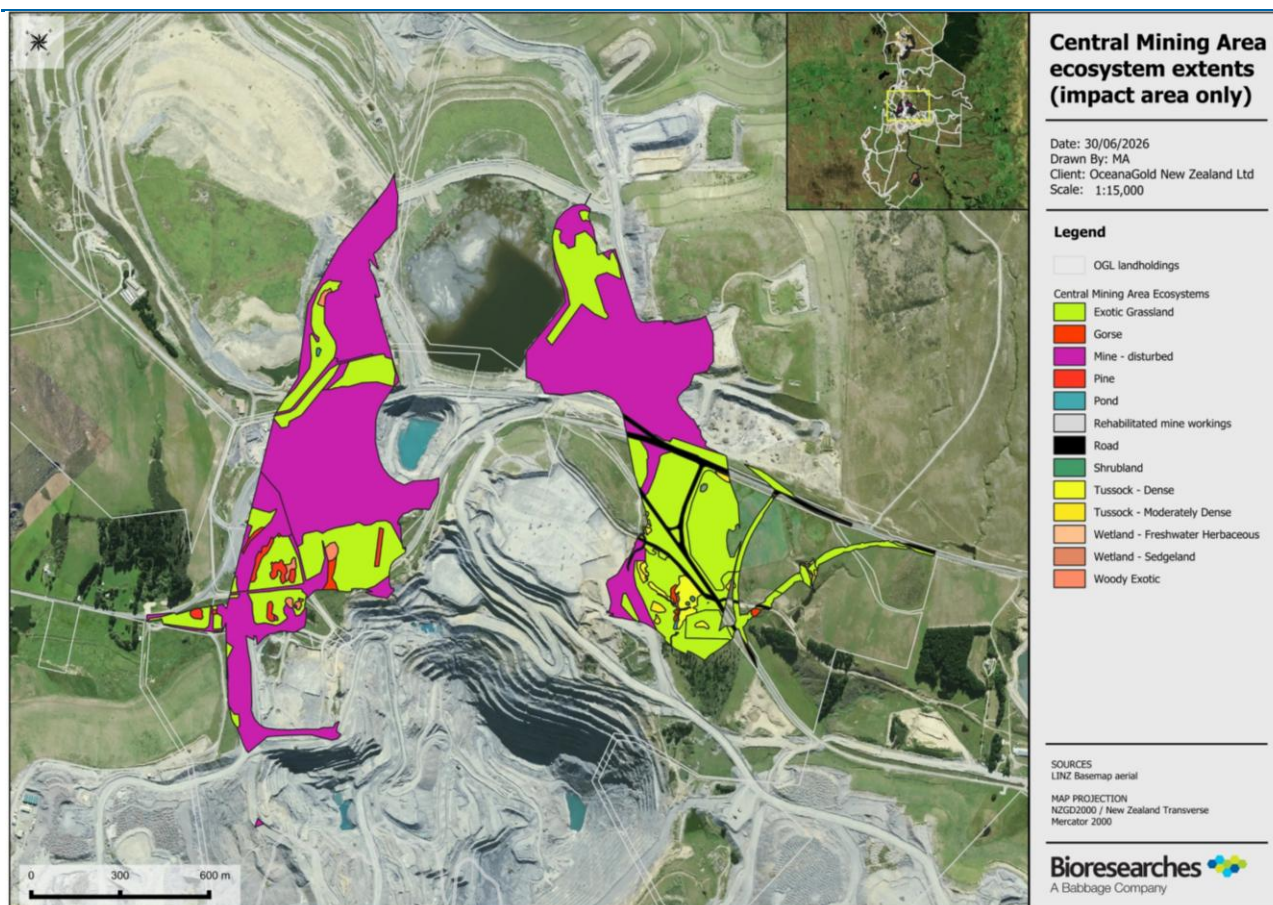


Figure 3.9. Central Mining Area. Ecosystem types identified within the assessed Project area.

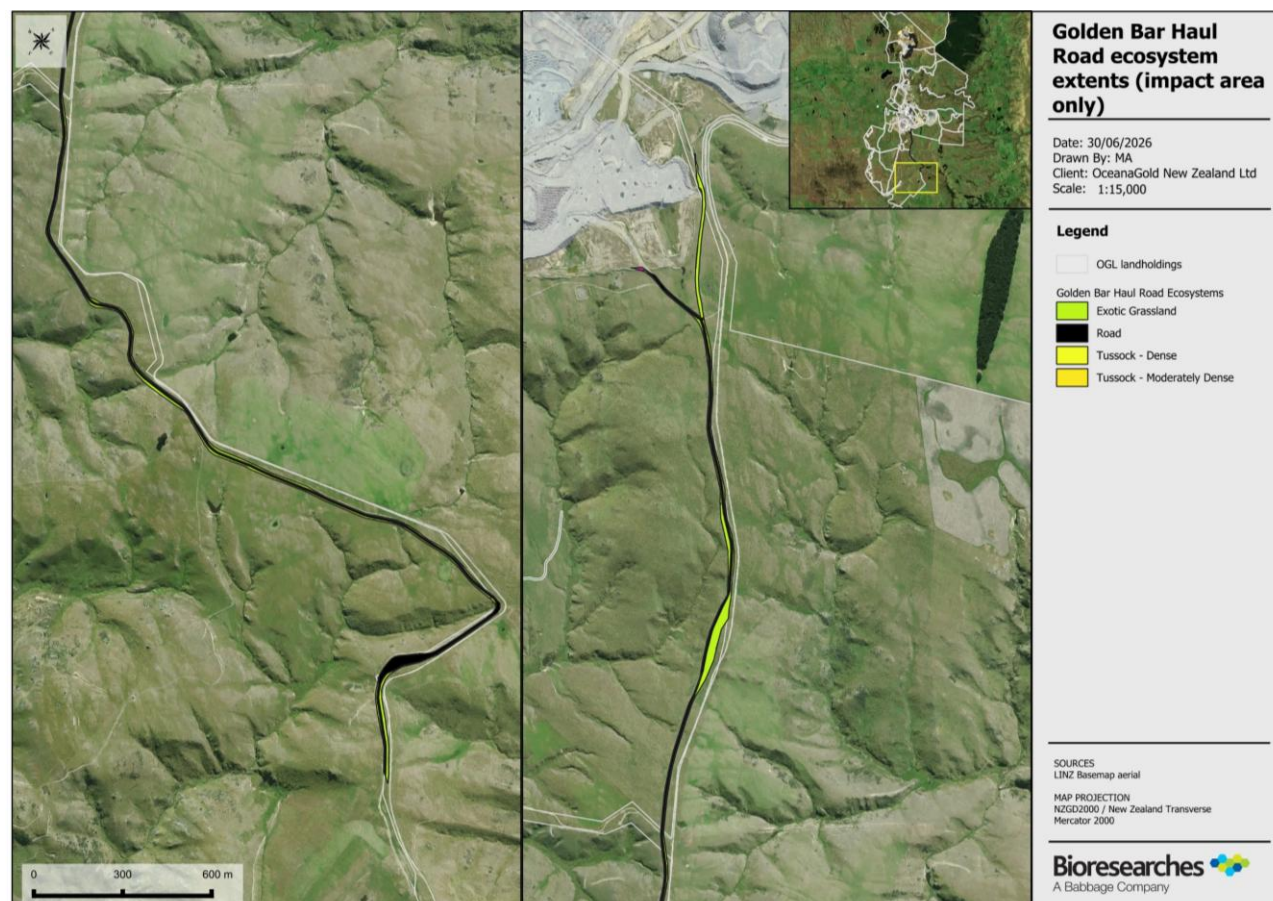


Figure 3.10. Golden Bar Haul Road. Ecosystem types identified within the assessed Project area.

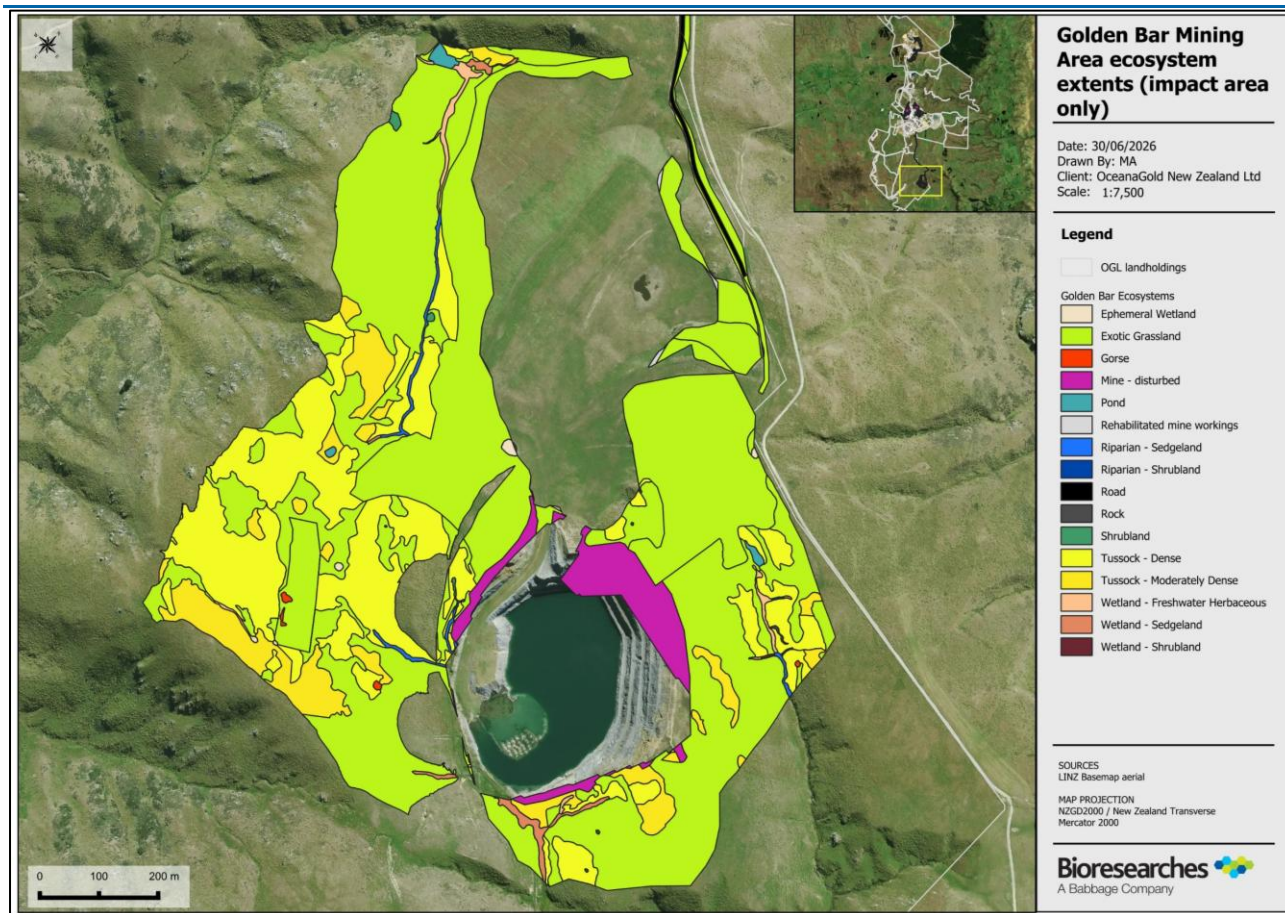


Figure 3.11. Golden Bar. Ecosystem types identified within the assessed Project area.

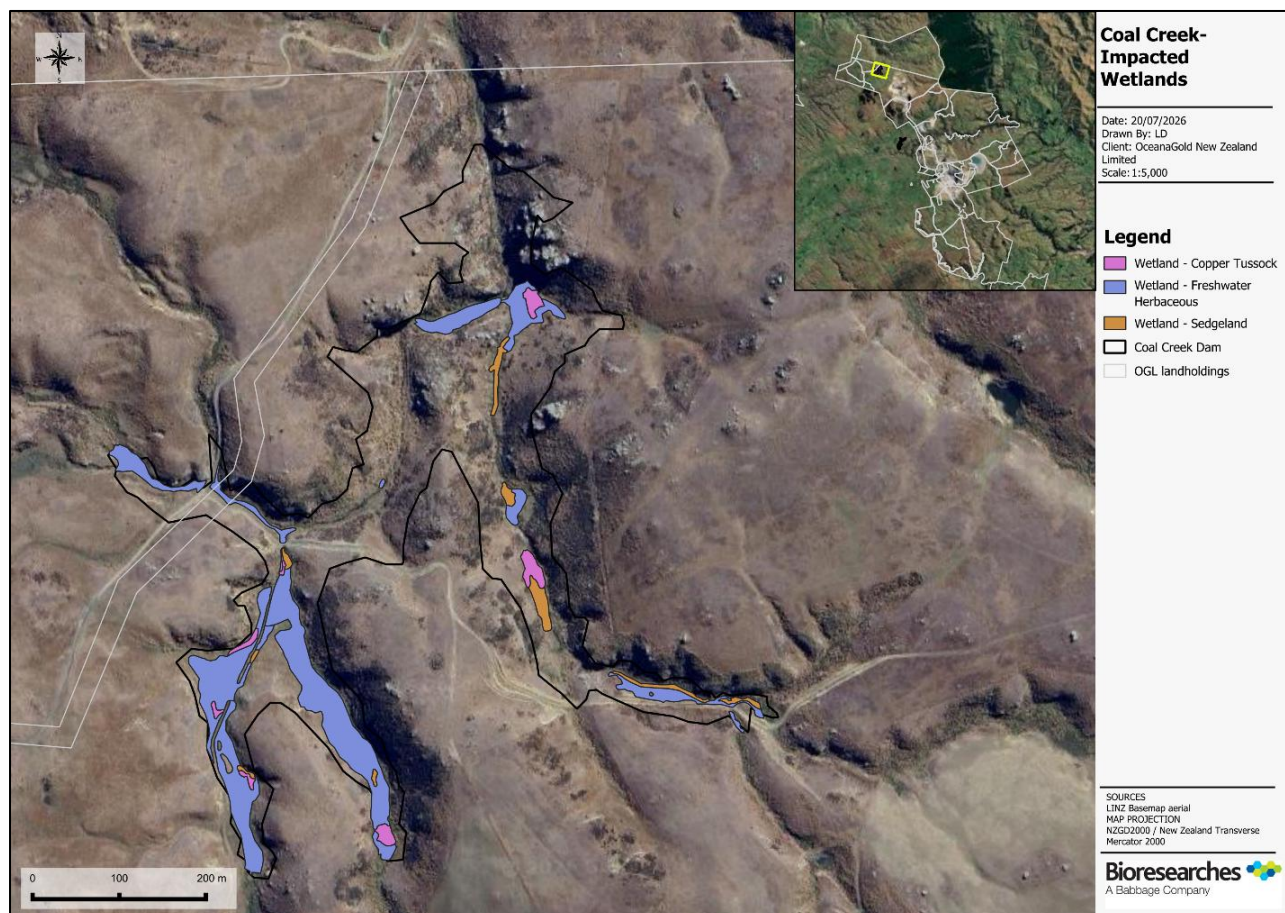


Figure 3.12. Coal Creek. Wetland types identified within the assessed Project area.



