

Macraes Phase 4 Fast-track

Residual Effects Terrestrial Restoration Plan

for: OceanaGold New Zealand Limited



DOCUMENT APPROVAL AND REVISION HISTORY

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Cover Illustration: Overview of Cranky Jims Shrubland Covenant.

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List of Abbreviations

Abbreviation	Full term	Description
BOAM	Biodiversity Offset Accounting Model	Quantitative biodiversity accounting model used to determine the scale and expected outcomes of terrestrial compensation actions.
ED	Ecological District	Ecological land classification unit. In this Plan, this generally refers to the Macraes Ecological District.
FTAA	Fast-track Approvals Act 2024	Legislation under which the Macraes Phase Four Project is being progressed.
MEEA	Murphys Ecological Enhancement Area	Proposed ecological enhancement and compensation area comprising protected indigenous habitats, intensive pest animal management and associated ecological connections.
MP4	Macraes Phase Four	The proposed fourth phase of development at the Macraes Operation.
OGNZL	OceanaGold New Zealand Limited	Owner and operator of the Macraes Operation and applicant for the MP4 Project.
RETRP	Residual Effects Terrestrial Restoration Plan	This Plan sets out the implementation, maintenance and monitoring requirements for terrestrial restoration and compensation actions.
TAR	Threatened and At Risk	Species classified as Threatened or At Risk under the New Zealand Threat Classification System.
VDT	Vegetation Direct Transfer	The salvage and transfer of intact vegetation and associated substrate from an impact area to a prepared receiving site.

1 EXECUTIVE SUMMARY

This Residual Effects Terrestrial Restoration Plan has been prepared for OceanaGold New Zealand Limited (OGNZL) to support the proposed Macraes Phase Four Project. The Project is being pursued under the Fast-track Approvals Act 2024 and would extend the life of mining operations at Macraes until at least 2039. The Project will result in permanent vegetation clearance, earthworks, and landform modification within the MP4 works footprint.

Following application of the Effects Management Hierarchy, significant residual adverse effects remain for indigenous terrestrial vegetation, specifically tussock grassland and dry shrubland habitats. The confirmed areas of residual indigenous vegetation loss are up to 90.01 hectares (ha) for tussock grassland and 3.06 ha for grey scrub. These residual effects require offset and/or compensation actions to achieve a net positive outcome for indigenous terrestrial biodiversity values.

The compensation package includes revegetation, protection and enhancement of existing indigenous vegetation, pest plant control, stock exclusion, and pest animal control. These actions are proposed across three restoration sites: Murphys Ecological Enhancement Area (MEEA), Cranky Jims Link, and Mt Highlay Station. Key actions include a 252ha predator-exclusion fenced area and surrounding predator control 1 kilometre buffer at MEEA; protection of existing tussock and dry shrubland habitats at MEEA, Cranky Jims Link, and Mt Highlay; dry shrubland and tussock revegetation planting (at Cranky Jims Link and Mt Highlay, respectively); and targeted enrichment planting at Cranky Jims Link to support longer-term ecological succession towards podocarp-broadleaf forest, an otherwise regionally extinct ecosystem.

This Plan sets out the methods required to implement and maintain the terrestrial compensation package, including site preparation, weed control, pest animal control, ecosourcing, planting procedures, infill planting, and staged implementation. New plants are to be ecosourced from within the Macraes Ecological District where practicable, with inclusion of on-site seed collection to preserve local gene pools.

Monitoring of the planting sites (Cranky Jims Link and the Mt Highlay restoration site) will be undertaken annually during the first five years following planting, followed by five-yearly monitoring at Years 10, 15, and 20 at Cranky Jims Link only. Monitoring will assess plant establishment, indigenous vegetation cover, indigenous species richness, threatened and at-risk plant species richness, and, for dry shrubland habitat, shrubland bird diversity. Monitoring results will inform adaptive management, including replacement planting, additional weed control, pest animal control, or other contingency actions where required.

The overall objective of this Plan is to provide a clear framework for implementing, maintaining and monitoring the terrestrial restoration actions required to compensate for residual adverse effects on indigenous terrestrial vegetation associated with the MP4 Project, and to support achievement of a net positive outcome for indigenous terrestrial biodiversity values within the Macraes Ecological District.

2 INTRODUCTION

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

Reflecting recent exploration success and optimisation work, together with higher gold prices, the Macraes Phase Four Project (“**MP4**” or “**the Project**”) seeks to extend the life of mining at the Macraes Operation until-at least 2039. This Residual Effects Terrestrial Restoration Plan (RETRP) has been prepared for the proposed Macraes MP4 Project on behalf of OGNZL.

2.1 MP4 Project Overview

The Project is made up of the following proposed key activities (as shown in Appendix B):

- Open pit extensions at Golden Bar, Coronation, Coronation North, and Innes Mills, and Golden Bar.
- Underground mine expansion through further development of the Golden Point Underground mine (“GPUG”).
- Tailings management, including:
 - Construction of the Frasers Tailings Storage Facility (“FTSF”) Stage 3 to accommodate a total tailings storage of up to an additional 118 153 Mt of tailings; and
 - Hydraulic mining and relocation of tailings from the Mixed Tailings Impoundment (“MTI”), Southern Pit Option 10 TSF (“SP10”), and Southern Pit Option 11A TSF (“SP11”) to FTSF.
- Waste rock disposal, including increased storage capacity within open pits and at existing waste rock stacks at Coronation, Coronation North, Innes Mills, Golden Bar, Golden Point, and Frasers.
- Water management infrastructure and operations, including:
 - Construction of Camp Creek and Coal Creek water storage dams for flow and water quality management;
 - Construction, operation and maintenance of a Water Treatment Plant; and
 - Ongoing operation use and maintenance of the Mine Water Management System (“MWMS”).
- Infrastructure and roading works, including:
 - Realignment of Macraes Road in two stages; and
 - Relocation of the Open Pit Mining Workshop.
- Ecological enhancements, including establishment of:
 - Establishment of the Murphys Ecological Enhancement Area (“MEEA”) near Murphys Creek, including predator-proof fencing, access tracks, and site facilities;
 - Mt Highlay restoration area;
 - Cranky Jims Link shrubland enhancement area;
 - Murphys Link tussock protection area; and
 - Additional offset and compensation measures for residual ecological impacts.
- Mine closure and rehabilitation activities, including rehabilitation of mining landforms, creation of pit lakes, dry capping of tailings storage facilities, and revegetation in accordance with consistent with existing closure objectives.

2.2 Project Impacts

The Project will result in permanent vegetation clearance, earthworks and landform modification within the MP4 surface works footprint (Bioresearches, 2026a). The assessed MP4 impact area is approximately 325 ha and includes the direct impact footprint as well as a 20 m precautionary buffer, where applied.

The Project is expected to impact up to (direct and indirect effects) 93.23 ha of indigenous terrestrial vegetation and habitat cover (Bioresearches 2026f), including:

- 90.01 ha of narrow-leaved tussock grassland and
- 2.96 ha of Dry shrubland (VS6: matagouri, *Coprosma propinqua*, kōwhai scrub; Singers and Rogers, 2014); as well as exotic vegetation (pasture, pine and disturbed mining areas) (Bioresearches, 2026f).
- 0.26 ha rock outcrop and tors

These losses will be compensated for in part through restoration planting at Cranky Jims Link and Mt. Highlay, as assessed in the Project Residual Effects Analysis Report (Document E13, Bioresearches 2026l). These two restoration areas are quantified in Table 1 below and mapped in Figure 1 as part of a wider compensation package that will deliver biodiversity benefits to the surrounding landscape through restoration, stock-proof fencing and predator control and legal protection over more than 1,000 ha.

Table 1. Overview of total planting and protection (compensation) of existing biodiversity values for MP4

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

Figure 1. (Over page). Overview of MP4 compensation package, identifying key compensation locations at Mt. Highlay, Cranky Jims Link and Murphys Ecological Enhancement Area

2.3 Purpose and Scope

The purpose of the Plan is to set out the practical measures required to implement, maintain and monitor terrestrial restoration and compensation actions proposed to address significant residual adverse effects on indigenous terrestrial vegetation values associated with the Project.

Specifically, this Plan applies to terrestrial restoration actions proposed at:

1. Mt Highlay Station: 175 ha tussock restoration planting
2. Cranky Jims Link: 50 ha shrubland restoration planting.

This Plan provides planting schedules and detailed methods for site preparation, weed control, planting, infill and enrichment planting, maintenance, monitoring and adaptive management requirements to ensure that restoration outcomes align with targets set in accordance with models.

Pest animal control is addressed separately in the Pest Animal Control Plan (Alliance Ecology, 2026) and is referred to only where it interacts with the restoration outcomes described in this Plan.

This Plan is intended to be read alongside the Ecological Impact Assessment, the relevant vegetation values assessment, and the residual effects analysis for terrestrial ecology (Table 2). It provides the implementation framework for achieving the terrestrial biodiversity outcomes identified in those assessments, including the establishment, protection and enhancement of indigenous vegetation within the Macraes Ecological District.

This Plan gives effect to the following resource consent conditions [to be inserted once consents are granted and then set out which section gives effect to the conditions].

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



Table 2. Ecology Documents prepared for the proposed Macraes Phase 4 Project. Current document highlighted.

Document #	Document name	Aspects covered	Author
E1	Terrestrial and Wetland Ecology Summary		Bioresearches (2026a)
Ecological Assessments			
E2	Assessment of Vegetation and Wetland Values	Terrestrial vegetation and wetlands	Whirika (2026)
E3	Assessment of Invertebrate Values		Bioresearches (2026b)
E4	Assessment of Lizard Values		Bioresearches (2026c)
E5	Assessment of Avifauna Values		Bioresearches (2026d)
E6	Assessment of Bat Values		Bioresearches (2026e)
E7	Ecological Impact Assessment	Terrestrial and wetland ecosystems and fauna	Bioresearches (2026f)
Ecological Management			
E8	Vegetation and TAR Flora Management Plan	Indigenous vegetation and threatened plants (wetland and terrestrial)	Bioresearches (2026g)
E9	Wetland Management Plan	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)

2.4 Landscape and Ecological Context

The following description has been extracted from the Whirika (2026) Vegetation and Wetland Values Assessment for the Macraes Phase 4 Fast Track Project.

The Macraes ED is one of two Ecological Districts that make up the Lammerlaw Ecological Region of Otago (Bibby 1997). The climate is moderate, with periodic snow-lie during winter and occasional summer drought. The topography of the area consists of rolling hill country with flattened ridge crests and shallowly to deeply incised drainage associated with the flat-topped Waipounamu Erosion Surface on the Rakaia Terrane, which has probably been exposed since the late Miocene (Forsyth 2001). Rock outcropping is predominantly associated with drainage systems, with some tor formation on ridge crests.