Figure 3.13. Camp Creek. Wetland types identified within the assessed Project area

4 Ecological Effects Assessments

A summary of direct impacts across the MP4 Project area is presented in (Figure 4.1).

4.1 Precautionary Approach

A precautionary approach was applied where survey limitations or uncertainty remained regarding the presence, extent, value or function of ecological features. Historical records, specialist knowledge, habitat suitability and wider landscape information were considered alongside field observations.

Where evidence was uncertain, suitable habitat was generally assumed to support indigenous species, including TAR taxa, unless sufficient information indicated otherwise.

Wetland areas of uncertain classification were retained within the assessment, and vegetation communities, species and habitats were generally assigned the higher applicable ecological value or conservation status.

Potential effects were also assessed using conservative spatial and magnitude assumptions. An additional 20 m buffer was applied around direct disturbance areas for indigenous vegetation and some fauna habitats to account for possible (but for the most part unlikely) edge effects, construction disturbance, accidental encroachment and degradation of adjoining habitat (despite vegetation plot data within existing pit and infrastructure edges indicating that condition remained comparable).

The higher magnitude indicated by proportional habitat loss or absolute area lost was generally adopted, while fauna assessments assumed that species could occupy all suitable affected habitat rather than only locations where they were detected.

Conservative assumptions were also applied to habitat condition, indirect effects, restoration trajectories and the effectiveness of management measures. The resulting assessment is therefore more likely to overestimate than underestimate ecological values, potential effects and residual effects management requirements. OGNZL has made a deliberate decision to adopt this conservatism to further reduce the risk of poor ecological outcomes overall.

Figure 4.1. (Over page). Summary of direct losses within the MP4 Project footprint.

SUMMARY OF DIRECT EFFECTS

MACRAES PHASE 4



The assessed non-consented impact area is approximately 319.76 hectares, including the direct impact footprint, plus a precautionary 20m buffer.

The primary land cover is modified but has moderate- very high ecological value. Key ecological losses are outlined below:

1

CORONATION

LOSSES: TERRESTRIAL

Loss of up to:

- 90 ha snow tussock grassland
- 3 ha dry shrubland
- 0.26 rock habitat

2

MACRAES
CENTRAL

LOSSES: FRESHWATER

Loss of up to:

- 1.1 ha ephemeral wetlands
- 1.4 ha of sedgeland wetlands
- 2.1 ha of wetland freshwater herbaceous vegetation
- 0.05 ha of other wetland and riparian habitat

3

GOLDEN
BAR

After avoidance, minimisation and remediation, final levels of effect remain at:



Very High: Snow tussock grassland, ephemeral wetland, southern grass skink, kōrero gecko, TAR Plants



High: Terrestrial invertebrate assemblage and several At Risk invertebrate species



Moderate: Rock habitat, McCann's skink, kārearea, banded dotterel and South Island pied oystercatcher

4.2 Direct and Indirect effects

4.2.1 Ecosystems and habitats

4.2.1.1 Terrestrial vegetation and flora

4.2.1.1.1 Direct effects

The MP4 works footprint encompasses up to 90.01 ha of tall tussock grassland (High value), 3.06 ha of dry shrubland (Moderate value) and 0.26 ha of schist rock outcrop (Very High value). The direct loss of these indigenous habitats constitutes the principal terrestrial vegetation effect. Effects are greatest at Coronation North (63.24 ha tussock, 2.76 ha shrubland), with additional losses at Golden Bar (24.40 ha tussock) and Central Mining Area (2.37 ha tussock). The overall unmitigated level of effect on tussock grassland is Very High, reflecting both the ecological value of this community and the scale of permanent clearance relative to the Macraes Ecological District context (Bioresearches 2026f; E7).

Dry shrubland losses are proportionally small and the unmitigated level of effect is Low, reflecting both the lower ecological value and the limited extent of loss relative to broader shrubland cover within OGNZL landholdings. Rock habitat is Very High ecological value, comprising specialist schist tor and outcrop features supporting threatened invertebrate and lizard communities. Although the area of direct rock habitat loss is small (0.26 ha), the irreplaceability of this substrate results in a Moderate level of effect that remains after avoidance and minimisation measures.

Forty-eight Threatened, At Risk, Data Deficient or regionally notable plant species (TAR plants) are recorded within the wider MP4 project area, with 29 species having confirmed records within or immediately adjacent to the clearance boundary.

Where individual plants cannot be avoided through final set-out, Very High net losses remain for five species. Pre-clearance surveys, vegetation direct transfer of tussock turf, seed and propagule collection, salvage, propagation and establishment at prepared recipient sites are expected to reduce effects for other species, although outcomes vary between species. Following mitigation and compensation, final outcomes comprise Very High net losses for five species, High net losses for four, Moderate net losses for seven, Low net losses for four and Very Low net losses for five. Three species are predicted to achieve Net Positive outcomes, while the outcome for dwarf broom remains uncertain, ranging from Net Positive to a Low net loss.

The proportional direct loss of these features, with consideration to the extent within the surrounding landscape on OGNZL landholdings is low (less than 5% of mapped occurrence). However, assessed magnitudes were increased where area extent remained high (tussock) or professional judgement guided the assessment (e.g. very high value rock outcrop) (Table 4-1).

4.2.1.1.2 Indirect effects

Indirect effects on retained tussock grassland and rock habitat include dust deposition on vegetation surfaces, weed invasion along clearance margins, altered runoff and soil moisture near pit margins, edge exposure, and accidental encroachment. These are managed through works boundary demarcation, dust suppression, erosion and sediment controls, and weed hygiene protocols. After application of avoidance,

minimisation and remediation measures, the final level of effect on tussock grassland remains Very High and on rock habitat Moderate, both requiring residual effects management.

Indirect effects on terrestrial vegetation, flora and fauna may occur where retained habitats adjoin construction and operational areas. These effects include dust deposition, sedimentation, weed invasion, accidental encroachment, altered surface runoff and soil moisture, and other edge effects that may reduce vegetation condition, alter species composition, or affect nearby Threatened, At Risk and taoka plants. These pathways are most relevant near pit margins, waste rock stack toes, haul roads, rock outcrops, gullies, and retained indigenous vegetation adjoining earthworks.

Potential edge effects are conservatively assessed as having potential to occur up to 20 m from the direct loss footprint, and the extent of this is quantified in Table 4-1 below. The rationale for this extent being considered conservative is based on tussock plots undertaken at 5 – 10 m from the existing pit and rock stack edges at Coronation North, which do not indicate any degradation with respect to measures of tussock structure, integrity and plant diversity.

Table 4-1. Extent of predicted effect (direct loss plus an additional 20 m edge) for terrestrial indigenous vegetation, flora, invertebrate and lizard habitat) of MP4 on terrestrial ecosystems per project area. Note exotic land cover has been assessed where it supports lizards and avifauna habitat.

Terrestrial component	Value	Coronation North (ha)	Central (ha)	Golden Bar / haul road (ha)	Total (ha)	Proportional Loss (%)	Magnitude	Pre-management Level of effect
Snow tussock grassland	High	63.24	2.37	24.40	90.01	4.51	High*	Very High
Dry shrubland	Moderate	2.76	0.05	0.25	3.06	0.38	Low	Low
Rock outcrop	Very High	0.17	0.00	0.09	0.26	0.84	Low**	Moderate

*Proportional loss is low (>5% loss), however areal extent (90 ha) is high.

** Proportional magnitude of 'Negligible' (based on (>1% loss), increased to 'Low' magnitude to acknowledge low replaceability.

4.2.1.2 Wetlands

4.2.1.2.1 Direct Effects

The MP4 works footprint results in direct reclamation and effective loss of approximately 4.17 ha of natural inland wetlands, arising from wetland reclamation. Affected wetland types include ephemeral wetland (1.14 ha; Moderate to Very High ecological value), freshwater herbaceous (1.65 ha; Low to High value), sedgeland (0.98 ha; Low to Moderate value), seepage wetland (0.02 ha; High value) and shrubland wetland (0.03 ha; Moderate value). Induced wetlands have formed adjacent to WRS's at Coronation and Frasers due to emerging seepage, with seepage capture drains proposed to be installed to divert this seepage for treatment. This will result in the additional loss of 3.58 ha of induced wetland.

The drainage of wetlands has been largely avoided through project design, including fill earthworks and avoidance of headwater gullies. No indirect drainage of wetlands has been identified. Potential for dewatering has been identified at Coronation and Golden Bar, in which 0.55 ha of wetland at Coronation has been conservatively estimated to be of 'high risk' due to the extent in groundwater drawdown (up to

20 m), resulting in a cumulative loss of 2.10 ha of freshwater herbaceous wetland and 1.43 ha of sedgeland. Whilst these effects may not be realised as the drawdown estimate does not account for shallow and perched groundwater, or surface water contributions, this wetland extent has been conservatively considered to be lost due to uncertainty in the catchment (ground and surface water) contributions. An additional 0.38 ha, and 0.39 ha of wetland extent and Coronation and Golden Bar has been conservatively identified as 'moderate risk' of dewatering, however, are not considered to be lost.

In addition to MP4 works, additional wetland extent and values will be lost through inundation for the Camp Creek and Coal Creek reservoirs. This will result in the additional loss of 0.31 ha of sedgeland (Moderate value), 2.68 ha of freshwater herbaceous wetland (Moderate to High value), and 0.21 ha of copper tussock wetland (High value)

Overall, 11.50 ha of wetland extent will be lost through the MP4 impact area, seepage capture drains and Camp and Coal Creek reservoirs (Table 4-2).

Whilst these wetlands have been assigned a High ecological value, due to their ability to support Threatened and At Risk (TAR) flora, represent nationally vulnerable ecosystems in New Zealand, including those with an Critically Endangered threat status (ephemeral wetlands), inference from available plot data suggests¹ wetlands directly impacted through the project are indicated to support a high degree of exotic vegetation, with 58% of wetlands with supporting vegetation plot data containing at least 70% vegetation cover of exotic species. Under current land management, these conditions are unlikely to improve as agricultural inputs such as stock access resulting in grazing, pugging, soil compaction and excessive nutrient inputs; weed and exotic flora invasion, fire and drying winds.

Table 4-2. Extent of predicted effect (direct loss plus 20 m edge and dewatering and diversion of water) of natural wetland ecosystems per project area

Ecosystem	Value	Coronation North	Central Mining Area	Golden Bar / Haul Road	Camp Creek	Coal Creek	Frasers WRS	Total Affected area (ha)	Extent within OGNZL Landholdings(ha)
Ephemeral	Moderate to Very High	0.39 ha	0.62 ha	0.13 ha	-	-	-	1.14	9.70 ha
Sedgeland	Low to Moderate	0.54 ha	0.12 ha	0.77 ha	0.05 ha	0.26 ha	-	1.74	13.24 ha
Freshwater herbaceous	Low to High	1.66 ha	0.77 ha	0.41 ha	0.19 ha	2.49 ha	-	4.78	30.59 ha
Shrubland wetland	Moderate	0.01 ha	-	0.02 ha	-	-	-	0.03	0.082 ha
Seepage	High	0.02 ha	-	-	-	-	-	0.02	0.13 ha
Copper Tussock	High	-	-	-	-	0.21	-	0.21	0.95 ha
Induced wetland	Negligible to Low	0.35 ha					3.23	3.38	-
Total		2.97	0.77	1.33	0.24	2.96	3.23	11.50	55.36

In considering the overall cumulative effects of wetland loss from the MP4 component, seepage capture drains and Camp Creek and Coal Creek, a cumulative 11.5 ha of wetland extent, ranging from Low to Very High ecological value will be lost, equating to a loss of 20.77 % of wetlands within OGNZL Landholdings.

¹ 2.08 ha of impact wetland extent vegetation communities is supported through vegetation plot data.

(Table 4-2). The loss of wetland extent within OGNZL Landholdings was assessed to be of Moderate magnitude due to the overall extent of wetland loss, and its relative proportion within the local landscape.

Table 4-3. Magnitude of direct effect for total wetland extent throughout the MP4 Project Area and Camp and Coal Creek

Ecosystem	Value	Cumulative area lost	Magnitude of direct effect
Ephemeral	Moderate to Very High	1.14	Moderate to Very High
Sedgeland	Low to Moderate	1.74	Low to Moderate
Freshwater herbaceous	Low to High	4.78	Low to High
Shrubland wetland	Moderate	0.03	Moderate
Seepage	High	0.02	High
Copper Tussock	High	0.21	High
Induced wetland	Negligible - low	3.58	Low
Overall	Moderate	11.5 ha	Moderate

4.2.1.2.2 Indirect effects

Indirect effects on retained wetland habitat include catchment alteration through increased water, dust and sediment deposition, weed invasion along clearance margins, edge exposure, and accidental encroachment. A cumulative 7.08 ha of retained wetland extent has been identified within the 100 m buffer zone of the direct works area for the MP4 footprint and an additional 0.39 ha of wetland extent located adjacent to Coal Creek (cumulative 7.47 ha) (Table 4-4).

Potential catchment effects to wetland arise from the drainage (loss of surface water contribution), dewatering (loss of groundwater contribution) and catchment increase (greater volume of water entering the wetland). Potential catchment increases may occur at Coronation and Golden Bar Haul Road through the placement of sediment retention ponds at the headwaters and may then result in high water volumes or longer discharges into the wetlands. This may result in long periods of saturation in the wetlands, providing a low to positive level of effect.

Indirect effects on retained wetlands including accidental encroachment, dust and/or sediment deposition on vegetation surfaces, weed invasion and discharge of low-quality water can be appropriately managed through works boundary demarcation, dust suppression, erosion and sediment controls, catchment supplementation, and weed hygiene protocols.

Table 4-4. Extent of indirect (outside works footprint, within 20 to 100 m buffer) effect of wetland ecosystems per project area

Ecosystem	Coronation North	Central Mining Area	Golden Bar / Haul Road	Camp Creek	Coal Creek	WRS	Total Affected area (ha)
Ephemeral	-	2.64	1.23	-	-		3.87
Sedgeland	0.16	0.13	1.07	-	-		1.36
Freshwater herbaceous	0.12	0.08	0.6	-	0.39	0.97	2.16
Shrubland wetland	-	-	-	-	-		0
Seepage	-	-	-	-	-		0
Copper tussock	0.08	-		-	-		0.08
Total	0.36	2.85	2.9	0	0.39	0.97	7.47

Overall, the cumulative direct effects from the MP4 project and Camp and Coal Creek will result in a cumulative 11.5 ha of wetland loss (direct loss, dewatering and diversion), resulting in a low to very high level of effect, dependant upon wetland type and its extent lost (Table 4-5).

Table 4-5. Overall loss of wetland extent throughout MP4 and the Reservoirs, and the corresponding magnitude of effect

Ecosystem	Value	Cumulative area lost	Pre-management level of effect
Ephemeral	Moderate to Very High	1.14	Moderate to Very High
Sedgeland	Moderate	1.74	Moderate
Freshwater herbaceous	Low to High	4.78	Low to High
Shrubland wetland	Moderate	0.03	Moderate
Seepage	High	0.02	High
Copper Tussock	High	0.21	High
Induced wetland	Negligible - low	3.58	Low
Overall	Moderate	11.5 ha	Moderate

4.2.2 Species-level effects

4.2.2.1 Invertebrates

Direct effects on invertebrates include the permanent loss of tussock, shrubland, rock, wetland-margin and riparian habitats that support indigenous invertebrate communities, together with the risk of mortality of surface-active and litter-dwelling invertebrates during vegetation clearance, soil stripping and excavation (Bioresearches 2026b; E3).

Indirect effects include habitat fragmentation and reduced local habitat connectivity, dust effects on vegetation condition and insect food resources, weed invasion altering plant community composition, artificial lighting affecting nocturnal taxa during the operational phase, and reduced availability of host plants for specialist herbivorous taxa.

4.2.2.2 Lizards

The impact areas are estimated to support approximately 155,500 lizards (excluding consented areas already requiring Wildlife Act Authorities under current consents), with lizard habitat widespread across the project footprint in tussock grassland, dry shrubland, rock outcrop, dense herbaceous cover, and wetland margins. Kōrero gecko carries the highest conservation concern of the three species and is the primary focus of lizard compensation planning (Bioresearches 2026c; E4).

Direct effects include permanent loss of foraging, refugia and basking habitat through vegetation clearance and earthworks, and the risk of injury or mortality during removal of vegetation cover, surface soils and rock refugia. The risk of injury or mortality is highest during the removal of schist rock outcrops and dense tussock tufts, where lizards may not disperse ahead of machinery. Indirect effects include habitat fragmentation, reduced refugia availability along retained habitat margins, increased predation risk from mammalian predators at new clearance edges, noise and vibration near retained habitats, and reduced habitat connectivity across the landscape.

4.2.2.3 Birds

Direct effects include permanent loss and modification of open-country, tussock, shrubland, wetland-margin and pond-margin habitats used for foraging and nesting, and the risk of disturbance, displacement or direct mortality of nests and chicks if vegetation clearance or earthworks occur during the breeding season. Kārearea is particularly sensitive, as the species uses cliffs, tussock slopes and rock outcrops for nesting and is known to defend nest territories against disturbance. Indirect effects include noise, vibration, artificial lighting, vehicle movement, habitat fragmentation, and reduced foraging area within and adjacent to active works.

4.2.2.4 Bats

Based on the acoustic survey results and supporting assessment, bats are not carried through as an affected ecological component for the effects assessment. No bat management actions, Wildlife Act authorities, offset or compensation measures are proposed as part of the MP4 ecology programme.

Table 4-6. Summary of the ecological value, pre-management and residual levels of effect for Threatened, At Risk, Data Deficient and other notable species materially considered in the MP4 effects assessment. Residual effects are those remaining following avoidance, minimisation and remediation, prior to biodiversity offsetting or compensation. Flora includes both terrestrial and wetland-associated Threatened, At Risk, Data Deficient and other notable plant species for which effects have been assessed in the EclA.

Species	National / regional threat status	Ecological value	Pre-management level of effect	Residual level of effect*
Flora				
Dwarf broom (<i>Carmichaelia corrugata</i>)	Threatened – Nationally Vulnerable / Threatened – Regionally Critical	Very High	Very High	Very High
Indigenous St John's wort (<i>Hypericum rubicundulum</i>)	Threatened – Nationally Endangered / Threatened – Regionally Critical	Very High	Very High	Very High
Wetland daisy (<i>Lagenophora barkeri</i>)	At Risk – Declining / Threatened – Regionally Endangered	Very High	Moderate	Moderate
<i>Lobelia ionantha</i>	At Risk – Declining / Threatened – Regionally Endangered	Very High	Very High	Very High
Creeping button daisy (<i>Leptinella pusilla</i>)	At Risk – Declining / Threatened – Regionally Endangered	Very High	High	High
<i>Rytidosperma thomsonii</i>	At Risk – Declining / Threatened – Regionally Endangered	Very High	Very High	High
<i>Sonchus aff. novae-zelandiae</i>	Threatened – Nationally Endangered / Threatened – Regionally Endangered	Very High	Very High	Very High
Bidibidi (<i>Acaena buchananii</i>)	At Risk – Declining / Threatened – Regionally Vulnerable	Very High	Very High	High
Narrow-leaved speargrass (<i>Aciphylla subflabellata</i>)	At Risk – Declining / Threatened – Regionally Vulnerable	Very High	Moderate	Moderate
Tufted hair grass (<i>Deschampsia cespitosa</i>)	At Risk – Declining / Threatened – Regionally Vulnerable	Very High	Very High	Very High
<i>Epilobium insulare</i>	At Risk – Declining / Threatened – Regionally Vulnerable	Very High	Moderate	Low
<i>Euchiton polylepis</i>	At Risk – Declining / Threatened – Regionally Vulnerable	Very High	High	Very High
<i>Juncus pusillus</i>	At Risk – Naturally Uncommon / Threatened – Regionally Vulnerable	Very High	Moderate	Moderate
<i>Lobelia perpusilla</i>	Not Threatened / Threatened – Regionally Vulnerable	Very High	High	High
Dwarf greenhood orchid (<i>Pterostylis tristis</i>)	At Risk – Declining / Threatened – Regionally Vulnerable	Very High	High	High
Delicate bluegrass (<i>Anthosachne falcis</i>)	At Risk – Declining / At Risk – Regionally Declining	High	Low	Very Low
Desert broom (<i>Carmichaelia petriei</i>)	At Risk – Declining / At Risk – Regionally Declining	High	Low	Low
<i>Colobanthus strictus</i>	Not Threatened / At Risk – Regionally Declining	High	High	High
<i>Juncus distegus</i>	Not Threatened / At Risk – Regionally Declining	High	Low	Very Low
New Zealand mint / hīoi (<i>Mentha cunninghamii</i>)	At Risk – Declining / At Risk – Regionally Declining	High	Low	Very Low
<i>Rytidosperma buchananii</i>	At Risk – Declining / At Risk – Regionally Declining	High	High	Moderate
Wetland grass (<i>Agrostis pallescens</i>)	At Risk – Naturally Uncommon / At Risk – Regionally Naturally Uncommon	Moderate	High	Moderate
<i>Brachyscome longiscapa</i>	At Risk – Naturally Uncommon / At Risk – Regionally Naturally Uncommon	Moderate	Very Low	Low
Hooker's mountain daisy (<i>Celmisia hookeri</i>)	At Risk – Naturally Uncommon / At Risk – Regionally Naturally Uncommon	Moderate	Very Low	Negligible
<i>Lagenophora pinnatifida</i>	Not Threatened / At Risk – Regionally Naturally Uncommon	Moderate	Moderate	Moderate
<i>Poa pusilla</i>	Not Threatened / At Risk – Regionally Naturally Uncommon	Moderate	Moderate	Moderate

<i>Olearia bullata</i>	Not Threatened / At Risk – Regionally Naturally Uncommon	Moderate	Low	Low
<i>Oxalis rubens</i>	Not Threatened / Regionally Data Deficient	Moderate	Low	Very Low
Porcupine shrub (<i>Meliccytus aff. alpinus</i> (c), CHR 541568; “Otago”)	Data Deficient / Regionally Data Deficient	Moderate	High	Moderate
Invertebrates				
Invertebrate assemblage, Project-wide	–	High	Very High	High
<i>Orocrambus sophistes</i>	Threatened – Nationally Vulnerable / regional status not assigned	Very High	High	High
<i>Agrotis admirationis</i>	At Risk – Declining / regional status not assigned	High	High	High
<i>Asaphodes recta</i>	At Risk – Declining / regional status not assigned	High	High	High
<i>Dasyuris partheniata</i>	At Risk – Declining / regional status not assigned	High	High	High
<i>Nyctemera annulata</i>	At Risk – Declining / regional status not assigned	High	Low	Low
New Zealand praying mantis (<i>Orthodera novaezealandiae</i>)	At Risk – Declining / regional status not assigned	High	Low	Low
<i>Pasiphila</i> sp. A (NZAC 04285480)	At Risk – Declining / regional status not assigned	High	Low	Low
<i>Patagoniodes farinaria</i>	At Risk – Declining / regional status not assigned	High	Low	Low
<i>Samana acutata</i>	At Risk – Declining / regional status not assigned	High	High	High
<i>Theoxena scissaria</i>	At Risk – Declining / regional status not assigned	High	High	High
<i>Bityla sericea</i>	At Risk – Naturally Uncommon / regional status not assigned	Moderate	Moderate	Moderate
<i>Wiseana fuliginea</i>	Data Deficient / regional status not assigned	Moderate	Moderate	Moderate
<i>Wiseana mimica</i>	Data Deficient / regional status not assigned	Moderate	Moderate	Low
<i>Zelandobius uniramus</i>	Data Deficient / regional status not assigned	Moderate	Moderate	Moderate
Otago ground wētā (<i>Hemiandrus maia</i>)	Not Threatened / regional status not assigned	Low	Low	Low
<i>Mecodema</i> sp. “Oamaru”	Not listed / regional status not assigned	Moderate	Moderate	Moderate
<i>Orocrambus cf. cyclopicus</i>	Not listed / regional status not assigned	Moderate	Moderate	Moderate
Lizards				
McCann’s skink (<i>Oligosoma maccanni</i>)	Not Threatened / Regionally Not Threatened	Low	Moderate	Moderate
Southern grass skink (<i>Oligosoma chionocholescens</i>)	At Risk – Declining / At Risk – Regionally Declining	High	Very High	Very High
Kōrero gecko (<i>Woodworthia</i> “Otago/Southland”)	At Risk – Declining / At Risk – Regionally Declining	High	Very High	Very High
Avifauna				
Kārearea / eastern falcon (<i>Falco novaeseelandiae</i>)	Threatened – Nationally Vulnerable / Regionally Vulnerable	Very High	Moderate	Moderate
Banded dotterel / pohowera (<i>Charadrius bicinctus bicinctus</i>)	At Risk – Declining / Regionally Vulnerable	Very High	Moderate	Moderate
South Island pied oystercatcher / tōrea (<i>Haematopus finschi</i>)	At Risk – Declining / Regionally Vulnerable	Very High	Moderate	Moderate
Black shag / kōau (<i>Phalacrocorax carbo</i>)	At Risk – Relict / Regionally Endangered	Very High	Low	Low
New Zealand pipit / pīhoihoi (<i>Anthus novaeseelandiae</i>)	At Risk – Declining / Regionally Not Threatened	High	Low	Low
Silvereye / tauhou (<i>Zosterops lateralis</i>)	Not Threatened / Regionally Declining	High	Very Low	Very Low
Fernbird / mātātā (<i>Poodytes punctatus</i>)	At Risk – Declining / Regionally Declining	High	Very Low	Very Low

*Residual level of effect is the level remaining after avoidance, minimisation and remediation measures and before biodiversity offsetting or compensation.

4.3 Assessment limitations

The ecological investigations were undertaken over several years using desktop review, habitat mapping and a range of targeted field surveys. Nevertheless, ecological surveys cannot confirm the presence, absence or distribution of every species. The EIANZ Ecological Impact Assessment Guidelines were used for this assessment (Roper-Lindsay *et al.*, 2018).

Detection was influenced by seasonal timing, weather, species activity and the survey methods applied, particularly for rare, cryptic, transient or non-flowering species. The botanical surveys did not cover the full range of seasonal plant expression, invertebrate activity varies substantially between seasons, and fauna surveys provide estimates of presence and habitat use rather than complete population inventories. Lizard population estimates, particularly for kōrero gecko, are indicative because detection probabilities and the extrapolation of observed densities across mapped habitat introduce uncertainty. Avifauna surveys describe species presence and relative activity rather than absolute abundance, and the bat assessment was based on a single survey season.

Some uncertainty also remains in relation to habitat extent, wetland classification, hydrological effects and predicted restoration outcomes. Habitat mapping was focused on the Project footprint, surrounding assessment areas and potential management sites rather than providing a complete inventory of the approximately 15,000 ha of OGNZL landholdings.

Small or previously unrecognised habitat areas may therefore remain unmapped, although this would generally result in an overestimate of the proportion affected by the Project and is precautionary.