The pre-human vegetation cover of the Macraes ED is thought to have comprised mainly dryland forest and shrubland (Bibby 1997). Montane short tussockland grading into subalpine tall tussockland, with areas of mixed hardwood and podocarp forest, kanuka forest and Coprosma-flax scrub (Bibby 1997) developed after much of the original vegetation cover was dramatically altered over the past c. 750 years as a result of anthropogenic factors (particularly repeated burning) (McGlone et al. 1995, Whitaker 1996). Since European settlement in the 1850's (Thompson 1949), areas have been burnt (sometimes repeatedly) and exotic grasslands induced by ploughing, oversowing, and applying fertiliser (Whitaker 1996). The present vegetation of the Macraes ED is of a highly modified nature, with approximately 75% of the district dominated by exotic vegetation types (mainly improved pastureland). The remaining indigenous vegetation types are predominantly comprised of varying density narrow-leaved tussockland, copper tussock-based wetlands and grey shrubland interspersed with rare tiny remnants of original forest cover and scattered ephemeral ponds (Bibby 1997, Thorsen pers. obs.).

Both the impact and the proposed offset sites are situated within the Macraes Ecological District (Macraes ED), in a largely agricultural landscape that also supports mining activities associated with the existing OceanaGold New Zealand operations. Exotic pasture grasses, native tussock land, and grey shrubland, interspersed with exotic shrubs, as well as large sections of forestry (such as Port Blakely, adjacent to Mt Highlay) represent the primary terrestrial vegetation cover types found throughout the project works, offset and compensation site extents.

3 PROPOSED ACTIONS FOR TERRESTRIAL RESIDUAL EFFECTS MANAGEMENT

The MP4 Project provides a multitool approach to biodiversity compensation, including:

Revegetation to create new terrestrial ecosystems and habitats;

Protection and enhancement of existing ecosystems within and around the restoration planting sites via pest animal and plant control, and removal of stock grazing.

As such, this Plan outlines revegetation, maintenance and monitoring targets at two restoration sites:

Mt. Highlay:	175 ha tussock planting,
Cranky Jims Link:	50 ha Dry shrubland planting

All restoration areas will be protected via covenant and stock fencing, as well as pest plant control (discussed in this management Plan) and pest animal control (discussed in Alliance Ecology, 2026).

The Macraes Ecological District is a highly modified pastoral and mining landscape in which indigenous tussock grassland, dry shrubland, rock habitat and remnant forest communities are fragmented within extensive areas of exotic pasture and plantation forestry. Despite this modification, OGNZL landholdings contain substantial areas of retained indigenous habitat and provide opportunities to improve ecological condition and connectivity through coordinated stock exclusion, mammalian pest control, weed management, legal protection, revegetation and enrichment planting.

These opportunities provide the basis for the residual effects management package. The proposed actions are concentrated at sites that can protect existing indigenous vegetation, expand habitat extent, buffer retained habitats, reconnect previously separated areas (such as ecological covenants at Cranky Jims Link) and support the recovery of indigenous plant and fauna communities over time. This landscape-scale approach is intended to provide more durable outcomes than isolated replacement planting alone.

3.1 Cranky Jims Link

The Cranky Jims Link proposes to connect two existing covenants (the Cranky Jims Shrubland covenant to the south, and the Island Block Covenant to the north) to create a corridor of connected, protected habitat. The Cranky Jims Shrubland Covenant currently supports sections of significant remnant indigenous shrubland forest within the Macraes ED. Flora species include kōhūhū (*Pittosporum tenuifolium*); broadleaf (*Griselinia littoralis*), tī kōuka (*Cordyline australis*), horoeke (*Pseudopanax crassifolius*), kōwhai (*Sophora microphylla*), makomako (*Aristotelia serrata*), putaputawētā (*Carpodetus serratus*), dense bush lily/kakaha (*Astelia fragrans*) and various ferns. Upper slopes of this forest consist of matagouri (*Discaria toumatou*), mingimingi (*Coprosma propinqua*), *Coprosma crassifolia* and desert broom (*Carmichaelia petriei*) (Ahika, 2021).

Proposed restoration actions at Cranky Jims Link include the planting of 50 ha of dry shrubland habitat within open pasture. This planting creates a link to existing dry shrubland vegetation within the wider Cranky Jims site, including the existing dry shrubland covenant.

A key outcome of the Cranky Jims restoration planting will be the enrichment of planting to support succession toward podocarp-broadleaved dryland forest, an otherwise lost ecosystem type within the Macraes Ecological District (ED). Enrichment will occur within existing dry shrubland and progress into newly planted areas from years three to five following initial planting and will create a seed source for podocarp-broadleaved forest within the Site.

Stock fencing will be extended to encompass both new and existing covenants within the Cranky Jims Site, creating a large network of protected habitat.

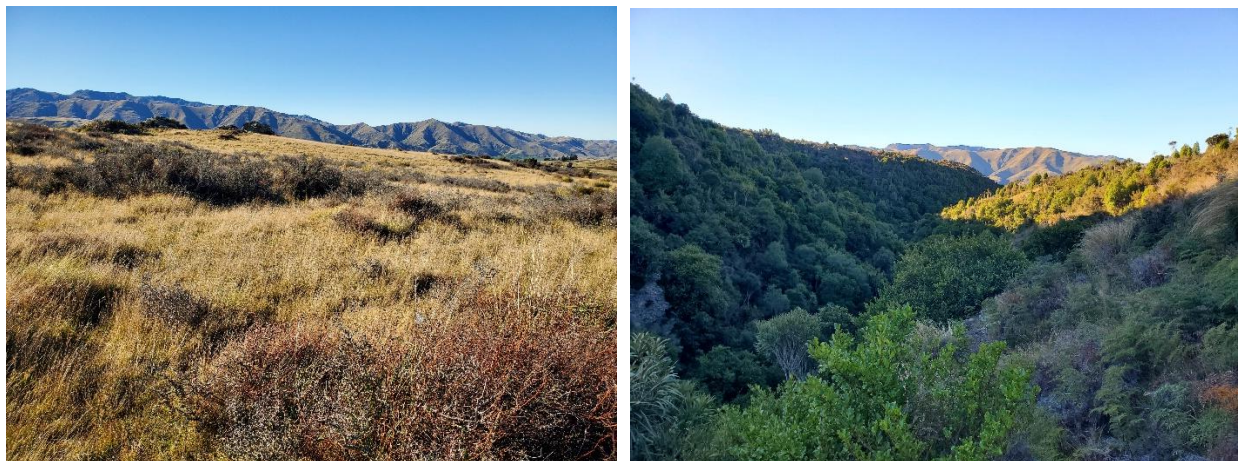
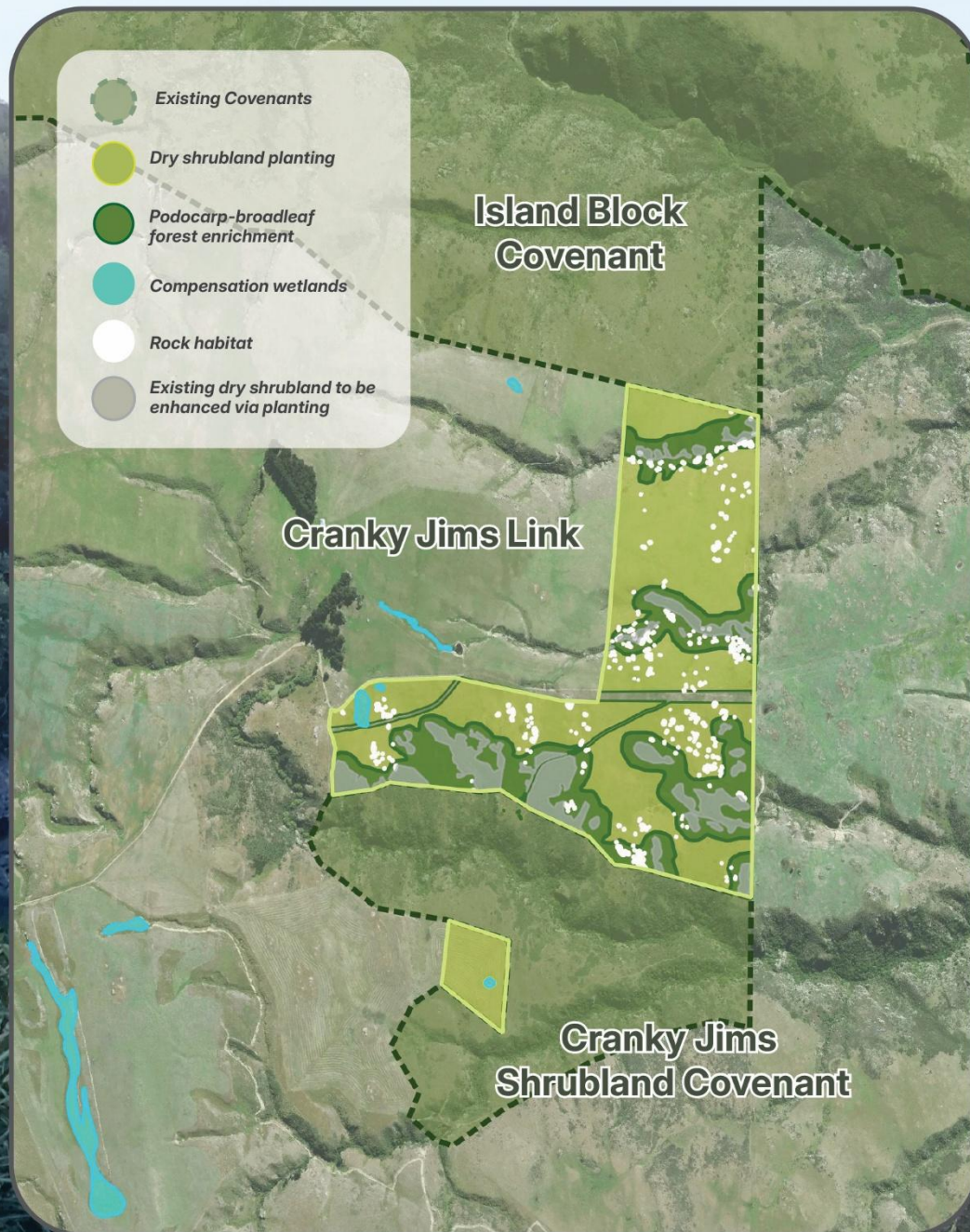


Photo 1: Open pasture interspersed with fragments of dry shrubland habitat (left); existing mature vegetation within gully systems (right) at Cranky Jims

Figure 2: (Over page) Proposed restoration actions at Cranky Jims Link, including restoration outcomes.