Wetland assessments were constrained by the number and seasonal timing of vegetation plots, evolving hydrological information, limited reference-condition sites and a lack of comparable restored wetlands within the Macraes Ecological District.

Restoration and compensation predictions therefore rely partly on professional judgement and assumed ecological trajectories, and will require baseline confirmation, ongoing monitoring and adaptive management.

The limitations and uncertainties described above are typical of ecological assessments for a project of this scale and complexity at the consenting stage. They do not indicate that the investigations are inadequate. Taken together, the desktop review, habitat mapping, targeted surveys, precautionary approach (as described below) and supporting technical assessments provide a sufficiently detailed and proportionate information base to identify the principal ecological values, assess the likely effects of the Project and develop appropriate management responses. The remaining uncertainties have been recognised explicitly and can be addressed through detailed design, pre-construction baseline confirmation, management-plan requirements, monitoring and adaptive management.

5 Ecological management

Adverse effects, as set out in Section 4, will be avoided and minimised through clear demarcation of approved work footprints and no-go areas, and retention of indigenous vegetation and rock habitat outside those footprints wherever practicable.

Pre-clearance surveys will be undertaken before works to identify nesting birds, TAR, taoka and invertebrate host flora within affected tussock grassland, shrubland, wetland and rock habitats, and areas occupied by indigenous lizards. Where practicable, work areas will be adjusted to avoid sensitive features, including any active nests of TAR bird species. Where effects cannot be avoided, salvage and relocation will be undertaken for lizards and suitable TAR and taoka plants, together with 10 % of tussock ecosystem vegetation direct transfer (VDT) of appropriate vegetation and soil substrates. Construction controls will also include staged vegetation and habitat clearance, dust suppression, erosion and sediment controls, lighting and access controls, weed hygiene and management, and rehabilitation of temporarily disturbed areas where practicable. These management measures are outlined below, and the levels of effect before and after mitigation are summarised in Table 5-1 to Table 5-3.

5.1 Ecosystem and habitat management

5.1.1 Vegetation and flora

Vegetation management will include VDT of approximately 10% of all directly impacted snow tussock communities. Habitat transfer into areas of temporary habitat loss involves salvaging and relocating intact sods or mats of vegetation, including the soil and root system. This technique allows for the preservation of biotic layers and facilitates the quick establishment of native plant communities with dense ground cover. Habitat transfer is particularly effective for low-stature ecosystems with dense root mats, such as tussock grasslands, and is an effective way of conserving both the vegetation and flora and fauna associated with the soil.

Threatened and At Risk and taoka plant species will be avoided where practicable (such as where they occur within the 20 m edge) and otherwise managed through salvage, seed or propagule collection, propagation, translocation, and incorporation into restoration planting schedules. Salvaged and propagated material will be established at prepared recipient sites and monitored to assess survival and establishment. These measures are expected to reduce pre-mitigation levels of effects for most TAR flora species.

For TAR flora, most species are expected to be able to be salvaged and/or propagated successfully, resulting in low-very low level effects on 16 TAR species, with outcomes less certain for eight species (5 spp.: moderate residual effect; 3 spp. High level effect). These residual effects are addressed through the wider terrestrial compensation package, including establishment of affected TAR species within protected restoration areas at MEEA, Cranky Jims Link and Mt Highlay. At Mt Highlay, approximately 15 ha of specialised planting around rock outcrops will incorporate rock-associated and TAR flora within the wider 175.65 ha tussock restoration programme, while restoration and habitat enhancement at MEEA and Cranky Jims Link will provide additional protected receiving habitat for affected species. These actions are intended to increase the abundance, distribution and long-term security of TAR flora within the Macraes Ecological District, although successful establishment remains uncertain for some species.



Figure 5.1. Narrow-leaved snow tussock at Coronation North.

5.1.2 Wetlands

Indirect effects on retained wetlands are assessed across the wider wetland assessment area. These effects are managed through wetland boundary demarcation, fencing and no-go areas, erosion and sediment controls, hydrology monitoring and adaptive management, dust suppression, and wetland plant salvage and propagation where practicable. At least 10 Threatened, At Risk or regionally Data Deficient hydric plant species are recorded in impact wetlands and shall be subject to salvage and relocation commitments under the Wetland Management Plan (E9) (see Table 4-6 and Table 6-1). After application of avoidance, minimisation and remediation measures, residual adverse effects on all wetland types require residual effects management through the wetland compensation package (see section 6.5).

5.2 Species-level management

5.2.1 Invertebrates

The Invertebrate Management and Monitoring Plan (IMMP) (document E10; Bioresearches 2026i) details measures focused on salvage and relocation of Threatened, At Risk, Data Deficient, and other notable indigenous invertebrates from affected habitats, as well as habitat enhancement. Vegetation Direct Transfer of approximately 10% of affected host vegetation will be undertaken where practicable to retain host plants, associated substrate, and habitat structure. Salvage and relocation will be timed and implemented in accordance with species activity, habitat requirements, and the methods set out in the IMMP.

While these measures are expected to reduce the extent and severity of some adverse effects, uncertainty remains regarding the effectiveness of certain mitigation techniques, particularly for less well-known taxa,

such as *Orocrambus sophistes*, which are partially addressed through the broader tussock grassland compensation package.

Following implementation of the IMMP, a Low to High residual level of effect for the overall invertebrate assemblage and for several At Risk and notable species (including *Orocrambus sophistes*, *Agrotis admirationis*, *Asaphodes recta*, *Dasyuris partheniata*, *Samana acutata*, and *Theoxena scissaria*) remains (Bioresearches, 2026l; E13). Accordingly, while mitigation may not fully address the permanent loss of individuals and habitat within the Project footprint, any losses relate largely to small numbers of individuals or to a relatively small area of the total available habitat for invertebrate species in the wider surrounding landscape. Thus, biodiversity compensation as outlined in the Terrestrial Residual Effects Analysis (document E13; Bioresearches 2026l) will contribute to addressing residual effects on invertebrates.

5.2.2 Lizards

Lizard management will involve intensive salvage and relocation operations for lizards, transferring lizards from affected habitats both before and during staged habitat clearance to a suitably appropriate and secure site. Salvaged lizards will be relocated to Murphys Link, into an area that provides appropriate habitat, long-term habitat security, and mammalian predator suppression. OGNZL proposes a substantial seasonal lizard salvage effort: a minimum of 120 person-hours per hectare (up to 180 person hrs/ ha) in each staged mining area, and salvage undertaken over 40–60 days per season—while recognising that salvage cannot recover every animal or replace lost habitat. The salvage and relocation programme will be supervised by suitably qualified and authorised herpetologists/ ecologists.

Furthermore, lizard management also provides for the creation of 62 rock stacks to replace the 47 directly lost and 17 potentially indirectly impacted in the 20 m buffer. The carefully and thoughtfully constructed rock stacks will be installed in Murphys Link to enhance habitats for relocated and resident lizards.

Despite these efforts, lizard mitigation will not reduce the overall level of effect on indigenous lizards. Southern grass skink and kōrero gecko retain a Very High residual level of effect after management, reflecting the magnitude of habitat loss relative to their local population sizes and the acknowledged limitations on complete salvage and relocation success. McCann's skink is assigned Low ecological value in accordance with the EclAG because it is nationally and regionally 'Not Threatened'. However, given the High magnitude of effect, the large number of individuals potentially affected and the species' ecological and cultural importance within the local ecosystem, the level of effect has been conservatively increased from Low to Moderate based on professional judgement. All three affected species are addressed through biodiversity compensation in the Terrestrial Residual Effects Analysis (document E13; Bioresearches 2026l), delivered through the MEEA predator-exclusion fence and landscape-scale pest control (document E18; Alliance Ecology 2026), and associated compensation programme to at least Year 2050.

Lizard management is detailed in the project's Lizard Management and Monitoring Plan (LMMP) (document E11; Bioresearches 2026j), and the management aligns with the vision and objectives of OceanaGold's overarching Lizard Management Strategy (OceanaGold 2026).

5.2.3 Avifauna

Avifauna management will include pre-works nesting surveys within proposed clearance and disturbance areas during the relevant breeding seasons. Any active nest identified will be clearly demarcated and protected through an appropriate exclusion buffer, with works avoided or modified until the nest is no longer active. Nest management will be undertaken in accordance with the Avifauna Management Plan (AMP; document E12; Bioresearches 2026k) and under the direction of a suitably qualified ornithologist.

Following implementation of management requirements as set out in the AMP, overall levels of effects are not expected to reduce the severity of effects on threatened bird species (kārearea, South Island Pied Oyster Catcher and banded dotterel), on the basis of the magnitude of available habitat contraction. For these species, the residual level of effect is assessed as Moderate.

For all other avifauna species, the level of effect is Low or Very Low, reflecting the mobility of birds and the availability of suitable habitat within the wider landscape.

Kārearea, banded dotterel, and South Island pied oystercatcher are the three avifauna species identified as requiring biodiversity compensation, addressed through the landscape-scale pest control (document E18; Alliance Ecology 2026) and habitat enhancement programme associated with the MEEA.

Table 5-1. Summary of terrestrial vegetation and habitat effects, avoidance, minimisation and remediation measures, and residual level of effect for MP4. The residual level of effect does not include biodiversity compensation.

Ecological component	Ecological value	Direct adverse effects	Indirect adverse effects	Magnitude of effect, unmitigated	Level of effect, unmitigated	Proposed avoidance, minimisation and remediation measures	Residual level of effect after avoidance, minimisation and remediation
Narrow-leaved snow tussock grassland	High	Permanent loss or modification of approximately 75.42 ha within the direct works footprint. Including the precautionary allowance for potential effects on adjoining vegetation, up to 90.01 ha is assessed as affected.	Potential dust deposition, weed invasion, edge effects, altered runoff or soil moisture, and accidental encroachment into retained vegetation.	High	Very High	Avoidance and footprint refinement where practicable; clear demarcation of works and no-go areas; retention of vegetation outside the approved footprint; VDT of affected snow tussock communities in accordance with the Vegetation and TAR Flora Management Plan; dust suppression; erosion and sediment control; weed hygiene and control; and rehabilitation of temporary disturbance areas where practicable.	Very High. Permanent vegetation loss remains and requires residual effects management.
Dry shrubland	Moderate	Permanent loss or modification of approximately 2.22 ha within the direct works footprint. Up to 3.06 ha is assessed as affected when the precautionary allowance for adjoining effects is included.	Potential weed invasion, dust deposition, edge effects, altered runoff, fragmentation and accidental encroachment into retained shrubland.	Low	Low	Avoidance and footprint refinement where practicable; works-boundary demarcation and protection of retained shrubland; dust suppression; erosion and sediment control; weed hygiene and control; and rehabilitation of temporary disturbance areas where practicable.	Low. The permanent loss remains and is addressed as part of the wider terrestrial residual effects management package.
Schist rock outcrops and tors	Very High	Permanent loss or disturbance of approximately 0.16 ha of rock habitat. Up to 0.26 ha is assessed as affected when the precautionary allowance for adjoining effects is included. Loss includes specialised rocky habitat supporting indigenous flora and fauna.	Potential dust deposition, weed establishment, accidental disturbance, altered runoff and degradation of retained rock-associated vegetation and habitat.	Low*	Moderate	Avoid retained rock outcrops and tors where practicable through final set-out; clearly demarcate retained rock habitat; prevent unnecessary stripping, burial or disturbance; undertake pre-clearance ecological checks; salvage or directly transfer associated vegetation and substrate where feasible; and apply dust, weed and access controls around retained features.	Moderate. Permanent loss of physical rock habitat cannot be remediated and requires residual effects management.

*The proportional and absolute loss of rock habitat would otherwise indicate a Negligible magnitude. The EclA adopts a precautionary Low magnitude to recognise the Very High ecological value and low replaceability of schist rock habitat.

Table 5-2. Summary of wetland ecological effects, management measures and overall level of effect for wetland and riparian receptors affected by MP4. The table summarises direct and indirect adverse effects, the unmitigated magnitude of effect, proposed avoidance, minimisation and remediation measures, residual effects management, and the overall level of effect after management prior to residual effects management. The final (residual) level of effect, reported here, does not consider biodiversity compensation.

Wetland type	Overall ecological value	Direct adverse effects	Indirect adverse effects	Magnitude of effect, unmitigated	Proposed avoidance, minimisation and remediation measures	Residual level of effect after avoidance, minimisation and remediation
Ephemeral wetland	Moderate to Very High	Direct reclamation and effective loss of ephemeral wetland extent within the works footprint and 20 m buffer. Loss of naturally uncommon wetland ecosystem values and associated indigenous wetland plant habitat.	Potential drainage or dewatering, altered surface-water inputs, altered inundation frequency, sedimentation, dust deposition, weed invasion and accidental encroachment. Ephemeral wetlands are sensitive to changes in wetting and drying cycles.	High to Very High	Final footprint demarcation, no-go areas, wetland boundary protection, erosion and sediment controls, dust suppression, hydrology monitoring and adaptive management, weed control, and salvage or transfer of wetland soils, seedbank or plant material where practicable.	Moderate to Very High. Residual effects addressed through wetland compensation.
Riparian freshwater herbaceous vegetation	High	Direct loss or modification of riparian herbaceous wetland vegetation were located within the works footprint or where wetland function is effectively lost.	Potential sedimentation, dust deposition, altered runoff, water-quality effects, weed invasion and edge effects along retained riparian wetland margins.	Moderate	Works boundary demarcation, protection of retained riparian margins, erosion and sediment controls, dust suppression, runoff management, weed hygiene, weed control and reinstatement of temporarily disturbed wetland margins where practicable.	High. Residual effects addressed through wetland compensation
Riparian sedgeland	Moderate	Direct loss or modification of riparian sedgeland vegetation within the works footprint or where wetland function is effectively lost.	Potential sedimentation, altered runoff, dust deposition, weed invasion, water-quality effects and accidental encroachment.	Moderate	Boundary demarcation, no-go areas where practicable, erosion and sediment controls, dust suppression, weed control, runoff management and reinstatement of disturbed riparian margins where practicable.	Moderate. Residual effects addressed through wetland compensation
Riparian shrubland	Moderate	Direct loss or modification of riparian shrubland or wetland-margin shrub vegetation were located within the works footprint or 20 m buffer.	Potential edge effects, altered runoff, sedimentation, dust deposition, weed invasion and accidental encroachment.	Moderate	Boundary demarcation, no-go areas where practicable, erosion and sediment controls, dust suppression, weed control and protection of retained riparian margins.	Moderate. Residual effects addressed through wetland compensation.
Wetland freshwater herbaceous vegetation	Low to High	Direct reclamation and loss of freshwater herbaceous wetland extent. Includes loss of wetland vegetation, hydrological function and potential rare wetland plant habitat where present.	Potential drainage or dewatering, altered runoff or catchment inputs, sedimentation, dust deposition, weed invasion and water-quality effects on retained wetland areas.	Moderate	Wetland boundary demarcation, fencing or no-go areas where required, erosion and sediment controls, dust suppression, water-quality controls, hydrology monitoring where relevant, weed management, and salvage or propagation of TAR wetland plants where practicable.	Low to High. Residual effects addressed through wetland compensation.
Wetland sedgeland	Moderate	Direct reclamation and loss or modification of sedgeland wetland extent within the works footprint or 20 m buffer.	Potential drainage or dewatering, sedimentation, dust deposition, altered runoff, weed invasion, water-quality effects and accidental encroachment.	Moderate	Wetland demarcation, fencing or no-go areas where required, erosion and sediment controls, dust suppression, hydrology monitoring where relevant, weed control and reinstatement of disturbed margins where practicable.	Low to Moderate. Residual effects addressed through wetland compensation

Wetland type	Overall ecological value	Direct adverse effects	Indirect adverse effects	Magnitude of effect, unmitigated	Proposed avoidance, minimisation and remediation measures	Residual level of effect after avoidance, minimisation and remediation
Wetland seepage	High	Direct loss of small seepage wetland extent within the works footprint. Loss of seepage-fed wetland vegetation and associated wetland function.	No indirect effects identified.	Moderate	Footprint demarcation, erosion and sediment controls, dust suppression, hydrology monitoring where relevant, weed control and salvage of wetland plant material where practicable.	High. Residual effects addressed through wetland compensation.
Wetland shrubland	Moderate	Direct loss or modification of small wetland shrubland extent and associated wetland-margin vegetation.	No indirect effects identified	Moderate	Boundary demarcation, no-go areas where practicable, erosion and sediment controls, dust suppression, weed control and protection of retained wetland margins.	Moderate. Residual effects addressed through wetland compensation.
Copper Tussock	High	Direct reclamation and loss or modification of copper tussock wetland extent within the works footprint or 20 m buffer.	Potential edge effects, altered runoff, sedimentation, dust deposition, weed invasion, water-quality effects and accidental encroachment.	High	Boundary demarcation, no-go areas where practicable, erosion and sediment controls, dust suppression, weed control and protection of retained wetland margins.	High. Residual effects addressed through wetland compensation.

Table 5-3. Summary of terrestrial flora and fauna effects, avoidance, minimisation and remediation measures, and final level of effect for terrestrial ecological components affected by MP4. The final (residual) level of effect, reported here, does not consider biodiversity compensation.

Terrestrial ecological component	Ecological value	Direct adverse effects	Indirect adverse effects	Overall Magnitude of effect	Overall Level of effect (unmitigated)	Proposed avoidance, minimisation and remediation measures	Residual level of effect after avoidance, minimisation and remediation
Threatened, At Risk, Data Deficient and locally uncommon terrestrial plants	Very High	Loss or disturbance of recorded plants and supporting habitat where individuals occur within the works footprint or 20 m buffer and cannot be avoided. Effects include removal of small or localised populations and loss of associated seedbank or habitat conditions.	Dust deposition, weed invasion, altered runoff or soil moisture, edge effects, accidental encroachment, and degradation of retained habitat or nearby plant records.	High	Very High*	Pre-clearance surveys; final set-out to avoid plants where practicable; no-go areas and demarcation; VDT where suitable; seed collection; propagation; salvage and translocation; recipient-site preparation; weed control; dust suppression; monitoring of transferred or salvaged material.	Low–Very Low for most species that are amenable to targeted salvage, propagation and planting. • High: 3 spp. • Moderate: 5 spp; • Low/Very Low: 16 spp.
Terrestrial invertebrates	High	Loss of tussock, shrubland, wetland-margin, riparian, rock and modified grassland habitats supporting invertebrate communities. Potential mortality during vegetation clearance, soil stripping and excavation.	Habitat fragmentation, reduced local habitat continuity, dust effects on vegetation, weed invasion, altered microhabitat conditions, artificial lighting effects on nocturnal taxa and reduced host-plant availability.	Moderate	High*	Invertebrate Management Plan; salvage and relocations; Staged vegetation clearance; VDT; dust and lighting controls; weed management; targeted management for TAR and notable invertebrates.	Low–High • High: 6 spp. • Moderate: 5 spp. • Low: 6 spp.
Lizards	High	Loss of tussock grassland, rock habitat, shrubland, dense grass, wetland-margin and modified habitats used by McCann’s skink, southern grass skink and kōrero gecko. Potential injury or mortality during vegetation clearance, earthworks and removal of refugia.	Habitat fragmentation, reduced refugia, increased edge exposure, dust effects on vegetation and prey, noise and vibration near retained habitat, increased predation risk along new edges and reduced habitat connectivity.	High	High*	Lizard Management Plan; pre-clearance habitat checks; salvage and relocation where required; staged habitat clearance; careful removal of refugia; relocation-site preparation; habitat enhancement at relocation sites; dust and access controls; monitoring of salvage and relocation outcomes.	Moderate–Very High • Very High: 2 spp. • Moderate: 1 sp.
Avifauna	Moderate	Loss and modification of open-country, tussock, shrubland, wetland-margin, pond-margin and mine-modified habitats used by indigenous birds. Potential disturbance, displacement or direct effects on nests if works occur during the breeding season.	Noise, vibration, lighting, dust, vehicle movement, habitat fragmentation, reduced habitat availability, increased edge effects and disturbance of retained foraging or nesting habitat.	Moderate	Moderate*	Avifauna Management Plan; pre-works checks; seasonal controls where practicable; nest management procedures for ground-nesting and other protected birds; staged clearance; minimisation of disturbance near active nests; dust and lighting controls.	Very Low–Moderate • Moderate: 3 spp. • Low: 3 spp. • Very Low: 17 spp.

* species dependent (refer to EclA, document E7; Bioresearches 2026f for detail).

6 Residual Effects Management

The overall objective of the residual effects management package is to achieve a net positive biodiversity outcome at the landscape scale, such that the enduring conservation benefits of the package outweigh the residual adverse effects of the Project. The package has been designed to provide direct redress for affected habitats and species wherever practicable, while also investing in strategic actions that facilitate the protection and recovery of biodiversity values of particularly high ecological importance within the Macraes Ecological District.

Despite the scale of the proposed management actions and the application of quantitative biodiversity accounting where suitable information is available, positive outcomes cannot be demonstrated with sufficient certainty for every affected value. Rock outcrop and tor habitat cannot be recreated within meaningful ecological timeframes, the successful establishment of some TAR plant species remains uncertain, and some wetland, invertebrate and lizard outcomes have long or uncertain recovery pathways. These limitations are acknowledged explicitly, and the package is therefore characterised as biodiversity compensation rather than a strict biodiversity offset.

However, the remaining losses are considered in the context of a substantially broader conservation programme. The package includes approximately 175 ha of tussock revegetation, 50 ha of dry shrubland restoration, 15 ha of planting around rock habitat, protection and management of approximately 500 ha of existing tussock grassland, 88 ha of shrubland and 44.5 ha of rock habitat, and the removal of approximately 265 ha of plantation forestry to avert the future loss of open indigenous habitats and associated wetlands. It also establishes a 252 ha predator-exclusion sanctuary within a wider approximately 1,170 ha pest-management buffer (which will be protected and maintained in perpetuity), restores ecological connections between protected areas, and initiates the recovery of depleted dryland podocarp–broadleaved forest.

These actions provide benefits that extend beyond the direct replacement of affected habitat. In particular, the MEEA predator-exclusion fence will create the largest predator-fenced management area for Otago skink and will support a network of secure management units for Otago skink, grand skink, kōrero gecko, southern grass skink and other indigenous fauna. The restoration and connectivity programme will also increase the extent, condition, resilience and long-term security of indigenous habitats across a modified pastoral and mining landscape.

6.1 Residual Effects Package

The Residual effects package combines direct habitat restoration and protection, species-focused management, threat reduction, averted habitat loss, ecological connectivity and long-term legal and operational protection. This section describes the proposed actions at Murphys Ecological Enhancement Area (MEEA), Mt Highlay, Cranky Jims Link and other wetland management areas (Figure 6.1), before summarising the predicted outcome for each affected habitat type and notable species in the accompanying residual effects table. Wetland compensation at Cranky Jims Link, Macraes Central and Murphys Outer will restore sedgeland and shrubland wetlands, establish copper tussock wetland, enhance degraded ephemeral wetlands, protect seep wetlands and provide receiving habitat for salvaged wetland flora.

Figure 6.1 (Over page) Summary of MP4 Residual Effects Management Package

COMPENSATION PACKAGE

MACRAES PHASE 4

Three sites for terrestrial compensation package components are proposed, along with additional sites for wetland compensation actions

Wetland Residual Effects

The compensation package targets wetland and riparian habitats across multiple sites throughout OGL landholdings. Compensation actions will improve wetland extent, condition, hydrology, flora and riparian function. Key creation, restoration, enhancement and protection measures include:

- 6.9 ha of sedgeland
- 5.6 ha copper tussock wetland
- 1.9 ha of degraded ephemeral wetland
- 0.2 ha of seep wetland
- 0.1 ha of shrubland wetland
- 1.8 ha indigenous herbaceous wetland
- 9 ha of unclassified wetland

Murphys Ecological Enhancement Area

A large, managed refuge for lizards, as well as protected habitat for birds, invertebrates and indigenous vegetation communities.

- 252 ha Predator Exclusion Fence
- 1,170 ha landscape-scale mammalian pest control
- 395 ha continuous covenant connecting MEEA to Redbank (Murphys Link)

Mt Highlay

Integrates tussock restoration, VDT (Vegetation Direct Transfer) and the ongoing protection of lizard habitat through an "averted loss" approach

- 175 ha of Tussock Planting, including 15 ha of rock edge flora restoration
- Removal of 265 ha of exotic pine preventing the future degradation of lizard habitat

Cranky Jims Link

Buffers and connects Cranky Jims Shrubland Covenant with Island Block Covenant to the north, with 50 ha of dry shrubland planting followed by enrichment to transition towards a podocarp-broadleaf forest, a functionally extinct ecosystem within the Macraes' ecological district

Connection of MEEA (known Otago skink population) to Redbank Covenant (grand skink population) links two 'Threatened' fauna species within the region

6.2 Mount Highlay Restoration Area

The Mount Highlay Restoration Area (Figure 6.2) combines approximately 175 ha of tussock restoration planting with removal of plantation saplings over 265 ha. Without intervention, the plantation will naturally develop towards a closed-canopy exotic forest with limited indigenous understory value and would displace or fragment lizard (and some TAR flora) and open-country habitat. Removing the young plantation averts that future loss and allows recovery towards tussock-dominated vegetation through planting, VDT and ongoing management.

Tussock restoration is strategically aligned with the highest density of rock outcrop habitat where shallow-soil flora species, associated with snow tussock habitats, comprise a strong component of shallow-soil plantings around a five metre edge from these features.

6.3 Cranky Jims Link and dryland podocarp restoration

Cranky Jims Link (Figure 6.3) establishes approximately 50 ha of indigenous shrubland and protects or enhances existing shrubland and rock habitat. The site connects currently separated covenant areas, improving habitat continuity and resilience.

Foundational planting over approximately 21 ha is also intended to initiate the return of dryland podocarp forest. This vegetation type represents the probable pre-human forest cover of parts of the Macraes Ecological District but is now functionally extinct there. Re-establishment is necessarily long term and uncertain, but it offers ecological, cultural and landscape benefits that are not captured by a like-for-like tussock or shrubland accounting model.

6.4 Murphys Ecological Enhancement Area (MEEA)

The MEEA (Figure 6.4) is the core fauna and landscape restoration component of the MP4 Project. A predator-exclusion fence will establish an approximately 252 ha pest-excluded area within the Murphys Creek catchment. The fence will be constructed within five years of consent being issued, with construction expected to take approximately 18 months to two years. Pest eradication within the fenced area will be completed during the first winter following completion of the fence, after which target pest mammals will be managed at zero density in accordance with the Pest Control and Elimination Plan. Maintenance of the MEEA fence will extend to 2050, after which it will be transferred to a special purpose trust which will be funded by a closure capitalisation fund set up by OGNZL. At this stage the parties to the trust and its governance have not been confirmed. This will be supported by landscape-scale mammalian pest management across approximately 1,170 ha, together with weed management, habitat enhancement and legal protection.

The wider Murphys Link connects the enhancement area with the existing Redbank Station Covenant and other protected habitat. This strengthens ecological continuity for lizards, including the Threatened grand skink, as well as birds and invertebrates and reduces the isolation of existing conservation areas.

The MEEA will provide a landscape-scale ecological protection and enhancement area and is a key project-enabled conservation outcome. OGNZL will fund maintenance of the predator-exclusion fence and

associated pest management through to 2050. After 2050, the MEEA will transfer, together with Cranky Jims Link and Mt Highlay, to a special purpose trust funded through an OGNZL closure capitalisation fund.

6.4.1 Predator-exclusion fence EclA

A separate Ecological Impact Assessment has considered the construction, operation and maintenance of the MEEA predator-exclusion fence (Bioresearches, 2026p; E17). The preliminary assessment uses a conservative approximately 4.64 ha fence corridor enclosing approximately 252 ha. Subject to final alignment survey and ecological verification, micro-siting, footprint minimisation, avoidance of occupied Otago skink and high-value rock habitat, and appropriate flora, fauna and wetland management are expected to reduce the level of effect to Very Low or Low. No fence-specific offset or compensation is considered necessary. The long-term benefits of predator exclusion are addressed separately as part of the wider MP4 biodiversity compensation package.