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:

- Pīpī (brown creeper)
- Miromiro (tomtit)
- Pīwakawaka (fantail)
- Riroriro (grey warbler)
- Tūī



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



Year 0 -----> Year 30+

3.2 Mt Highlay Station

Mt Highlay Station contains an area of approximately 265 ha of recently established conifer forestry. In 2023, the site was planted in Douglas fir, *Pinus radiata*, and hybrid pine (*P. radiata* × *P. attenuata*) (Forest Management Limited, 2025). The plantings have exhibited high survivorship and are establishing well, with trees currently reaching around 1 m in exposed areas and up to 1.2–1.4 m in more sheltered locations with favourable soils.

The compensation package proposes to first remove existing forestry, preventing the long-term degradation of existing habitat features for native fauna, such as tors, tussockland and wetlands, in an averted loss approach (preventing the loss of habitat caused by pine forest maturation). This discussion can be found in the Residual Effects Analysis Report: Terrestrial (Bioresearches, 2026l).

In addition, to compensate for the loss of tussock grassland habitat within the MP4 project extent, 175 ha of tussock planting is proposed at Mt Highlay. The plant lists encompass a 5m buffer surrounding existing rock outcrops, to include additional tor-specialist threatened plant species to further increase diversity at the site.

Approximately 7.5 ha of vegetation direct transfer (VDT), involving the salvage of tussock habitat from the MP4 project impact sites and relocation to protected areas, will occur at Mt Highlay. The VDT falls outside of proposed planting areas and is discussed in the Threatened and At-Risk flora management plan (Bioresearches 2026g).



Photo 2: Existing young forestry vegetation at Mt Highlay (left); Forestry on the left bank, and existing tussock on the right bank at Mt Highlay (right).

Figure 3 (Over page) Proposed restoration actions at Mt. Highlay, including restoration outcomes

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



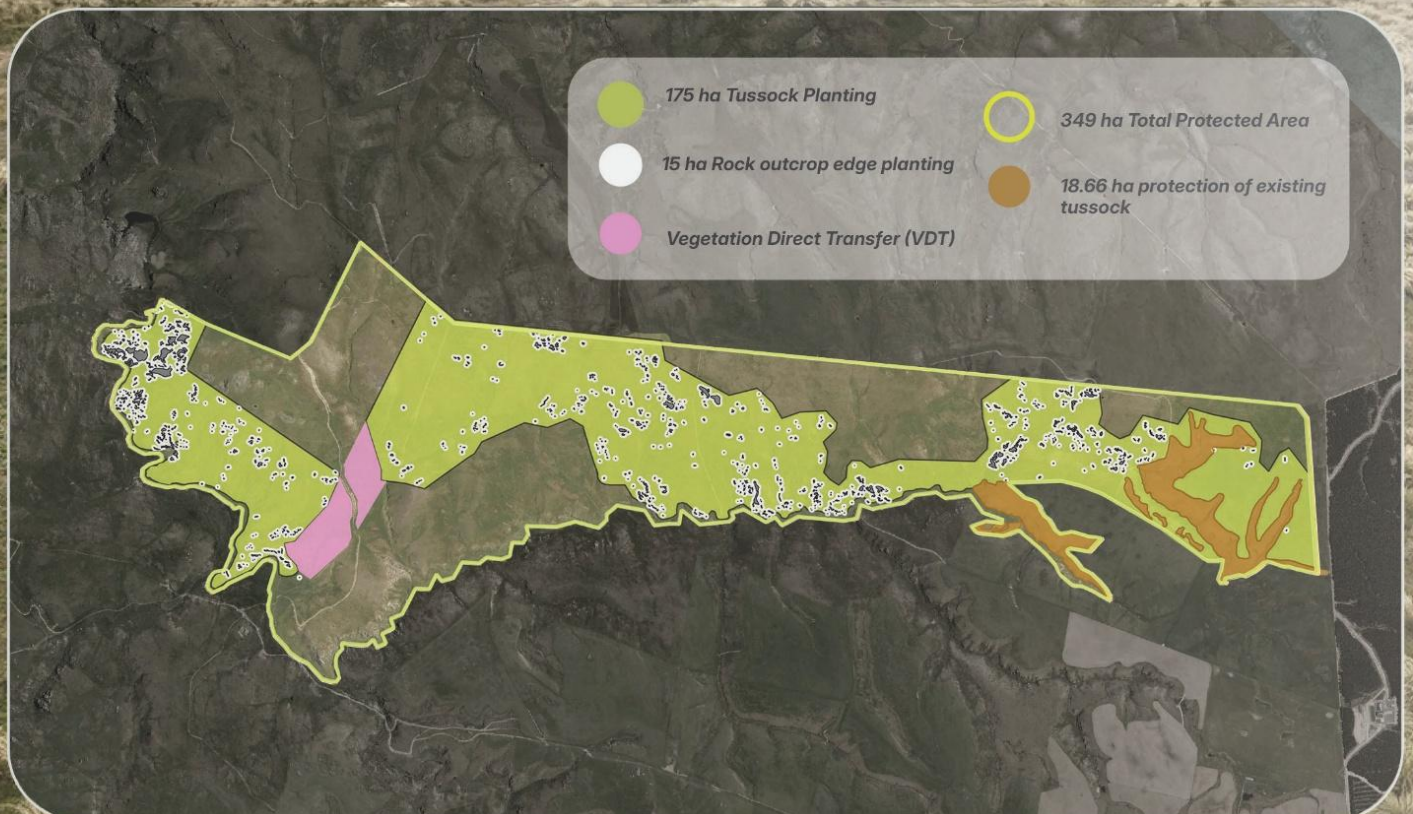
Averted Loss Approach

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



4 GENERAL SITE PREPARATION

4.1 Pest Plant Control

4.1.1 Pest Plant Control Objectives

Weed/pest plant management is required within the Mt Highlay and Cranky Jims Link planting compensation sites to facilitate the successful establishment of restoration planting.

The objective of pest plant management is to maintain the restoration sites to allow indigenous vegetation to form the predominant vegetation cover, rather than to achieve complete eradication. Complete eradication of all exotic plant species from the restoration areas is neither practical nor achievable, given the long-term and large-scale nature of the compensation sites. Instead, control shall be undertaken to ensure that pest plants do not compromise the establishment of restoration planting or degrade the ecological values of existing indigenous vegetation.

Initial weed control should be completed sufficiently in advance of planting to ensure any residual herbicide is no longer likely to affect newly installed plants.

Weed management shall adopt an adaptive approach, with control efforts directed toward those species that present the greatest threat at a given stage of restoration. During the establishment phase, control shall focus on species likely to suppress or outcompete newly planted indigenous vegetation. As restoration plantings mature and canopy cover develops, management effort shall progressively shift toward preventing the establishment and spread of ecosystem-transforming weeds, particularly wilding conifers, while responding to any newly emerging priority species identified during routine monitoring.

As restoration planting is expected to take approximately 20 years (Cranky Jims Link) and 15 years (Mt Highlay) to achieve the modelled vegetation outcomes, outside of the five-year intensive plant maintenance period, targeted weed management will be required throughout this establishment period as part of the adaptive management approach (as well as required as part of ongoing covenant management). Following canopy/indigenous coverage development, the maintenance frequency may reduce; however, ongoing surveillance and targeted control of high-risk pest plants will continue throughout the life of the covenant to maintain restoration outcomes and protect indigenous vegetation values.

4.1.2 Priority Pest Plant Species

Pest plants have the potential to outcompete, smother or displace indigenous vegetation, resulting in reduced restoration success and long-term changes to ecosystem composition. Numerous exotic species occur within and surrounding the restoration sites, including pasture grasses, herbs, woody shrubs and trees.

Weed management shall target those species most likely to hinder restoration planting or significantly alter indigenous ecosystems. Species requiring control may change over time as restoration progresses and should be reviewed during routine maintenance visits as part of the adaptive management programme.

4.1.2.1 Establishment Phase (Mt Highlay and Cranky Jims Link Planting)

Prior to planting, and during the initial establishment period, weed control should focus on species that are likely to suppress planted seedlings or inhibit successful restoration. Blanket control of pasture grasses and low-growing herbaceous weeds is generally not recommended, as this may create extensive areas of bare ground that are rapidly recolonised by more problematic woody weed species, as well as being costly. Where deemed appropriate by the restoration contractor, planting may occur directly into pasture vegetation.

At the Mt Highlay restoration site, existing plantation forestry comprising *Pinus radiata*, Douglas fir (*Pseudotsuga menziesii*) and other plantation conifers shall be dug out, or poisoned using cut and paste, prior to planting as part of the averted loss compensation strategy.

At Cranky Jims Link, the proposed planting area is predominantly vegetated with modified grassland habitat, and as such, minimal control prior to planting is expected. Wilding conifers should be targeted prior to planting as they appear throughout the restoration site, including within existing dry shrubland vegetation.

Priority species requiring control during the establishment phase may include:

- Gorse (*Ulex europaeus*)
- Exotic broom (*Cytisus scoparius*)
- Sweet briar (*Rosa rubiginosa*)
- Heather (*Calluna vulgaris*)
- Spanish heath (*Erica lusitanica*)
- Lupins (*Lupinus* spp.)
- *Dryopteris* spp.
- Other weed species identified by the restoration ecologist as significantly affecting restoration planting.

4.1.2.2 Long-Term Management (Mt Highlay, Cranky Jims Link, and MEEA)

As restoration planting matures and indigenous vegetation develops, increasing canopy cover is expected to suppress many light-demanding weed species. Long-term management is proposed for both the planting sites at Mt Highlay and Cranky Jims, as well as the protected vegetation at MEEA, which contains a degree of indigenous habitat. Control to prevent degradation, rather than the eradication of all pest plants, is practicable given the scale of the restoration and protected areas.

Long-term pest plant management should progressively focus on ecosystem-transforming weeds capable of permanently altering vegetation composition and ecological function.

Priority long-term weed species include:

- Wilding conifers
- Hawthorn (*Crataegus monogyna*)
- Elder (*Sambucus nigra*)
- Tutsan (*Hypericum androsaemum*)

- Any pest plant identified by the maintenance contractor as having the potential to degrade indigenous habitats

Due to the proximity of commercial forestry, ongoing recruitment of wilding conifers is anticipated throughout the life of the covenant. Detection and removal of wilding conifers should therefore remain a high priority during all maintenance visits.

Gorse and exotic broom are expected to periodically recolonise disturbed ground from the existing seedbank and surrounding vegetation. These species should be controlled where they are suppressing restoration planting or expanding into existing indigenous vegetation. However, complete eradication across the restoration sites is not anticipated, and their significance is expected to reduce as native vegetation matures and canopy cover limits regeneration.

Should additional weed species become established or be identified as posing a significant threat during routine maintenance visits, these should be incorporated into the weed management programme as part of the adaptive management approach.