Figure 6.2 (Over page). Summary of compensation actions at Mt. Highlay.

Figure 6.3 (Following page) Summary of compensation actions at Cranky Jims Link.

Figure 6.4 . (Following page) Summary of compensation actions at Murphys Ecological Enhancement Area.

Mt Highlay



Tussock Restoration

Strategic integration of 175 ha of tussock restoration including 7.5 ha of Vegetation Direct Transfer (VDT) from the impact sites



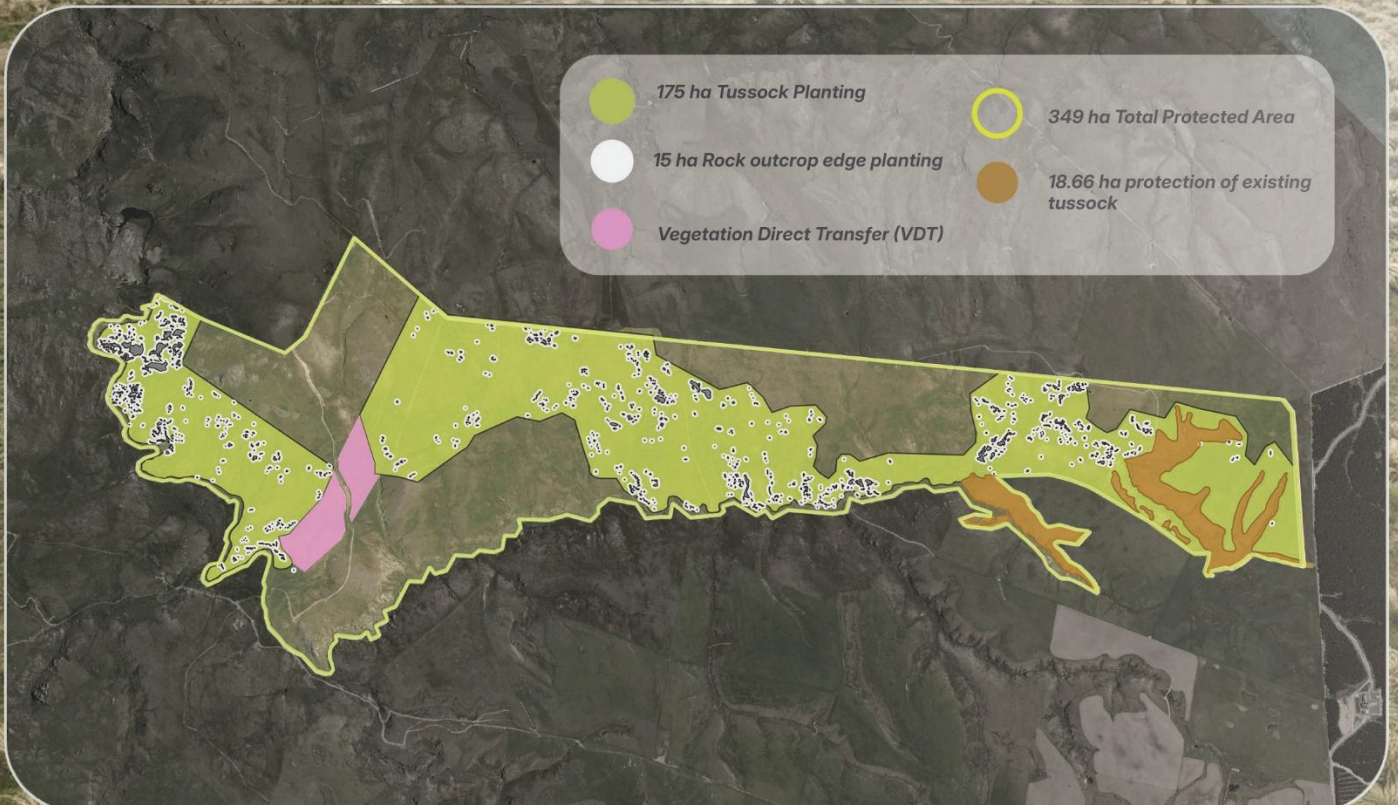
Averted Loss Approach

Removal of 265 ha of planted exotic forestry and protection of habitat for the future benefit of native lizards

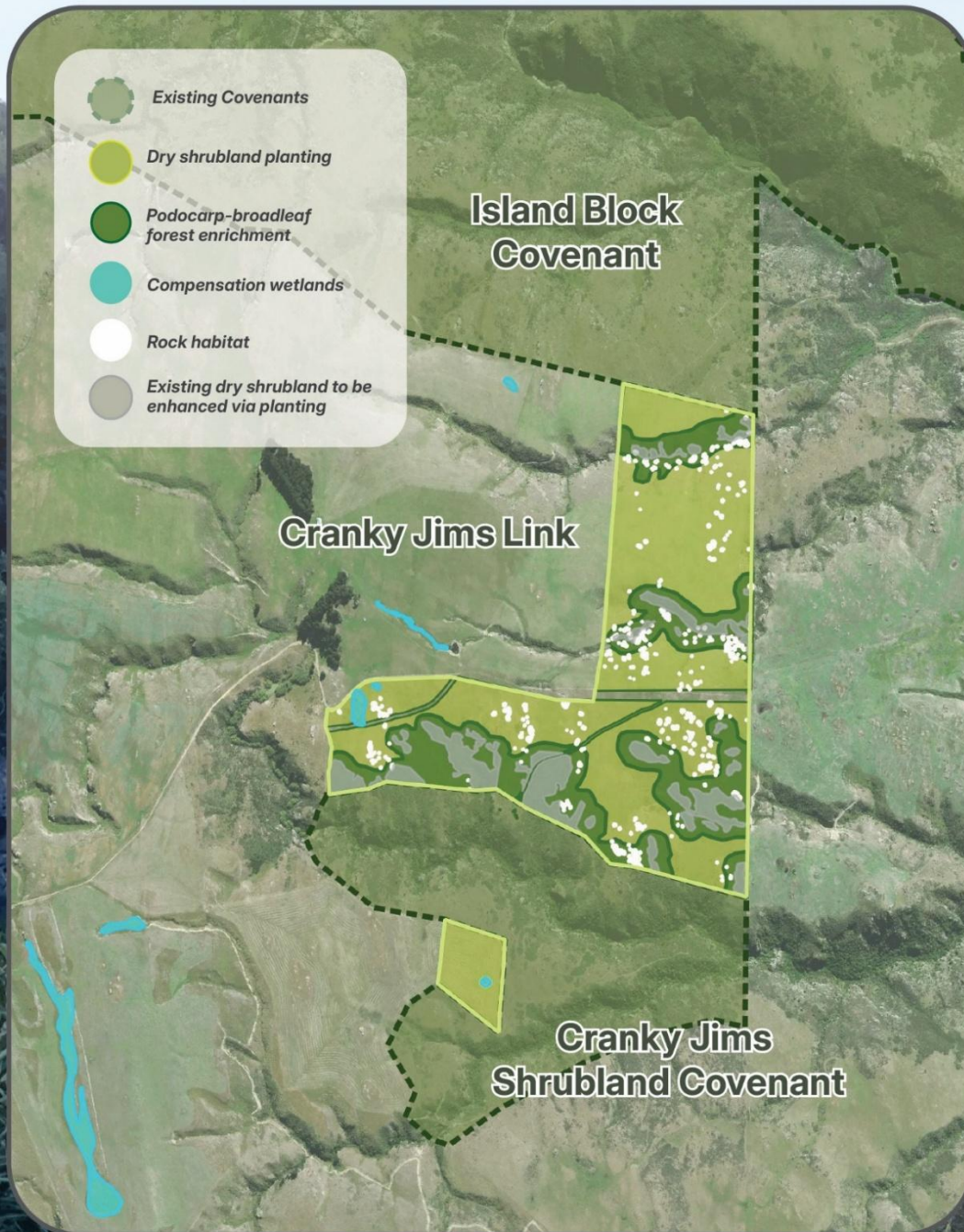


Dedicated rock edge planting

15 ha rock outcrop edge planting with shallow-soil specialists including TAR flora species



Cranky Jims Link



Buffers and connects Cranky Jims Shrubland Covenant with Island Block Covenant to the north, with 50 ha of Dry shrubland planting designed to transition towards podocarp-broadleaf forest, a functionally extinct ecosystem in the ecological district



Planting and connection of covenants provides habitat for indigenous bird species, including:

- Pipipi (brown creeper)
- Miromiro (tomtit)
- Piwakawaka (fantail)
- Riroriro (grey warbler)
- Tūī



Transition from dry shrubland to podocarp-broadleaf forest, an otherwise lost ecosystem within the Macraes'



MURPHYS ECOLOGICAL ENHANCEMENT AREA

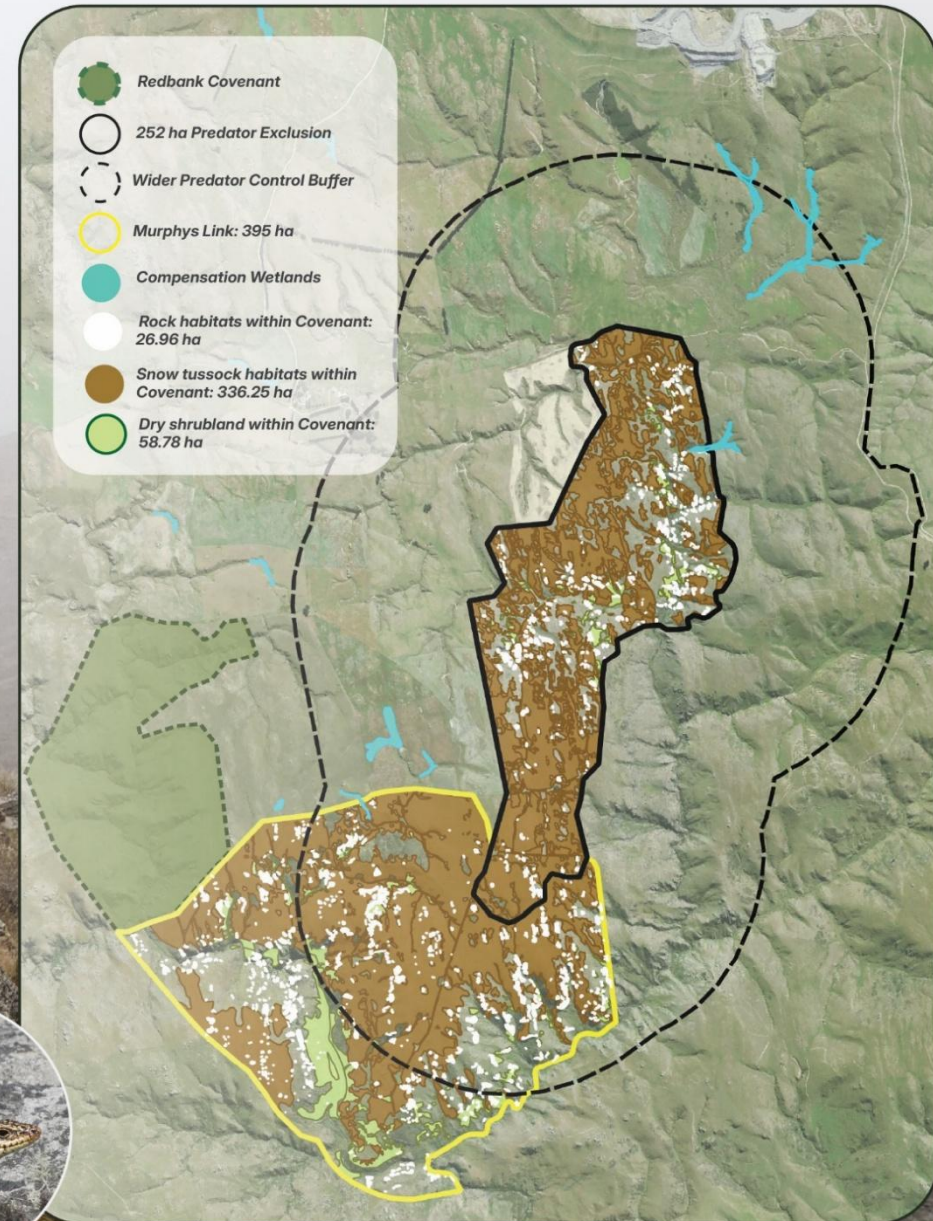


A large, managed refuge for lizards, as well as protected habitat for birds, invertebrates and indigenous vegetation communities.



Protection of rock habitats provides benefits for indigenous flora, invertebrates, lizards and avifauna

Connection of MEEA - via Murphys Link- to Redbank Covenant links grand skink and Otago skink populations, both 'Threatened' within the region



6.5 Wetland and riparian compensation

The wetland package includes sedgeland restoration, copper tussock wetland creation and restoration, enrichment of degraded ephemeral wetlands, shrubland wetland restoration, protection of seep wetlands, hydric plant salvage and hydrological management. Riparian restoration along the North Branch Waikouaiti River and Murphys Creek is proposed to address instream and margin effects and improve connectivity between terrestrial and freshwater habitats.

The key components include:

- Restoration and enhancement of approximately 2.78 ha of degraded ephemeral wetlands
- Restoration and enhancement of approximately 5.48 ha of sedgeland wetland
- Establishment and enhancement of approximately 5.06 ha of copper tussock wetland,
- Restoration and protection of approximately 0.12 ha of shrubland wetland;
- Enhancement and establishment of Threatened and At Risk wetland plants
- Protection and stock exclusion of approximately 0.22 ha of headwater seep wetland; and
- Protection and stock exclusion of approximately 0.96 ha of wetland, and 2.48 ha of riparian habitats.

The proposed Camp Creek and Coal Creek wetland compensation package includes restoration, enhancement and protection actions across multiple locations within OGL landholdings.

The key components include:

- Restoration and enhancement of approximately 1.47 ha of sedgeland wetland
- Restoration, establishment and enhancement of approximately 0.54 ha of copper tussock
- Enhancement and establishment of Threatened and At Risk wetland plants
- Protection and stock exclusion of 9 ha of wetland

6.6 Compensation Outcomes

More than 875 ha of indigenous vegetation and habitats is proposed to be added to the existing network of ecological covenants and protected management areas, compared with an overall disturbance area of approximately 360 ha. (of which not all holds ecological value). The protected area includes MEEA, tussock enhancement land adjacent to MEEA, Mount Highlay pine removal and restoration areas, and additional land at Cranky Jims that links existing covenants. The exact covenant schedule must be confirmed in the final spatial package.