4.1.3 Control Methodology

Weed control should be undertaken in accordance with current best practice ecological restoration methodologies, including relevant Otago Regional Council guidance for pest plant management. Control should be targeted to individual plants or discrete infestations wherever practicable to minimise spray drift and avoid unnecessary damage to indigenous vegetation. Personnel undertaking weed control should be suitably experienced in ecological restoration.

At Mt Highlay, plantation forestry shall be controlled prior to planting through appropriate digging out or poisoning measures to prevent regrowth. Wilding conifers occurring within Cranky Jims Link and the MEEA should be controlled using cut-stump, drill-and-fill or other approved methodologies appropriate to plant size and site conditions.

Woody weed species such as gorse, broom, sweet briar and lupins produce persistent soil seedbanks and are expected to require ongoing follow-up control following initial treatment. Control may be undertaken using targeted herbicide application, cut-stump treatment or manual removal, depending on infestation size, surrounding vegetation and site accessibility. Herbicide application over broad areas should be limited to locations where there is minimal risk of damage to indigenous vegetation.

Weed management should remain adaptive throughout the life of the restoration programme. Monitoring undertaken during routine maintenance visits should inform future control priorities, allowing management effort to respond to changing weed threats as indigenous vegetation develops.

4.2 Pest Animal Control

A round of pest animal control should be conducted immediately prior to planting to reduce pest numbers and prevent herbivory of new plants. This must follow the protocols set out in the Alliance Ecology (2026) Pest Animal Control Plan, and at a minimum target rabbits, hares, possums, pigs and deer, which all pose a significant threat to new plantings.

4.2.1 Fencing

All planting areas must be fenced to exclude stock. Fencing must be completed before planting begins and may utilise existing fences, where these are in good condition and align with the outside of the mapped planting extents. Fences must be of a robust post and wire design. If evidence of stock incursion is seen within planting areas fences must be checked for damage, and if none found then fences must be modified to add chain link, wire mesh or sheep-netting.

5 PLANTING

This section outlines a description of the planting zones. Planting lists can be found in Appendix A and have been informed by Otago Regional Council planting guides, knowledge of the local environment, as well as with reference to the historic vegetation coverage of the restoration sites. The threat status of plants, as well as their identification as taoka species (as identified in Schedule 97 of the Ngāi Tahu Claims Settlement Act 1998¹) or for their ability to host TAR invertebrate species, has also been included.

5.1.1 Cranky Jims Link

The Cranky Jims Link planting consists of a total 50 ha of grey shrubland planting linking to existing covenants in the wider landscape. A pioneer (open ground) and enrichment zone (of existing shrubland initially, and subsequently of the pioneer planting) have been developed to provide strong diversity and restoration of rare (Threatened and At Risk) and taoka flora values, and to create fauna habitat for indigenous species, including avifauna and invertebrates.

Stage one of the planting (Figure 4) will involve the planting of 50 ha of pioneer species (Table 3), with the addition of 13 ha of enrichment planting species (Table 4) throughout existing dry shrubland within the Site. This enrichment zone extends into the pioneer zone adjacent to existing grey scrub, where shelter will benefit new plantings. The enrichment planting in this stage includes species that can tolerate some light and exposure, as existing vegetation is sparse in some sections.

Stage two of the planting (Figure 5) includes 36 ha of enrichment of the pioneer planting zone (utilising the same enrichment species list as in stage one, due to the higher degree of exposure). Stage two will also include 21 ha of podocarp-broadleaf enrichment targeted at the existing vegetation and wider surrounds, where shelter will be greatest. This planting list (Table 5) contains broadleaf and podocarp species that will eventually transition the planting into a mixed broadleaved–podocarp forest, a very high-value ecosystem type otherwise lost from the Macraes ED. Stage two planting may be undertaken from year three to five following initial planting, provided initial planting has reasonably established to provide shelter for enrichment species.

The total planting across the dry shrubland pioneer planting zones provides 50.59 ha of additional vegetation habitat. The enrichment of both existing dry shrubland and the pioneer planting zone will provide additional benefits via increasing diversity, increasing density, and allowing the eventual transition to high-value podocarp-broadleaf forest.

Planting has been specified at 45% coverage for the pioneer planting zone. An average spacing of 2.3m has been calculated based on the overall area and total number of initial plants. However, planting should be randomised on the day, clustering small groupings of the same species based on their given expected diameter/spread. Clustering will aid in providing shelter to new plantings, as well as mimicking natural regeneration within the environment.

¹ Ngāi Tahu Claims Settlement Act 1998, 1998 No 97 New Zealand Public Act (1998), <https://www.legislation.govt.nz/act/public/1998/0097/latest/whole.html>

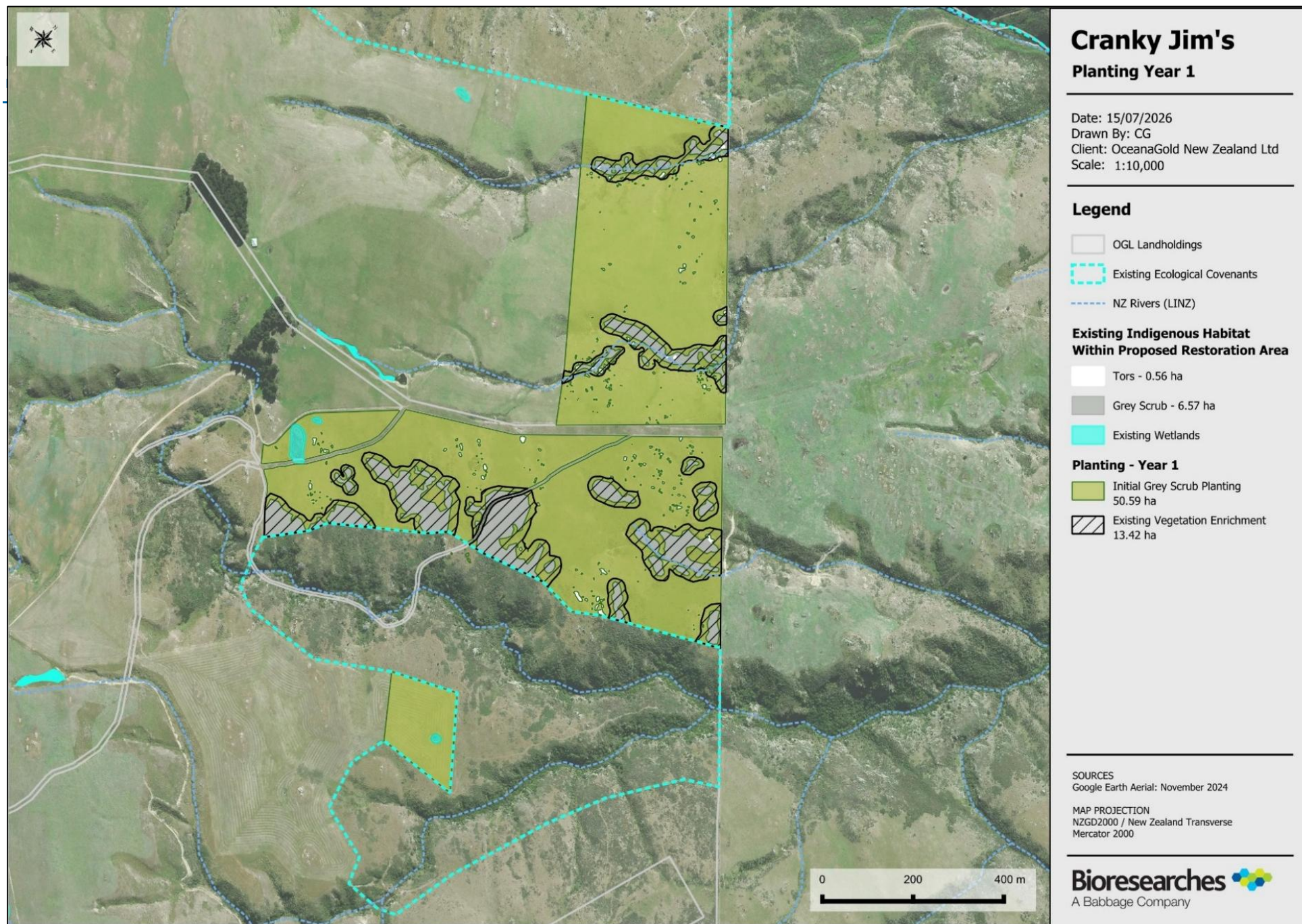


Figure 4: Map showing the proposed planting zones for the first year of planting at Cranky Jims Link

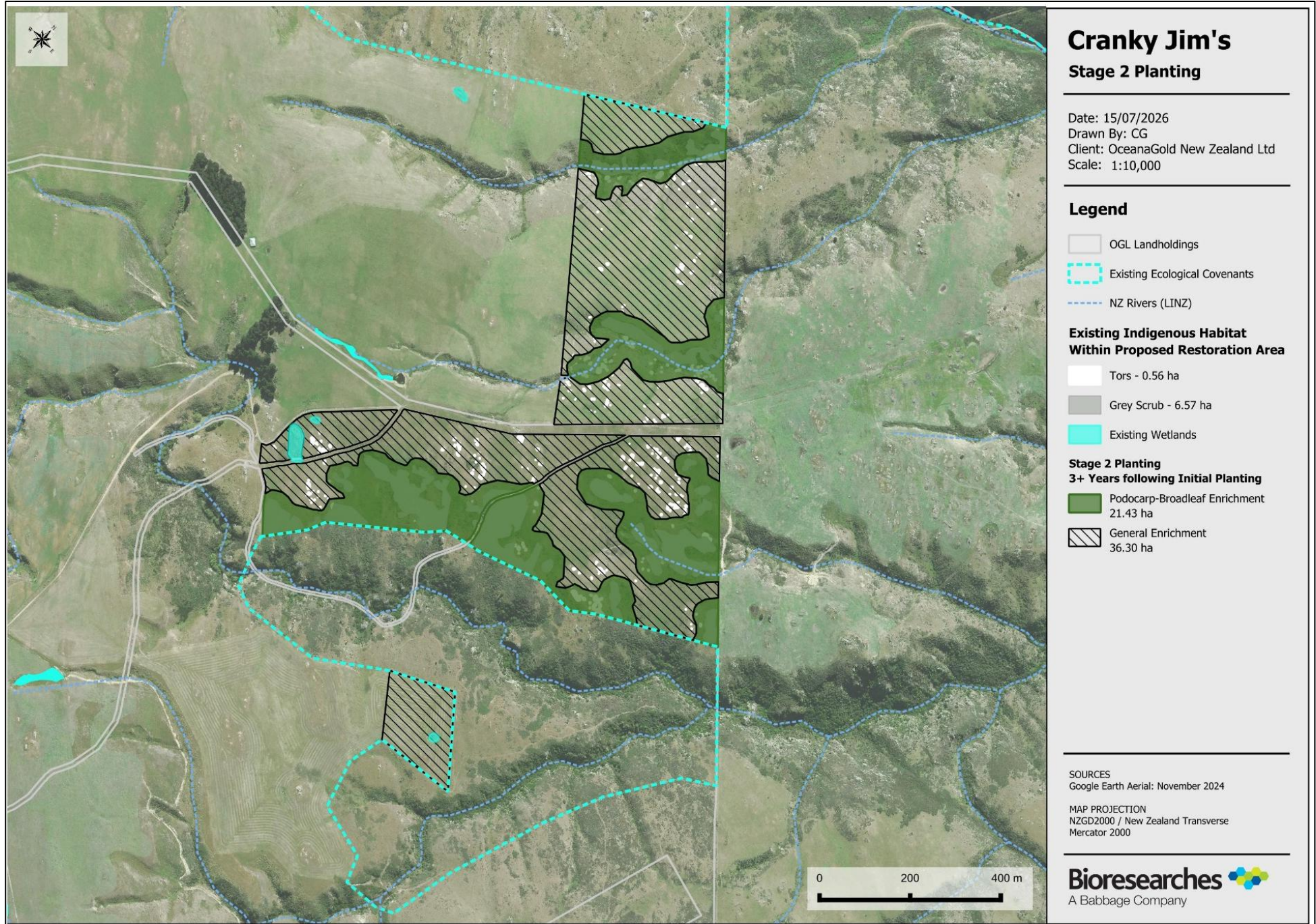


Figure 5: Map showing location of proposed planting zones for the second stage of planting at Cranky Jims Link (occurring from three years following initial planting)