6.6.1 Durability and Additionality

The compensation package includes both enduring protection of compensation land and active ecological management over defined implementation and management periods. OGNZL will fund the relevant compensation actions and pest-management programme through to 2050, including maintenance of the MEEA predator-exclusion fence. After 2050, the MEEA, Cranky Jims Link and Mt Highlay compensation areas will transfer to a special purpose trust funded through an OGNZL closure

capitalisation fund. The predator-exclusion fence, landscape-scale pest control, plantation removal, creation of new ecological connections, dryland podocarp restoration, wetland programme and surrender of development rights associated with the Back Road Waste Rock Stack are all linked to MP4 and would not reasonably be expected to occur under the no-project scenario.

Table 6-1. Predicted outcomes for vegetation, wetlands and TAR flora ecological components.

Indigenous component	Ecological value	Residual effect	Compensation	Predicted Outcome
Terrestrial or Wetland habitat Type				
Narrow leaved snow tussock grassland 90.01 ha	High	Very High	175 ha tussock revegetation at Mt Highlay; 354.88 ha tussock protection, pest control and stock exclusion at MEEA and Mt Highlay	Net Positive (modelled and unmodelled)
Dry Shrubland 3.06 ha	Moderate	Low	50 ha shrubland revegetation at Crankys Link; 87.84 ha shrubland protection, pest control and stock exclusion at MEEA, Mt Highlay and Crankys Link	Net Positive (modelled and unmodelled)
Rock outcrop / tor 0.26 ha	Very High	Moderate	15 ha Rock outcrop/ tor edge planting at Mt. Highlay; 44.5 ha rock tor habitat protection, pest control and stock exclusion at MEEA, Mt Highlay and Crankys Link	Net Positive (unmodelled)
Ephemeral Wetland	Moderate-High	Very High	2.95 ha enhancement and restoration through 1.8 ha Cranky Jims Connection. 0.98 ha at Macraes Central/Golden Bar Haul Road. 0.17 ha at Murphys Link.	Uncertain
Freshwater herbaceous wetland (FHW)	Low-High	High	5.6 ha restoration and enhancement through: 2.08 ha Cranky Jims Connection, 3.52 ha Macraes Central, and 4.5 ha wetland protection in perpetuity at Coal Creek, 0.96 ha wetland and riparian protection in perpetuity and Murphys Link	Net Positive (modelled and unmodelled)
Sedgeland	Low-Moderate	Moderate	6.9 ha restoration and enhancement through 1.93 ha Cranky Jims Connection, 1.63 ha Murphys Link, 3.4 ha at Macraes Central, and 3.6 ha wetland protection in perpetuity at Coal Creek	Net Positive (modelled and unmodelled)
Seepage wetland	High	Low	0.22 ha wetland protection in perpetuity at Murphys Link	Net Positive (unmodelled)
Shrubland wetland	Low-Moderate	Low	0.14 ha revegetation and enhancement at Murphys Link	Net Positive (modelled)
Copper tussock wetland	Moderate	High-Very High	0.92 ha wetland protection in perpetuity at Coal Creek	Net Positive (unmodelled)

Indigenous component	Ecological value	Residual effect	Compensation	Predicted Outcome
Induced wetland	Negligible to Low	Low	4.14 ha wetland protection in perpetuity at Mt Highlay	Net Positive (unmodelled)
TAR Flora				
Dwarf broom (<i>Carmichaelia corrugata</i>)	Very High	Very High	8,799 plants included in Mt Highlay planting, moderate likelihood of success	Uncertain
Indigenous St John's wort (<i>Hypericum rubicundulum</i>)	Very High	Very High	No compensation planting	Net Loss (Very High)
Wetland daisy (<i>Lagenophora barkeri</i>)	Very High	Moderate	No compensation planting	Net Loss (Moderate)
<i>Lobelia ionantha</i>	Very High	Very High	Wetland restoration planting lists	Net Loss (Moderate)
<i>Leptinella pusilla</i>	Very High	High	No compensation planting	Net Loss (High)
<i>Rytidosperma thomsonii</i>	Very High	Very High	No compensation planting	Net Loss (Very High)
<i>Sonchus novae-zelandiae</i>	Very High	Very High	No compensation planting	Net Loss (Very High)
<i>Acaena buchananii</i>	Very High	High	No compensation planting	Net Loss (High)
Narrow-leaved speargrass (<i>Aciphylla subflabellata</i>)	Very High	Moderate	139,779 plants included in Mt Highlay planting, moderate likelihood of success	Net Positive (unmodelled)
Tufted hair grass (<i>Deschampsia cespitosa</i>)	Very High	Very High	No compensation planting	Net Loss (Very High)
<i>Epilobium insulare</i>	Very High	Low	No compensation planting	Net Loss (Low)
<i>Euchiton polylepis</i>	Very High	Very High	No compensation planting	Net Loss (Very High)
<i>Juncus pusillus</i>	Very High	Moderate	Ephemeral restoration planting lists	Net Loss (Low)
<i>Lobelia perpusilla</i>	Very High	High	Ephemeral restoration planting lists	Net Loss (Low)
Dwarf greenhood orchid (<i>Pterostylis tristis</i>)	Very High	High	No compensation planting	Net Loss (High)
Delicate bluegrass (<i>Anthosachne falcis</i>)	High	Very Low	No compensation planting	Net Loss (Very Low)
Desert broom (<i>Carmichaelia petriei</i>)	High	Low	Plantings: 49,076 plants at Mt Highlay 7730 plants at Cranky Jims Link Moderate likelihood of success	Net Positive (unmodelled)
<i>Juncus distegus</i>	High	Very Low	No compensation planting	Net Loss (Very Low)

Indigenous component	Ecological value	Residual effect	Compensation	Predicted Outcome
New Zealand mint / hīoi (<i>Mentha cunninghamii</i>)	High	Very Low	No compensation planting	Net Loss (Very Low)
<i>Rytidosperma buchananii</i>	High	Moderate	No compensation planting	Net Loss (Moderate)
Wetland grass (<i>Agrostis pallescens</i>)	Moderate	Moderate	No compensation planting	Net Loss (Moderate)
<i>Brachyscome longiscapa</i>	Moderate	Low	No compensation planting	Net Loss (Low)
Hooker's mountain daisy (<i>Celmisia hookeri</i>)	Moderate	Very Low	No compensation planting	Net Loss (Very Low)
<i>Poa pusilla</i>	Moderate	Moderate	No compensation planting	Net Loss (Moderate)
<i>Shawia bullata</i> (formerly <i>Olearia bullata</i>)	Moderate	Low	Plantings: 1065 plants at Cranky Jims Link Moderate likelihood of success	Net Positive (unmodelled)
<i>Oxalis rubens</i>	Moderate	Very Low	No compensation planting	Net Loss (Very Low)
Porcupine shrub (<i>Melicytus</i> aff. <i>alpinus</i> 'Otago')	Moderate	Moderate	No compensation planting	Net Loss (Moderate)

Table 6-2. Predicted outcomes for TAR fauna ecological components.

Indigenous component	Ecological value	Residual effect	Compensation	Predicted Outcome
Invertebrates				
<i>Orocrambus sophistes</i>	Very high	High	Host-plant replanting of narrow-leaved snow tussock (<i>Chionochloa rigida</i> subsp. <i>rigida</i>) at Mt Highlay Station only: 233,110 plants in the open tussock planting zone plus 17,247 plants in the rock outcrop buffer zone (250,357 plants total). Further potential benefit from the MEEA fence, buffer and Murphys Link protection package; monitoring.	Uncertain
<i>Agrotis admirationis</i>	High	High	No species-specific host plant identified in the Restoration Plan; general benefit from the combined ~175 ha snow tussock (Mt Highlay) and ~50 ha dry shrubland (Cranky Jims Link) revegetation, plus MEEA/buffer/Murphys Link protection; release-site monitoring.	Uncertain
<i>Asaphodes recta</i>	High	High	Host-plant replanting of fireweed (<i>Senecio dunedinensis</i>): 27,594 plants in the Mt Highlay rock outcrop buffer zone.	Uncertain

Indigenous component	Ecological value	Residual effect	Compensation	Predicted Outcome
<i>Dasyuris partheniata</i>	High	High	Host-plant replanting of speargrass (<i>Aciphylla subflabellata</i>), all at Mt Highlay: 127,802 plants in the open tussock zone plus 11,977 plants in the rock outcrop buffer zone (139,779 plants total). Not recorded at Cranky Jims Link.	Uncertain
<i>Nyctemera annulata</i>	High	Low	Host-plant replanting of fireweed (<i>Senecio dunedinensis</i>): 27,594 plants in the Mt Highlay rock outcrop buffer zone (shared planting with <i>Asaphodes recta</i>).	Net Positive (unmodelled)
<i>Orthodera novaezealandiae</i>	High	Low	No species-specific host plant identified in the Restoration Plan; general benefit from the shrubland/tussock revegetation at both sites and the MEEA fence (includes suitable dry shrubland habitat).	Net Positive (unmodelled)
<i>Pasiphila</i> sp. A (NZAC 04285480 "Carmichaelia")	High	Low	Host-plant replanting across four <i>Carmichaelia</i> species used as TAR insect hosts for this species: coral broom (<i>C. crassicaulis</i> subsp. <i>crassicaulis</i>) 100,047 plants; desert broom (<i>C. petriei</i>) 56,806 plants; dwarf broom (<i>C. corrugata</i>) 8,799 plants; climbing broom (<i>C. kirkii</i>) 7,695 plants, plus a further 6,683 <i>C. kirkii</i> in the Cranky Jims Stage 2 podocarp-broadleaf enrichment list. Combined total: approximately 173,347 plants across both planting sites.	Net Positive (unmodelled)
<i>Patagoniodes farinaria</i>	High	Low	No species-specific host plant identified in the Restoration Plan; general benefit from tussock/shrubland revegetation at both sites and the MEEA/buffer/Murphys Link protection package.	Uncertain
<i>Samana acutata</i>	High	High	Same host-plant suite and numbers as <i>Pasiphila</i> sp. A above (coral broom, desert broom, dwarf broom, climbing broom, with approximately 173,347 plants across Mt Highlay and Cranky Jims Link).	Net Positive (unmodelled)
<i>Theoxena scissaria</i>	High	High	Same host-plant suite and numbers as <i>Pasiphila</i> sp. A above (approximately 173,347 plants across Mt Highlay and Cranky Jims Link).	Net Positive (unmodelled)
<i>Bityla sericea</i>	Moderate	Moderate	Host-plant replanting of three <i>Coprosma</i> species, all at Cranky Jims Link Stage 1 pioneer planting: <i>C. crassifolia</i> (mikimiki) 3,786 plants; <i>C. intertexta</i> 4,348 plants; <i>C. propinqua</i> (mingimingi) 2,899 plants (11,033 plants total).	Net Positive (unmodelled)

Indigenous component	Ecological value	Residual effect	Compensation	Predicted Outcome
<i>Wiseana fuliginea</i>	Moderate	Moderate	Host plant unknown/not identified, but larvae thought to feed on pasture grasses, which are abundant in the local landscape; general habitat protection package (MEEA, buffer, Murphys Link).	Uncertain
<i>Wiseana mimica</i>	Moderate	Low	Host plant unknown/not identified (as above); general habitat protection package.	Uncertain
<i>Zelandobius uniramus</i>	Moderate	Moderate	No planting-based host measure (aquatic stonefly); potential benefit of stream habitat protection within the MEEA fence, buffer and Murphys Link; monitoring.	Uncertain
<i>Hemiandrus maia</i>	Low	Low	No species-specific host plant identified; general tussock/shrubland revegetation and MEEA/buffer/Murphys Link protection package.	Net Positive (unmodelled)
<i>Mecodema</i> sp. "Oamaru"	Moderate	Moderate	No species-specific host plant identified (ground beetle); general benefit from revegetation and MEEA fence (includes habitat for this species), buffer and Murphys Link protection.	Uncertain
<i>Orocrambus</i> cf. <i>cyclopicus</i>	Moderate	Moderate	Host-plant replanting of narrow-leaved snow tussock (<i>Chionochloa rigida</i> subsp. <i>rigida</i>) at Mt Highlay: 250,357 plants (same planting as for <i>Orocrambus sophistes</i> above).	Uncertain
Lizards				
McCann's skink	Low	High	Predator exclusion within the 252 ha MEEA fence and averted habitat loss through removal of ~265 ha of plantation forestry at Mt Highlay. The species-specific BOAM predicts positive outcomes across all three modelled habitat categories.	Net Positive (modelled & unmodelled)
Southern grass skink	High	Very high	Predator exclusion within the 252 ha MEEA fence and averted habitat loss through removal of ~265 ha of plantation forestry at Mt Highlay. The species-specific BOAM predicts positive outcomes for two of the three modelled habitat categories, but unmodelled compensation benefits expected to outweigh modelled deficits.	Net Positive (modelled & unmodelled)

Indigenous component	Ecological value	Residual effect	Compensation	Predicted Outcome
Kōrero gecko	High	Very high	Rock habitat protection, plantation removal at Mt Highlay, predator exclusion/ suppression, and improved connectivity between rock, snow tussock and shrubland habitats. No species-specific BOAM was possible due to a lack of gecko density data; a positive response is inferred from <i>Woodworthia</i> "Central Otago" gecko counts approximately doubling within a predator-exclusion fence over five years (Turner & Norbury, 2023), but the magnitude of benefit cannot currently be quantified for this species.	Net Positive (unmodelled)
Avifauna				
Kārearea / eastern falcon (<i>Falco novaeseelandiae</i>)	Very High	Moderate	252 ha predator exclusion within MEEA and 1,170 ha landscape-scale predator suppression within the surrounding buffer.	Net Positive (modelled)
Banded dotterel / pohowera (<i>Charadrius bicinctus bicinctus</i>)	Very High	Moderate	252 ha predator exclusion within MEEA and 1,170 ha landscape-scale predator suppression within the surrounding buffer.	Net Positive (modelled)
South Island pied oystercatcher / tōrea (<i>Haematopus finschi</i>)	Very High	Moderate	252 ha predator exclusion within MEEA and 1,170 ha landscape-scale predator suppression within the surrounding buffer.	Net Positive (modelled)
New Zealand pipit / pīhoihoi (<i>Anthus novaeseelandiae</i>)	High	Low	No species-specific compensation measure. Predicted to benefit from pest control, and large scale tussock planting.	Net Positive (unmodelled)
Silvereye / tauhou (<i>Zosterops lateralis</i>)	High	Very Low	50 ha shrubland revegetation at Crankys Link	Net Positive (modelled)
Fernbird / mātātā (<i>Poodytes punctatus</i>)	High	Very Low	No species-specific compensation measure and not confirmed as resident or breeding onsite. Expected to benefit from 50 ha shrubland revegetation at Crankys Link, 87.84 ha shrubland protection, stock exclusion at MEEA, Mt Highlay and Crankys Link	Uncertain

The residual effects management package will also provide additional benefits that are not relied upon to counterbalance the quantified MP4 residual effects. These additional benefits are set out in Table 6-3 below.