Table 3: Cranky Jims Stage 1 Planting: Pioneer Planting List (see Figure 4)

Botanic Name	Common Name	Threat Status	Spacing (m) based on initial plants	Indicative Crown Diameter at Target Year (m)	Total Area (m ²)	Composition (%)	Target Cover Share (%)	Total Potential Requirement Including 20% Replacement Allowance	Initial Plants	Notes
<i>Carmichaelia crassicaulis</i> subsp. <i>crassicaulis</i>	Coral broom	Threatened – Nationally Vulnerable	2.30 Average	1.2	505894	6	2.70	15098	12078	TAR invertebrate host (<i>Pasiphila</i> sp., <i>Samana acutata</i> , <i>Theoxena scissaria</i>)
<i>Carmichaelia petriei</i>	Desert broom	At Risk - Declining		1.5	505894	6	2.70	9663	7730	TAR invertebrate host (<i>Pasiphila</i> sp., <i>Samana acutata</i> , <i>Theoxena scissaria</i>)
<i>Coprosma crassifolia</i>	Mikimiki	Not Threatened		1.75	505894	4	1.80	4733	3786	TAR invertebrate host (<i>Bityla sericea</i>)
<i>Coprosma intertexta</i>	Coprosma	At Risk - Declining		2	505894	6	2.70	5435	4348	TAR invertebrate host (<i>Bityla sericea</i>)
<i>Coprosma propinqua</i>	Mingimingi	Not Threatened		2	505894	4	1.80	3624	2899	TAR invertebrate host (<i>Bityla sericea</i>)
<i>Corokia cotoneaster</i>	Korokio	Not Threatened		1.5	505894	4	1.80	6442	5153	Taoka species
<i>Discaria toumatou</i>	Matagouri	Not Threatened		2.5	505894	15	6.75	8697	6957	
<i>Helichrysum lanceolatum</i>	Niniaio	Not Threatened		1.75	505894	6	2.70	7099	5679	
<i>Leptospermum scoparium</i>	Mānuka	Not Threatened		2.25	505894	5	2.25	3579	2863	Taoka species
<i>Melicytus alpinus</i>	Porcupine shrub	Not Threatened		1.5	505894	8	3.60	12883	10306	
<i>Myrsine divaricata</i>	Weeping matipo	Not Threatened		2.5	505894	4	1.80	2320	1856	
<i>Olearia lineata</i>		At Risk - Declining		2.25	505894	7	3.15	5010	4008	
<i>Olearia odorata</i>	Scented tree daisy	At Risk - Declining		2.25	505894	7	3.15	5010	4008	
<i>Ozothamnus vauvilliersii</i>	Mountain tauhinu	Not Threatened		1.5	505894	4	1.80	6442	5153	
<i>Sophora microphylla</i>	Kōwhai	Not Threatened		4.5	505894	8	3.60	1433	1146	Taoka species
<i>Teucrium parvifolium</i>	Teucrium	At Risk - Declining		1	505894	6	2.70	21740	17392	
			Total			100	45	119208	95362	

Table 4: Cranky Jims Link Stage 1 Planting: Enrichment of existing shrubland and surrounding area (Figure 4)

Botanic Name	Common Name	Threat Status	Spacing (m) based on initial plants	Indicative Crown Diameter at Target Year (m)	Total Area (m ²)	Composition (%)	Target Cover Share (%)	Total Potential Requirement Including 20% Replacement Allowance	Initial Plants	Notes
<i>Aristotelia fruticosa</i>	Mountain wineberry	Not Threatened	2.03 Average	2	134180	2	0.70	374	299	
<i>Carmichaelia crassicaulis</i> subsp. <i>crassicaulis</i>	Coral broom	Threatened – Nationally Vulnerable		1.2	134180	5	1.75	2597	2077	TAR invertebrate host (<i>Pasiphila</i> sp., <i>Samana acutata</i> , <i>Theoxena scissaria</i>)
<i>Carmichaelia kirkii</i>	Climbing broom	At Risk - Declining		1.2	134180	5	1.75	2597	2077	TAR invertebrate host (<i>Pasiphila</i> sp., <i>Samana acutata</i> , <i>Theoxena scissaria</i>)
<i>Carpodetus serratus</i>	Putaputawētā	Not Threatened		3.5	134180	3	1.05	184	147	
<i>Clematis marata</i>	Clematis	Not Threatened		0.6	134180	5	1.75	10382	8305	
<i>Clematis quadribractiata</i>	Clematis	At Risk – Naturally Uncommon		0.8	134180	5	1.75	5840	4672	
<i>Coprosma dumosa</i>	Coprosma	Not Threatened		3	134180	3	1.05	250	200	
<i>Cordyline australis</i>	Ti kōuka	Not Threatened		2	134180	2	0.70	374	299	Taoka species
<i>Dacrycarpus dacrydioides</i>	Kahikatea	Not Threatened		3.5	134180	5	1.75	307	245	Taoka species
<i>Griselinia littoralis</i>	Kāpuka	Not Threatened		2.5	134180	5	1.75	599	479	Taoka species
<i>Kunzea ericoides</i>	Kānuka	Not Threatened		3.8	134180	5	1.75	260	208	Taoka species
<i>Muehlenbeckia complexa</i> var. <i>complexa</i>	Pōhuehue	Not Threatened		2	134180	3	1.05	562	449	
<i>Olearia bullata</i>	Tree daisy	At Risk - Declining		2.5	134180	3	1.05	360	288	Must be planted in damp areas
<i>Olearia fimbriata</i>	Robust tree daisy	Threatened – Nationally Vulnerable		1	134180	5	1.75	3738	2990	
<i>Parsonsia capsularis</i> var. <i>tenuis</i>	NZ jasmine	Data deficient		1	134180	5	1.75	3738	2990	
<i>Phyllocladus alpinus</i>	Mountain toatoa	Not Threatened		2	134180	5	1.75	935	748	Taoka species
<i>Pittosporum tenuifolium</i>	Kōhūhū	Not Threatened		2.25	134180	5	1.75	739	591	Taoka species
<i>Podocarpus laetus</i>	Hall's tōtara	Not Threatened		3.75	134180	5	1.75	267	213	Taoka species
<i>Pseudopanax crassifolius</i>	Horoeka	Not Threatened		2	134180	5	1.75	935	748	Taoka species

<i>Pseudopanax ferox</i>	Fierce lancewood	At Risk – Naturally Uncommon		2.5	134180	5	1.75	599	479	
<i>Rubus schmidelioides</i>	Tātārāmoa	Not Threatened		2.5	134180	3	1.05	360	288	
<i>Sophora microphylla</i>	Kōwhai	Not Threatened		4	134180	3	1.05	142	113	Taoka species
<i>Veronica rakaiensis</i>	Hebe	Not Threatened		1	134180	5	1.75	3738	2990	
<i>Veronica salicifolia</i>	Koromiko	Not Threatened		1.5	134180	3	1.05	998	798	Taoka species
Total						100	35	40875	32693	

Table 5: Cranky Jims Stage 2 planting: Podocarp-broadleaf enrichment (Figure 5)

Botanic Name	Common Name	Threat Status	Spacing (m) based on initial plants	Indicative Diameter Range (m)	Total Area (m2)	Composition (%)	Target Cover Share (%)	Total Potential Requirement Including 20% Replacement Allowance	Initial Plants	Notes
<i>Carmichaelia kirkii</i>	Climbing broom	At Risk - Declining	2.50 Average	1.75	214295	15	7.5	8020	6683	
<i>Dacrydium cupressinum</i>	Rimu	Not Threatened		3.5	214295	5	2.5	669	557	Taoka species
<i>Lophomyrtus obcordata</i>	Rōhutu	At Risk - Declining		2	214295	10	5	4094	3411	
<i>Melicope simplex</i>	Poataniwha	Not Threatened		2	214295	6	3	2457	2047	
<i>Myrsine australis</i>	Mapou	Not threatened		2	214295	8	4	3275	2729	
<i>Melicytus ramiflorus</i>	Mahoe	Not Threatened		2	214295	8	4	3275	2729	
<i>Pennantia corymbosa</i>	Kaikōmako	Not Threatened		3.5	214295	10	5	1337	1114	
<i>Phyllocladus alpinus</i>	Mountain toatoa	Not Threatened		2	214295	8	4	3275	2729	Taoka species
<i>Prumnopitys taxifolia</i>	Matai	Not Threatened		3	214295	8	4	1456	1213	Taoka species
<i>Pseudopanax colensoi</i> var. <i>colensoi</i>	Mountain five-finger	Not Threatened		1.6	214295	10	5	6396	5330	
<i>Podocarpus laetus</i>	Hall's tōtara	Not Threatened		4	214295	6	3	615	512	Taoka species
<i>Raukiau anomalous</i>	Raukiau	Not Threatened		1.25	214295	6	3	6287	5239	
Total:						100	50	41156	34293	

5.1.2 Mt Highlay Restoration Area

Mt Highlay Restoration Area has a total of 175 ha of tussock planting, which has a single pioneer planting zone. The existing rock outcrops within the restoration area are proposed to be buffer planted to a width of 5m with a specific “rock outcrop buffer planting mix” (15 ha), to enable the addition of shallow soil-specialist species, which are often TAR and/or taoka species, or host TAR invertebrates.

The planting lists (Table 6, Table 7) has been designed to reach the modelled 45% coverage at year 15. A model showing the expected planting density following year 15 is provided in Figure 6. Planting will be randomised, but clustering of small groups of plants aids in providing shelter and mimicking natural regeneration.

Figure 7 and Section 3.2 shows the location of proposed planting zones.

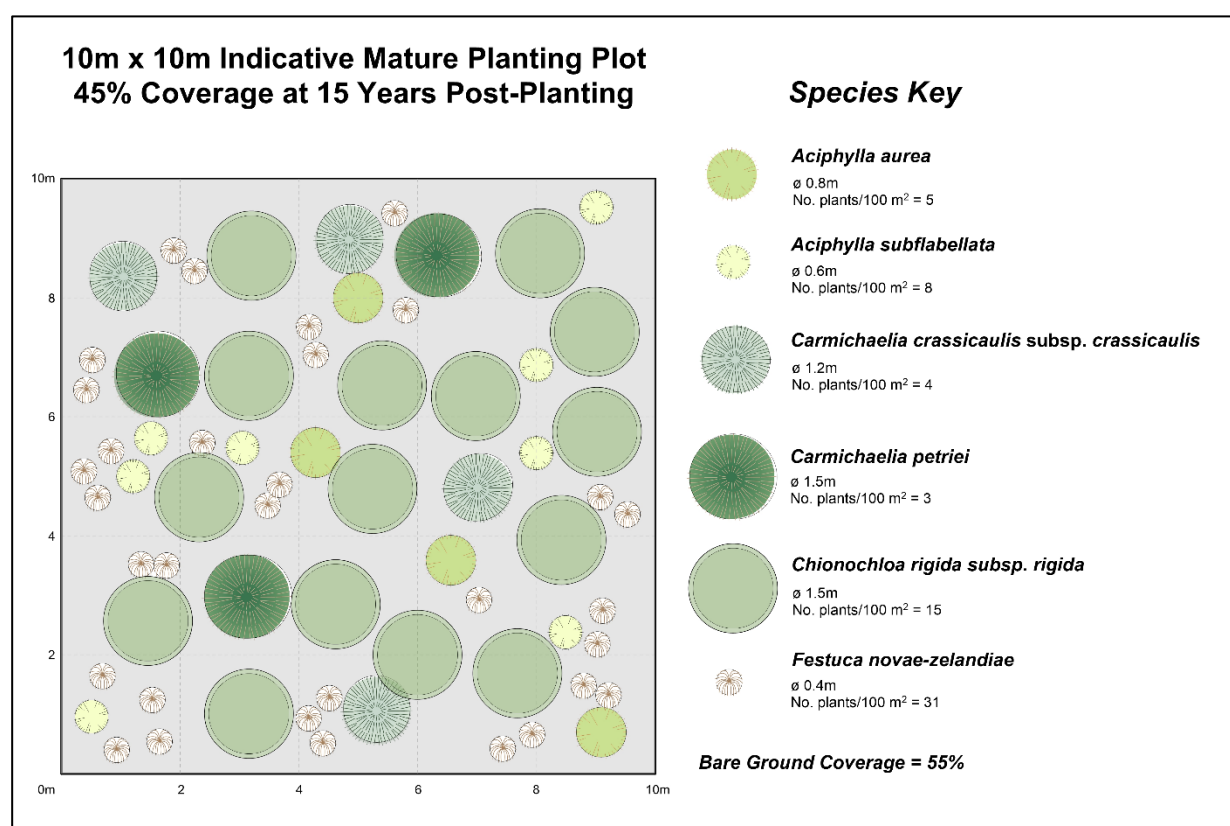
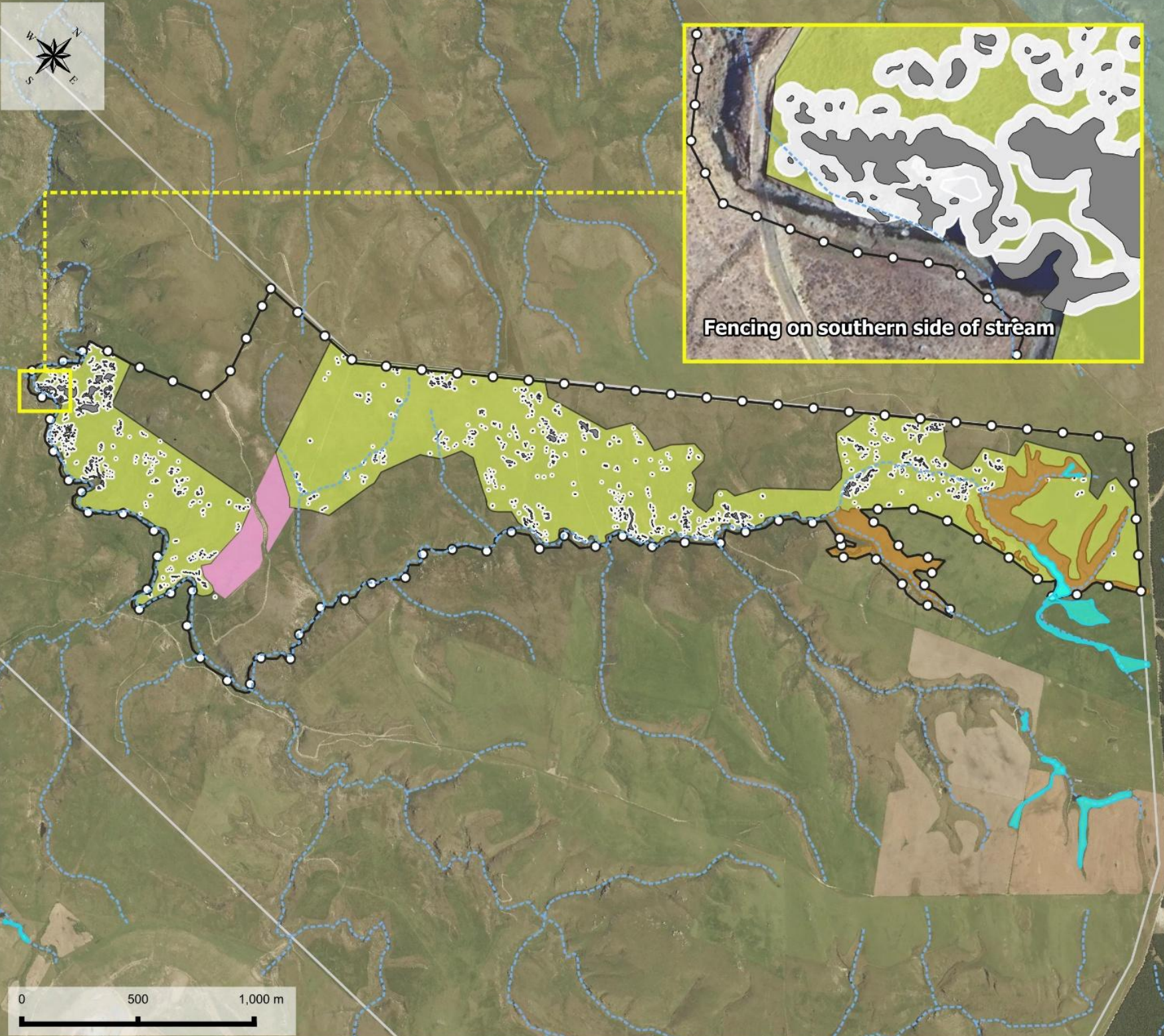


Figure 6: Diagram showing the expected plot coverage with indigenous species (45%) at year 15 following the successful establishment of tussock planting (representative of the open tussock planting zone only).

Figure 7: (Over page) Proposed restoration actions at Mt Highlay Station



Mt Highlay

Tussock Restoration

Date: 18/07/2026
Drawn By: CG
Client: OceanaGold New Zealand Ltd
Scale: 1:22,000

Legend

 Mt Highlay Property Boundary

 Rivers/Streams (LINZ)

Compensation Planting (175 ha)

 Open Tussock Planting
160.60 ha

 Rock Outcrop 5m buffer Planting
15.05 ha

 Mt Highlay Fence

Existing Indigenous Habitat

 Existing Tussock
Of which 18.66 ha protected

 Existing Grey Scrub
Of which 0.74 ha protected

 Identified Wetland

 Tors - 4.07 ha within protected area

 VDT Area - 7.5 ha

SOURCES
Google Earth Aerial: November 2024

MAP PROJECTION
NZGD2000 / New Zealand Transverse
Mercator 2000

Table 6: Mt Highlay: Planting list for open tussock planting zone (see Figure 7)

Botanic Name	Common Name	Threat Status	Spacing (m) based on initial plants	Indicative Diameter Range (m)	Total Area (m2)	Relative Species Composition (%)	Target Cover Share (%)	Total Potential Requirement Including 20% Replacement Allowance	Initial Plants	Notes
<i>Aciphylla aurea</i>	Golden spaniard	Not Threatened	1.09 Average	0.8	150500	2	0.9	3369	2695	Taoka species
<i>Aciphylla subflabellata</i>	Speargrass	At Risk - Declining		0.6	150500	5	2.25	14972	11977	TAR invertebrate host (<i>Dasyuris partheniata</i>) Taoka species
<i>Carmichaelia corrugata</i>	Dwarf broom	Threatened – Nationally Vulnerable		0.7	150500	5	2.25	10999	8799	TAR invertebrate host (<i>Pasiphila</i> sp., <i>Samana acutata</i> , <i>Theoxena scissaria</i>) Both broom species are vulnerable to browsing from stock and pests. Will need to be planted in larger grades to improve survival. Snail bait also a useful option. Dwarf broom may need caging.
<i>Carmichaelia crassicaulis</i> subsp. <i>crassicaulis</i>	Coral broom	Threatened – Nationally Vulnerable		1.2	150500	6	2.7	4492	3593	
<i>Corokia cotoneaster</i>	Korokio	Not threatened		1.75	150500	3	1.35	1057	845	Taoka species
<i>Festuca novae-zelandiae</i>	Hard tussock	Not Threatened		0.4	150500	7	3.15	47158	37726	
<i>Melicytus alpinus</i>	Porcupine shrub	Not threatened		0.8	150500	8	3.6	13474	10779	May need hand weeding - requires open ground
<i>Chionochloa rigida</i> subsp. <i>rigida</i>	Narrow-leaved snow tussock	Not Threatened		1.5	150500	45	20.25	21559	17247	
<i>Olearia lineata</i>	Tree daisy	At Risk - Declining		2.25	150500	5	2.25	1065	852	
<i>Senecio dunedinensis</i>	Fireweed	Threatened - Endangered		0.25	150500	2	0.9	34493	27594	TAR invertebrate host (<i>Asaphodes recta</i> , <i>Nyctemera annulata</i>)
<i>Rubus cissoides</i>	tātārāmoa, bush lawyer	Not Threatened		1.5	150500	3	1.35	1438	1150	
<i>Parsonsia capsularis</i> var. <i>capsularis</i>	NZ jasmine	Not Threatened		1.5	150500	3	1.35	1438	1150	
<i>Muehlenbeckia complexa</i> var. <i>complexa</i>	small-leaved pōhuehue	Not Threatened		2	150500	3	1.35	809	647	
<i>Muehlenbeckia australis</i>	pōhuehue	Not Threatened		1.5	150500	3	1.35	1438	1150	
Total					150500	100	45	157761	126204	