Table 6-3. Additional Conservation benefits of the MP4 compensation package.

Ecological value	Proposed benefit	Predicted outcome
Otago skink	Protection and predator exclusion for the population within MEEA.	Net Positive (unmodelled)

Dry Shrubland bird species	Protection and predator exclusion within MEEA and Cranky Jims for the species not directly impacted by MP4 footprint (e.g. Tui, bellbird, brown creeper, tomtit). Additional habitat created at Cranky Jim's link with dry shrubland planting.	Net Positive (modelled)
Depleted podocarp-broadleaved forest components	Enrichment planting within Cranky Jims Link to initiate succession towards an ecosystem now highly depleted within the Macraes Ecological District	Net Positive (unmodelled)
Landscape connectivity	Connection and buffering of MEEA, Redbank, Cranky Jims and Island Block protected areas	Net Positive (unmodelled)

6.7 Community and mana whenua considerations

Engagement with Kā Rūnaka and other relevant stakeholders has occurred during development of the MP4 ecological assessments and residual effects management package, including discussion of the proposed restoration approach and the form of the compensation package. This engagement is ongoing and formal feedback on the final package is still awaited. The project approach recognises that Kā Rūnaka does not support large areas of uniform tussock planting where other restoration methods may deliver better ecological outcomes, and that conversion of productive pasture to tussock may not be supported by the local farming community. These considerations have informed development of a package intended to be ecologically effective, practical and enduring, while remaining responsive to consultation outcomes as they are confirmed.

6.8 Overall conservation legacy

Collectively, the conservation gains attributable to the MP4 Project cover an area of over 2,000 hectares. These gains, encompassing restoration and maintenance of ecological condition and function, have been designed with longevity in mind and are expected to leave a lasting conservation benefits.

7 Monitoring and adaptive management

7.1 Purpose of monitoring

Monitoring serves three functions:

1. to verify compliance with management plan obligations;
2. to assess the effectiveness of management measures and requirement for adaptive management measures; and
3. to track biodiversity outcomes at compensation and enhancement areas over time.

Monitoring results inform adaptive management responses where performance targets are either not being met or when evidence shows that some actions are achieving better outcomes than others. The monitoring framework for MP4 is distributed across the ecological management plans and residual effects reports, with coordination responsibilities held by OGNZL (Bioresearches, 2026g–k; E8–E12; Bioresearches, 2026l; E13; Bioresearches, 2026m; E14). Monitoring also provides the evidence required to assess the condition and trajectory of compensation values before the proposed transfer of the principal terrestrial compensation areas to the special purpose trust after 2050.

7.2 Monitoring framework

7.2.1 Compliance monitoring

Compliance monitoring confirms that management plan obligations are being implemented as required, including works demarcation, no-go area establishment, ecological supervision attendance, fauna salvage completion, wetland protection measures, dust and sediment control maintenance, and reporting deadlines. Compliance monitoring is the responsibility of the relevant SQEP (ecological

supervisor) and the OGNZL environmental manager, with records maintained and reporting prepared annually.

7.2.2 Effectiveness monitoring

Effectiveness monitoring assesses whether management measures are achieving their intended outcomes; for example, whether lizard salvage rates are consistent with expected capture efficiencies, whether wetland hydrological monitoring indicates retained wetlands are maintaining expected inundation regimes, and whether invertebrate salvage and host plant relocation have resulted in establishment at recipient sites.

7.2.3 Outcome monitoring

Outcome monitoring assesses biodiversity outcomes at compensation and enhancement areas against the performance targets set in the residual effects report. Key outcome monitoring commitments are: vegetation condition, cover and species richness at tussock and shrubland compensation areas (assessed at 5, 10 and 20 years); wetland condition, vegetation cover, species richness and TAR plant presence at compensation wetland sites (assessed at 2, 5, 7 and 15 years); lizard density within MEEA (assessed annually for at least 5 years); avifauna breeding success at enhanced habitat areas (assessed annually); and pest animal catch rates across the landscape-scale pest control area (assessed annually) (Bioresearches 2026l, E13; Bioresearches 2026m, E14).

7.2.4 Trigger-based monitoring

Trigger-based monitoring involves specific checks at defined thresholds that prompt an escalated management response. Examples include wetland hydrological monitoring with triggers for remedial action if inundation frequency falls below defined thresholds; lizard density monitoring with triggers for enhanced pest control or habitat management if density targets are not being approached by defined review dates; and vegetation monitoring with triggers for supplementary planting or weed control if cover targets are not achieved.

7.3 Construction-phase monitoring

7.3.1 Vegetation clearance monitoring

Ecological supervision records during vegetation clearance provide the primary compliance monitoring data for vegetation management obligations. Records include clearance areas and dates, TAR plant salvage outcomes, VDT operations, no-go area compliance, and any unexpected values encountered. Vegetation clearance monitoring reports will be provided to OGNZL.

7.3.2 Wetland protection monitoring

Wetland protection monitoring during construction confirms that wetland boundary demarcation is in place, buffer fencing is intact, and hydrological monitoring equipment is operational at all designated monitoring wetlands. Any evidence of encroachment, fence damage, hydrological anomalies or vegetation change within retained wetlands is reported to the OGNZL Environmental Manager and recorded for adaptive management or remediation recommendations to be actioned.

7.3.3 Invertebrate salvage monitoring

Invertebrate salvage monitoring records salvage effort, salvage conditions, general descriptions of invertebrates salvaged and relocated, and the species and numbers of host plants salvaged and relocated. Post-release monitoring at recipient sites is undertaken to assess whether notable species, and other indigenous invertebrate groups, are present at the release sites in the years following the relocations and to determine the success of host plant translocations and planting of host plants for notable invertebrates, to assess the potential habitat quality for relocated species. Salvage outcomes are reported in the annual compliance report (Bioresearches 2026i; E10).

7.3.4 Lizard salvage monitoring

Lizard salvage monitoring records capture rates by species, sex, age class and habitat type, and records of injuries or mortalities associated with the salvage operation. Salvage findings reports are prepared after each salvage event and summarised in annual compliance reports. Relocation sites, including the constructed rock piles, are monitored for lizard activity to assess continued occupancy and changes in abundance over time (Bioresearches 2026j; E11).

7.3.5 Breeding bird monitoring

Pre-works breeding surveys are undertaken annually before the commencement of vegetation clearance or earthworks in areas with confirmed or potential presence of TAR breeding birds. Survey results determine the location and timing of no-go buffers and seasonal controls for that works season. Annual breeding bird surveys are also conducted at compensation and enhancement areas to assess changes in breeding pair numbers and productivity over time (Bioresearches 2026k; E12).

7.4 Residual effects monitoring

7.4.1 Terrestrial compensation monitoring

Terrestrial compensation monitoring at MEEA, Cranky Jims Link and Mount Highlay Restoration Area includes vegetation cover and composition monitoring at permanent plots within revegetation and enhancement areas; pest animal monitoring (kill traps and tracking tunnels); lizard monitoring (pitfall traps, coverboards, visual encounter surveys) within MEEA; avifauna breeding success monitoring; and weed management monitoring. Monitoring results are assessed against the BOAM performance targets at 5, 10 and 20 years, with interim results reviewed annually to inform adaptive management (Bioresearches 2026l; E13).

7.4.2 Wetland compensation monitoring

Wetland compensation monitoring at Cranky Jims Link, Macraes Central and Murphys Outer includes vegetation plots, photographic records, TAR plant presence and abundance, hydrological monitoring and weed monitoring. Monitoring methods and plot locations are specified in the Wetland Monitoring Plan (Bioresearches 2026p; E17). Results are assessed against performance targets at 2, 5, 7 and 15 years. Benchmark site monitoring provides the reference conditions against which compensation wetland trajectories are evaluated.

7.4.3 Pest animal monitoring

Pest animal control monitoring will be undertaken across all sites subject to pest animal control measures (e.g., prior to and following the construction of the MEEA predator-exclusion fence, across the 1,170 ha landscape-scale pest control area, and within Murphys Link). Pest animal monitoring is detailed in the Pest Control Report (Alliance Ecology 2026). Annual reporting confirms that pest control operations are being implemented and assesses control effectiveness. Where catch rates indicate poor control efficacy, adaptive responses including increased trap density, alternative control methods or supplementary control are implemented (Bioresearches 2026l E13; Alliance Ecology 2026).

7.4.4 Flora and fauna response monitoring

Flora and fauna response monitoring at compensation areas tracks the ecological response to management actions over time. For flora, this includes survival and recruitment monitoring of transplanted TAR plants at wetland compensation sites, and diversity and cover monitoring at vegetation compensation plots. For fauna, this includes lizard response monitoring at MEEA and recipient sites, invertebrate monitoring at recipient sites, and avifauna response monitoring at enhanced habitat areas (Bioresearches, 2026g–k; E8–E12; Bioresearches, 2026l; E13).

7.5 Ecological performance targets and triggers

Performance targets are quantitative benchmarks that define when a compensation outcome is on track or has been achieved. For tussock and shrubland compensation, targets are specified at 5, 10 and 20 years for cover, indigenous species richness and structural height. For wetland compensation, targets are specified at 2, 5, 7 and 15 years for indigenous cover, species richness and TAR plant presence. Adaptive management triggers are defined as the thresholds below which interim targets indicate that the compensation trajectory is insufficient to achieve the 15-year outcome, and which require corrective action (Bioresearches 2026l, E13; Bioresearches 2026m, E14).

7.6 Adaptive management and contingency measures

Where monitoring indicates that progress toward ecological performance targets are not on track, per pre-defined biodiversity targets, adaptive management or corrective actions are implemented within a defined timeframe. Corrective actions may include supplementary planting; enhanced weed control; adjusted pest control methods or intensity; additional flora salvage or seed collection operations; or re-assessment of relocation site suitability. Where corrective actions do not return the compensation trajectory to target within a specified timeframe, contingency measures (such as replace or plant alternative species) may be needed. These could be escalated responses, including additional conservation investment at alternative sites within the Macraes Ecological District, may be required.

7.7 Reporting and review

Annual compliance and monitoring reports are to be prepared by the relevant SQEP and provided to OGNZL summarising management plan implementation, salvage outcomes, monitoring results and

adaptive management actions taken during the year. Reports are prepared by the ecological supervisor or the relevant specialist practitioners for each value group. A comprehensive review of compensation outcomes is conducted at the 5-year, 10-year and 20-year milestones, with findings reported to OGNZL and made available for regulatory audit and consent compliance. Reporting prior to 2050 should also document the condition of the MEEA fence, pest-management performance, ecological outcomes achieved, outstanding management requirements and information necessary to support the proposed transition to the special purpose trust.

8 Conclusion

The Macraes Phase 4 Project will result in unavoidable residual effects on indigenous tussock grassland, wetlands, schist rock habitat, Threatened and At Risk flora, and habitat used by indigenous fauna. Extensive avoidance, minimisation and remediation measures have been incorporated into the Project design, including refinement of mining footprints, protection of retained habitats, species salvage and relocation programmes, and the surrender of previously granted resource consents for development of high ecological value areas such as Back Road Waste Rock Stack. These measures significantly reduce ecological effects but cannot avoid all permanent habitat loss and impacts associated with the Project.

OGNZL's response to these residual effects is a substantial biodiversity compensation package that extends beyond simple hectare-for-hectare replacement. The package combines predator exclusion, landscape-scale pest control, habitat restoration, wetland enhancement, covenant protection, ecological connectivity and prevention of future habitat loss to achieve broader and more enduring biodiversity gains across the Macraes Ecological District.

The proposed actions, including the MEEA, Mount Highlay restoration, Cranky Jims Link restoration, wetland compensation programme, and long-term management commitments through to at least 2050, represent a significant conservation investment that is directly attributable to MP4 and would not be expected to occur in the absence of the Project.

Biodiversity accounting and ecological assessment indicate that, following implementation of the compensation package, Net Positive outcomes are expected for tussock grassland, dry shrubland, lizards, and avifauna, while wetland compensation is expected to achieve No Net Loss, and in some cases Net Positive outcomes, for wetland values. While some residual losses will remain, particularly for schist rock habitat and certain Threatened and At Risk plant species, these effects are outweighed by the scale of the long-term conservation gains provided by the wider package.

The compensation package provides for enduring protection and restoration of substantial areas of terrestrial and wetland habitat, supported by active pest management and predator exclusion through the committed management period. OGNZL will fund the MEEA predator-exclusion fence and pest-management programme through to 2050, after which the MEEA, Cranky Jims Link and Mt Highlay will transfer to a special purpose trust funded through a closure capitalisation fund. The detailed post-2050 governance arrangements remain to be confirmed.

Overall, while MP4 will result in some permanent ecological losses, the combination of avoidance, mitigation, compensation, enduring protection and adaptive management is expected to deliver a positive biodiversity outcome at the Macraes Ecological District scale. The Project is therefore considered to provide an appropriate and proportionate response to its residual ecological effects and to establish a substantial conservation legacy through to at least 2050.

9 References

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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.