Table 7: Mt Highlay: Planting list for rock outcrop 5m buffer planting zone (see Figure 7)

Botanic Name	Common Name	Threat Status	Spacing (m) based on initial plants	Indicative Diameter (m)	Total Area (m²)	Relative Species Composition (%)	Target Cover Share (%)	Total Potential Requirement Including 20% Replacement Allowance	Initial Plants	Notes
<i>Aciphylla aurea</i>	Golden spaniard	Not Threatened	1.22 Average	0.8	1606000	5	2.25	89862	71889	Taoka species
<i>Aciphylla subflabellata</i>	Speargrass	At Risk - Declining		0.6	1606000	5	2.25	159753	127802	TAR invertebrate host (<i>Dasyuris partheniata</i>) Taoka species. <i>May need caging to protect from browsers</i>
<i>Carmichaelia crassicaulis</i> subsp. <i>crassicaulis</i>	Coral broom	Threatened – Nationally Vulnerable		1.2	1606000	12	5.4	95852	76681	TAR invertebrate host (<i>Pasiphila</i> sp., <i>Samana acutata</i> , <i>Theoxena scissaria</i>) <i>Both broom species are vulnerable to browsing from stock and pests. Will need to be planted in larger grades to improve survival. Snail bait also a useful option.</i>
<i>Carmichaelia petriei</i>	Desert broom	At Risk - Declining		1.5	1606000	12	5.4	61345	49076	TAR invertebrate host (<i>Pasiphila</i> sp., <i>Samana acutata</i> , <i>Theoxena scissaria</i>)
<i>Chionochloa rigida</i> subsp. <i>rigida</i>	Narrow-leaved snow tussock	Not Threatened		1.5	1606000	57	25.65	291388	233110	TAR invertebrate host (<i>Orocrambus sophistes</i>)
<i>Festuca novae-zelandiae</i>	Hard tussock	Not Threatened		0.4	1606000	9	4.05	646995	517596	
						100	45	1345195	1076154	

5.2 Planting Procedure

5.2.1 Ecosourcing

New plants should be ecosourced² from within the Macraes Ecological District. Where this is not possible, or populations of a species are limited, indicating limited genetic diversity, this may be extended to equivalent habitat within dryland Otago. On-site seed collection to preserve the genetic lineage of the area is required to ensure that lost values from the project extent are being retained. Ecosourcing ensures plants are adapted to their specific regional climatic conditions and increases rates of survival in plantings. As ecosourcing requires the collection of seed and growing of young plant stock for replanting, long lead-in times are typical; often in the order of a minimum of 12 to 18 months prior to the planting season.

Records on collection locations and dates are required to be kept for each round of planting, including, at a minimum, the date of collection and precise location. Keeping a record of seed collection ensures that, where seed germination has been unsuccessful, contingency measures such as altering seed collection locations or propagation methodology can be undertaken.

5.2.2 Seed Germination

Prior to planting, seed stock shall be grown ideally in similar, inland conditions to the restoration sites. Watering should be limited to ensure deep root systems develop that can tolerate periods of drought. **Plant stock will be sun-hardened within the Macraes ED for a minimum of two months prior to planting.**

5.2.3 Hydroseeding, Direct Drilling and Other Experimental Planting Methods

Throughout the project lifetime, experimental planting methods should be trialled, such as hydroseeding, direct drilling, drone seeding, or other methods that may be developed over time. While experimental methods will not replace traditional planting these are additionally included to test and measure the success of alternative methodologies within the particular environmental conditions of Macraes. Alternative methods may be considered as a tool for future planting projects and may be used as a supplementary tool to achieve higher densities of indigenous plants as part of the MP4 project.

5.2.4 Planting Season

The planting season generally runs from March to June and recommences in late August to September. This avoids the dry months of summer and the period most likely to have frozen ground and deep snow in winter. It is recommended that planting is only commenced when soil moisture levels have reached sufficient levels to support new planting, and as such, planting in March is conditional on weather conditions. Planting in early autumn is preferred to Spring, as drought conditions over summer may mean late-planted individuals have not had sufficient time to develop strong root systems. The preferred planting season is therefore from March (as deemed appropriate by a consulting planting expert) to early June (avoiding the winter period if the ground is frozen).

² Ecosourcing refers to the propagation of native plants from naturally occurring wild populations and the planting of the resulting plants back within the same geographic area.

5.3 Planting Completion Reporting

At the completion of the planting in each identified planting area, a planting completion report should be prepared by a suitably qualified ecologist, verifying that the planting has been completed in accordance with the detailed restoration planting plan for the area.

The planting completion report must provide details of the ecosourced seed collection locations and processes from the nursery provider, including, at a minimum, the date of collection and location. Keeping a record of seed collection ensures that, where stock has been unsuccessful, contingency measures such as altering seed collection location or propagation methodology can be undertaken.

5.4 Infill Planting

It is acknowledged that a degree of plant failure within the first few years following planting may be experienced due to the exposure of the sites and the scale of planting. To ensure that the planting meets modelled BOAM targets, each planting zone and stage will receive infill planting if required, with the total amount subject to the overall success of the various planting zones. The planting tables in Appendix A provide total numbers, including infill based on 80% initial survivorship, for cost estimate purposes.

5.5 Planting Staging

The large area of restoration planting across the two sites, and associated high numbers of required plants, will require the timed staging of planting to ensure that sufficient plant stock is available. The table below demonstrates the expected planting requirements at Mt Highlay and Cranky Jims Link per year, in order for restoration planting to keep pace with indicative losses. In general, approximately 16 ha per year is required at Mt Highlay, and 5 ha per year at Cranky Jims Link.

Table 8: Cumulative planting at Mt Highlay and Cranky Jims Link, based on planting

Mt. Highlay Tussock Planting: 175 ha			Cranky Jims Link Shrubland Planting: 50 ha		All Planting
Project Year Ending	Annual Tussock Planting per year (Ha)	Annual Cumulative Tussock Planting (Ha)	Total Area of Shrubland Planting per year (Ha)	Cumulative Shrubland Planting (Ha)	Total Area of Planting per year (Ha)
1	15.91	15.91	0	0	16
2	15.91	31.82	5	5	21
3	15.91	47.73	5	10	21
4	15.91	63.64	5	15	21
5	15.91	79.55	5	20	21
6	15.91	95.46	5	25	21
7	15.91	111.37	5	30	21
8	15.91	127.28	5	35	21
9	15.91	143.19	5	40	21
10	15.91	159.10	5	45	21
11	15.90	175.00	5	50	21

6 MAINTENANCE REQUIREMENTS

The maintenance section of this report details the required measures at both the planting and protected vegetation restoration sites. Maintenance, especially in consideration of the modelled planting outputs of the biodiversity offset accounting model (BOAM), is planned for a predicted outcome of planting to reach compensation targets at 20 years post-planting for Cranky Jims Link, and 15 years at Mt Highlay. As such, plant maintenance focuses on ensuring plant survivorship via replacement planting and weed control to suppress competition. A sample maintenance schedule has been provided in Table 9.

Maintenance activities include weed control, particularly of species likely to reinvade, such as elder, hawthorn, tutsan, and wilding pines. Weed control within planting areas has been described in section 4.1 of this Plan. Maintenance also includes replacement planting and fence maintenance to prevent stock incursion.

Maintenance reports should be provided at the end of each visit for each section of planting by the maintenance contractor. At a minimum, reports should provide notes on

- Plant health;
- Plant survivorship (and locations of significant failures via GPS);
- A list of pest plants, their location and their control methods;
- Pest animal damage; and
- Signs and locations of stock presence, including pugging, browsing, scat, or broken fencing and what repairs were completed.

Annual reports at the end of each year following planting in years 1-5 are also required and discussed in section 7.1.1.1 of this Plan.

Due to the large scale of the proposed planting, plant guards are not recommended. However, new plants are vulnerable to browsing pests while they establish. To prevent plant mortality, visual checks of all planting areas should be done every two months for the first six months after planting, where routine maintenance checks are not otherwise occurring, and four times per year after this for the first two years. All plants should be checked, but *Coprosma* and *Carmichaelia* species, as well as other palatable broadleaf species, must be particularly monitored, as plants in these genera are known to be susceptible to herbivory.

Should evidence of mammalian pest animal damage be seen (such as leaf or stem damage, ring-barking or chewed plants) on more than 10% of plants, this shall trigger immediate additional pest animal control. This must trigger fencing upgrades to wire mesh sheep netting if damage is caused by stock entering the planting area. Note that consideration for invertebrate herbivory should include if the plant is a host of a TAR invertebrate species and avoidance of control methods that may impact TAR invertebrates may be necessary. Consult with an invertebrate ecologist prior to control if necessary. If particular species are found to suffer high levels of damage or mortality, they must have plant guards, or cages, installed for protection and any dead plants must be replaced in the following planting season. Alternatively, suitable substitutes may be chosen in consultation with the project botanist. Photos of damage, with date and location included, notes on areas checked, plant condition and any responses to herbivory must be kept and included in monitoring reports.

Table 9: Table outlining maintenance requirements for the planting and restoration sites.

Planting Tasks - Year 1	Year prior to planting			Beginning of year following planting											
	prior to pla	February	March	April	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March
Initial pest plant control - general															
Spot spraying prior to planting															
Planting - (light green subject to suitable weather)															
Plant monitoring and maintenance															
Visual Planting Inspections for pest animals															
Planting Tasks - Year 2				April	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March
Infill Planting (if required)															
Plant monitoring and maintenance															
Visual Planting Inspections for pest animals															
Planting Tasks - Year 3-4				April	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March
Infill Planting (if required)															
Plant monitoring and maintenance															
Planting Tasks - Year 5				April	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March
Plant monitoring and maintenance															
Existing Vegetation Tasks - Year 1				April	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March
Weed control															
Existing Vegetation Tasks - Years 2-5				April	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	March
Weed control															

7 BIODIVERSITY OUTCOME MONITORING PLAN

Monitoring biodiversity compensation actions is critical to determining overall compensation success, and ultimately, whether a net positive outcome is achieved. Should compensation outcomes fall short of expected outcomes at any point in the monitoring process, then contingency actions are provided here to counterbalance potential shortfalls.

Compensation actions and outcomes will be measured annually for five years during planting establishment, and then once every five years in years 10 and 15 post-planting for Cranky Jims Link and Mt Highlay, as well as again in year 20 for Cranky Jims Link.

The purpose of the monitoring is to:

1. Track and verify that the stated outcomes are met for identified biodiversity attributes.
2. Provide feedback with recommendations for any additional management required to ensure the offset performs to targets.
3. Identify any requirements for contingency actions early, where any shortfalls could affect offset outcomes.
4. Provide a monitoring report, following each monitoring occasion, to demonstrate that the offset is developing as expected and is being appropriately managed and maintained.

Table 10: Indicative progressive monitoring targets (of values averaged across monitoring plots) for 175 ha tussock revegetation – Note: compensation success measured at 15 years. Targets prior to net positive outcome are indicative only and may prompt management response.

Tussock revegetation	5 years	10 years	15 years
Height (m)	0.3	0.5	1m
Indigenous cover (%)	10	30	45%
Proportion of indigenous species (%)	10	25	45%
Indigenous vascular richness (count)	5	6	6 spp
Vascular plant TAR species richness (count)	2	2	2 spp

Table 11: Monitoring targets for 50 ha dry shrubland revegetation – Note: compensation success measured at 20 years. Targets prior to net positive outcome are indicative only and may prompt management response.

Dry shrubland revegetation	5 years	10 years	15 years	20 years
Height (m)	0.3	0.5	1	1.5
Indigenous cover (%)	0.5	5	10	20%
Proportion of Indigenous Species (%)	5	7	8	10%
Indigenous vascular richness (count)	9	9	9	9 spp
Vascular plant TAR species richness	1	1	2	3 spp
Indigenous shrubland bird diversity	1	1	3	4 spp

The following provides further details relating to monitoring targets identified in Table 10 and Table 11 above:

- Height: Maximum height within each plot to be recorded and mean calculated for all plots within a site
- Indigenous cover: Measured as a percentage of plot cover and median calculated for all plots within a site
- Proportion of indigenous species: Of the species recorded, the percentage that are indigenous, mean for all plots within a site
- Indigenous vascular count richness: Total number of indigenous species within the plot, median for all plots within a site
- TAR species richness count: Total number of threatened or at-risk indigenous species within the plot, median for all plots within a site
- Shrubland bird diversity: Calculated via five-minute bird counts (5MBC) at each site

7.1 Monitoring Methods

Establishment monitoring will be undertaken annually for the first five years for revegetation planting, followed by five-yearly monitoring thereafter. A detailed compensation report will be prepared at Years 5, 10, and 15 for Cranky Jims Link and Mt Highlay, and year 20 for Cranky Jims only, assessing the progress of the revegetation planting against the biodiversity compensation targets and BOAMs. These reports must identify any major contingencies that need to be implemented, such as remodelling of any biodiversity attributes in response to actual results or adjustment of timescales and adaptive management.

The required annual and subsequent five-year monitoring periods are to commence following the planting of each section/stage or type (pioneer or enrichment) of planting.

A sample monitoring schedule for a single planting stage is provided in the table below. Note that each year commences following completion of planting, and as such, “years” will begin from the month planting was completed in.

Table 12: Outline of reporting requirements across the 15/20-year monitoring period for a single planting stage (noting that monitoring requirements start at 1 for the addition of each new planting stage). Annual reports are due at the end of each year, with year 1 commencing from the date of planting (i.e., completing during the following winter planting season). Multiple reports for any one year can be combined into one report.

Year	1	2	3	4	5	10	15		20
Planting Completion Report <i>See section 5.3 for details</i> To be completed by a suitably qualified ecologist	Within 30 days following planting completion								
Maintenance Monitoring Requirements <i>See section 6 and 7 for details</i> To be completed by the maintenance contractor	Three visits (November, January, March)	Three visits (October, January, March)	Three visits (October, January, March)	Three visits (October, January, March)	Two visits (October, March)		Ongoing maintenance and monitoring requirements subject to needs (informed by Section 6 'Maintenance Requirements' and Section 7 'Adaptive Management')		
Annual Planting Reports <i>See section 7.1.1.1 for details</i> To be completed by a suitably qualified ecologist	Single visit at the end of the year following planting	Single visit at the end of the year following planting	Single visit at the end of the year following planting	Single visit at the end of the year following planting					
Five-Year Establishment and Compensation Report <i>See section 7.1.1.2 for details</i> To be completed by a suitably qualified ecologist					Single visit at the end of the year following planting				
5-Yearly Compensation Reports <i>See section 7.1.2 for details</i> To be completed by a suitably qualified ecologist						Single visit at the end of the year	Single visit at the end of the year		Single visit at the end of the year (Cranky Jims Link only)

7.1.1 Monitoring of Establishment Phase: Years 1-5

7.1.1.1 Annual Monitoring

Annual monitoring in the first five years for each planting area should include the following assessment parameters at a minimum:

- Plant survival and growth
- Note of specific species or areas that are performing poorly
- Weed presence and the effectiveness of pest plant control
- Indications and locations of pest animal presence (scat, browsing)
- Indigenous vegetation coverage
- Indications and locations of stock presence (pugging, widespread browsing, damaged fencing)

Annual monitoring should be conducted by a suitably qualified ecologist, independently of the routine maintenance monitoring (which is undertaken by the plant maintenance contractor). Drone monitoring may be trailed as a monitoring method, but this must not replace ground-truthed checks by a suitably experienced person.

7.1.1.2 Five-Year Establishment and Compensation Report

After year five following planting, detailed compensation reporting is required. To provide information relating to the success outcomes identified in Table 10 and Table 11, 10m x 10m permanent plots must be established in each revegetation area, consisting of at least one plot per 5 ha of planting or protected vegetation. Measures to be reported include:

- Height of the vegetation (m)
- Indigenous vascular plant richness (count)
- Vascular plant TAR species richness (count)
- Proportion of indigenous species (%)
- Indigenous vegetation cover (%) – to be measured as per cent ground coverage
- Indigenous shrubland bird diversity (for dry shrubland planting at Cranky Jims Link only)

The location of these plots should be clearly marked on-site with permanent waratahs, as well as with GPS co-ordinates to accurately revisit plots in subsequent monitoring years, given that the monitoring interval is once every five years.

The location of plots will be proportionate to the type of planting and spread throughout the restoration sites. For **Mt Highlay**, as 15 ha of the 175 ha total is within the rock outcrop 5m buffer planting zone, approximately 10% of the plots should fall within these planting zones.

At **Cranky Jims Link**, monitoring will also include five-minute bird counts at each plot (for methodology, see Hartley and Greene 2012). Further details are provided in the Avifauna Management and Monitoring Plan (Bioresearches, 2026k)

An Establishment and Compensation Report is to be prepared, setting out both the requirements of the annual monitoring report (see section 7.1.1.1 above), as well as the results of the compensation

monitoring plot measurements at year five, and assessing whether the revegetation is meeting the modelled targets in Table 10 and Table 11. Any major adaptive management actions, contingencies or adjustments to the model should be identified at this time and appropriate action taken (see section 7.2).

Photo point sites should be established within each plot, and the first photos should be taken at year 5.

7.1.2 Compensation Reporting (Years 10, 15, 20)

The 10 x 10m permanent plots and associated reporting are outlined in section 7.1.1.2, and will be repeated at years 10, 15, and 20 (for Cranky Jims Link only) at five-yearly intervals. Mt Highlay is modelled to reach the BOAM targets at year 15, and as such, monitoring is not required in year 20. Drone data should be repeated to capture the coverage of indigenous vegetation throughout planting sites.

Data collection must include those from Table 10 and Table 11, as well as the collection of photo points.

The 10-, 15- and 20-year reports must detail whether the modelled targets of the BOAMs have been reached, and where targets have not been reached, whether further biodiversity compensation actions are required to ensure a net positive biodiversity outcome and the success of the model.

As of year five, these reports should identify any major shortcomings of the planting and restoration sites, and where required, outline the recommended adaptive management measures (section 7.2).

7.2 Adaptive Management

The purpose of routine maintenance during the first one to five years of planting is to ensure that planting progresses appropriately towards the modelled targets of the compensation package at years 15 (Mt Highlay) or 20 (Cranky Jims Link). The monitoring reports provided at the end of each maintenance period, as well as the independent annual planting reports, are therefore critical in ensuring adaptive management is undertaken as soon as required. Adaptive management includes replacement planting, weed control, and pest animal control, as well as identifying other factors on-site which may be hindering restoration efforts (such as damage to fencing, drought, poor take of certain seed stock).

7.2.1 Replacement Planting

Replacing any areas of planting that has not survived will be critical to ensure that modelled BOAM targets are met (Table 10 and Table 11).

Where plants continue to fail, either by location, species or seed stock, contingency actions may include:

- Making suitable species substitutions in consultation with the project botanist and local plant nursery, based on on-site conditions.
- Altering the location of seed collection for future plantings.
- Ensuring planting is undertaken early in the season if drought is impacting survivorship over summer (i.e., not planting in September).
- Undertaking hydroseeding where trials have proven successful for infill planting.

7.2.2 Weed Control

Where weeds are causing significant loss in indigenous plantings, follow-up controls at a higher frequency than those identified in Table 9 may be required. Alteration of methodology may need to be considered in consultation with the project ecologist and plant maintenance contractor.

7.2.3 Pest Animal Control

Where pest animals are identified as having major impacts on restoration planting (the loss of 10% or more of any planting area or individual species), additional pest animal control measures may be required. Rabbits are expected to be the primary pest likely to damage plantings. Where rabbit or other pest animal damage is occurring, contingency actions may include the use of plant guards/cages on particularly sensitive plant species, or additional rabbit shooting or baiting programmes during the early stages of plant establishment. Fencing should also be inspected at each visit and repaired where any broken or damaged areas or evidence of stock incursions are found, to prevent damage to restoration areas by stock.

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Appendix A Calculation of Plant numbers for Cranky Jims Link and Mt Highlay

Plant numbers were calculated according to the area of ground each species is expected to occupy when viewed from above at the target assessment year. Each plant was represented as a circle using its indicative crown diameter.

The area occupied by one plant was calculated as:

$$\text{Plant footprint} = \pi \times \left(\frac{\text{diameter}}{2} \right)^2$$

The required number of each species was then calculated by dividing its allocated target-cover area by the footprint of one plant:

$$\text{Number of plants} = \frac{\text{Total planting area} \times \text{species target cover percentage}}{\pi \times (\text{diameter}/2)^2}$$

The species target-cover percentages collectively equal the overall cover target. For example, where the overall target is 45%, the individual species allocations collectively total 45% of the planting area.

Plant numbers represent the quantity initially required to achieve the target cover, assuming the plants survive and reach their indicative crown diameters. A separate 25% replacement allowance (i.e. 80% survival) has been included for costing purposes. Replacement planting will be undertaken where monitoring identifies mortality or failure.

Appendix B MP4 Overview

